



University of Southern Maine

Portland, Maine

Project Manual

Toilet Room Fit Out

Science Building

USM Project # 2012-066

Owner:

University of Maine System
for the University of Southern Maine
P. O. Box 9300
Portland, ME 04104-9300

Architect/Engineer:

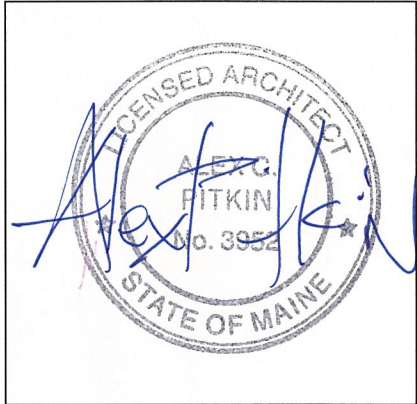
Symmes Maini & McKee Associates, Inc./SMMA
1000 Massachusetts Avenue
Cambridge, Massachusetts 02138

SMMA 11082.04

OCTOBER 10, 2013

Project and Campus

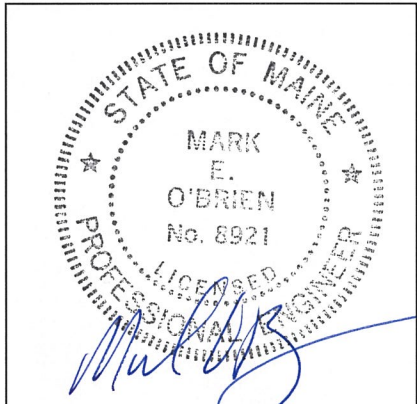
Professional Seal Page



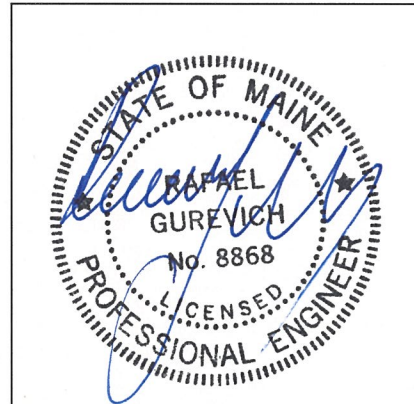
Architecture



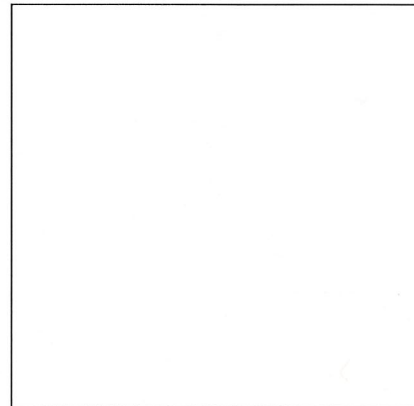
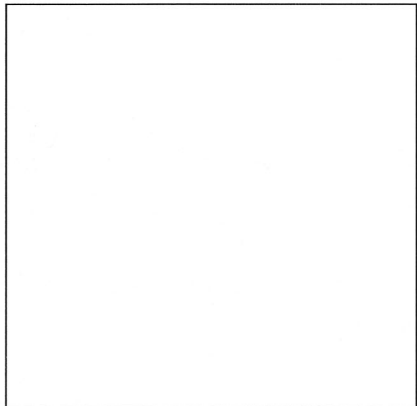
Plumbing



Mechanical



Electrical



UNIVERSITY OF SOUTHERN MAINE, PORTLAND CAMPUS
TOILET ROOM FIT-OUT

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University of Maine
University of Southern Maine, Portland Campus

Toilet Room Fit-Out

List of Drawings

Sheet Number

Sheet Title

***SEE DRAWING COVER SHEET FOR LIST OF DRAWINGS
AND ISSUE DATES**

00 11 13
NOTICE TO CONTRACTORS AND SUBCONTRACTORS
REQUEST FOR BIDS
(Advertisement)

Sealed Bids in envelopes plainly marked for: BIOSCIENCE TOILET ROOM FITOUT PROJECT 2012-066, addressed to:

University of Southern Maine
c/o Robert W. Bertram
Executive Director of Facilities Management
25 Bedford St., Portland, ME 04104

Will be received until 1:00 PM TUESDAY OCTOBER 29, 2013 at which time they will be opened and read aloud.

Sealed bids may also be hand delivered to 25 Bedford St., Portland, ME on the University of Southern Maine campus. Proposals received after the stated time will not be considered and will be returned unopened.

Sealed bids may be hand delivered to Facilities Management, 25 Bedford St., Portland, ME.

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: Fitout of Men's and Women's Rooms and Custodial Closets on 2nd, 3rd and 5th floors of Bioscience Research, approximately 465 square feet per floor.

A mandatory pre-bid meeting and building walk-through will be held at 10:00 AM Thursday, October 17, 2013 at 25 Bedford St., Portland, ME. Bidding Contractors must attend for their bids to be considered, and subcontractors are strongly encouraged to attend. No other tours will be given.

Copies of the Plan and Specifications may be obtained by prospective bidders at cost from:

Xpress Copy, 100 Fore Street, Portland, ME 04101, 207 775-2444, <http://www.xpressplanroom.com/>.

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 St., Portland, ME

University of Maine System, Office of Facilities, 16 Central Street, Bangor, ME 04401, Tel. (207)973-3334

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
for

The University of Maine System Board of Trustees

00 11 13.10

NOTICE TO CONTRACTORS AND SUBCONTRACTORS
REQUEST FOR BIDS
(Advertisement)

The University of Southern Maine is seeking bids for the following construction project:

Bioscience Toilet Room Fitout Project #2012-066

Project Summary: Fitout of Men's & Women's rooms and Custodial Closets on 2nd, 3rd, and 5th floors of Bioscience. Approx. 465 sf per floor.

Bids will be received until 1:00 PM Tuesday, October 29, 2013 at 25 Bedford St., Portland, ME, at which time and place the Bids will be opened and read aloud.

A mandatory Pre-Bid meeting will be held at 10:00 AM Thursday, October 17, 2013 at 25 Bedford St., Portland, ME.

Additional information may be obtained at:

<http://www.usm.maine.edu/facilities/current-projects> Bioscience Toilet Room Fitout

UNIVERSITY OF MAINE SYSTEM
Robert W. Bertram for Board of Trustees

SECTION 00 21 13
Instructions 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.

Bid Form

BIDDER: _____

University of Maine, **UNIVERSITY OF SOUTHERN MAINE**
c/o **Robert W. Bertram, Executive Director of Facilities Management**
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 **BIO SCIENCE TOILET ROOM FIT-UP**, 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 (\$_____).

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 _____
ADDENDUM # _____ DATED _____ ADDENDUM # _____ DATED _____
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 **March 31, 2014.** 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.

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 _____ a certain proposal, attached hereto and hereby made a part hereof, to enter into a contract in writing for the _____.

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.

*** Date ***

*** Contractor ***

*** Address ***

*** City, State Zip ***

RE: Notice of Award - **Bio-Science Toilet Room Fit-Out**

Dear *** Contractor Name ***:

You are hereby notified that the *** Campus *** acting on behalf of the University of Maine System accepts your Bid of ***\$ Total Amount including as statement as to any alternates that are included *** for the above named project, subject to final resolution of any bid protests and the parties' ability to establish and confirm final terms, as well as the execution of a written contract and your furnishing satisfactory bonds within twelve (12) calendar days as provided in the bidding documents.

This Notice of Award will permit you to proceed with the ordering of materials and scheduling the work so that the project can be completed on time. Should you fail to execute a contract or furnish satisfactory bonds within the stipulated time; the bid bond accompanying your proposal will be forfeited to the University of Maine System as liquidated damages.

Enclosed are three (3) originals of your contract agreement for signature. Further, please have your surety provide three (3) originals of the Performance Bond and the Payment Bond, as prescribed in Sections 00 61 13.13 and 00 61 13.16 of the bid document, and a properly executed "Power of Attorney." Please advise your surety agent that the bonds should carry the same date as this Notice of Award and the Contract Agreement. All copies of the signed contract, bonds and insurance certificates should be forwarded directly to this office. Once they are completely signed, a bound copy of the contract will be returned for your use.

Prior to your starting any work on the construction site, this office must receive Certificates of Liability Insurance as specified in Section Article 11 of AIA Document A201 – 2007 General Conditions of the Contract for Construction and Section 00 73 00.01 University of Maine System Supplemental Conditions. Please advise your surety that the certificate holder should be as follows: University of Maine System, 16 Central Street, Bangor, Maine 04401.

The day-to-day administrative and technical details of this project will be administered by the Project Manager. The Project Manager for this project is *** Project Manager's Name ***. All correspondence relative to the day-to-day administration of the project should be directed to *** Address ***.

A pre-construction conference on this project will be scheduled as soon as possible. This conference must be attended by your firm's authorized representative, as well as by your project superintendent.

Sincerely yours,

*** Chief Financial Officer Name ***

Chief Financial Officer

Enclosures

cc: UM System Office

UNIVERSITY OF MAINE SYSTEM
Construction Contract Agreement

THIS AGREEMENT is made and entered into the _____ day of _____ 20____, by and between the Contractor _____ and the University of Maine System acting by and through the University of _____.

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 _____, prepared _____ 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 or the following date _____ and shall be substantially completed on or before _____ 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) _____ Alternate (4) _____

Unit Prices

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 execution of this agreement, consist of:

.1 This agreement.

.2 AIA Document A201-2007, General Conditions of the Contract for Construction, as modified by

.3 The Specifications as outlined in the Project Manual (_____).

.4 The Drawings as listed in the Project Manual.

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

Addenda No. 1 _____

Addenda No. 2 _____

.6 Other documents if any (List any other documents that are intended to be part of the Contract)

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 Carol Potter

The Owner and the 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 Maine System for the
University of Southern Maine.

By: _____
Title

Witness

Witness

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****

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_____.

WITNESS:

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****


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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Does this policy include coverage for:			
a. Premises - Operations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Explosion, Collapse and Underground Hazards?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Personal Injury Coverage?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Products Coverage?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Completed Operations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Contractual Coverage for the Insured's obligations in A201?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
E. Other Provisions			

 Authorized Representative

 Date of Issue

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 <input type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS MADE <input type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC				EACH OCCURRENCE \$ FIRE DAMAGE (Any one fire) \$ MED EXP (Any one person) \$ PERSONAL & ADV INJURY \$ GENERAL AGGREGATE \$ PRODUCTS - COMP/OP AGG \$																
	AUTOMOBILE LIABILITY <input type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> HIRED AUTOS <input type="checkbox"/> NON-OWNED AUTOS				COMBINED SINGLE LIMIT (Ea accident) \$ BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$																
	GARAGE LIABILITY <input type="checkbox"/> ANY AUTO				AUTO ONLY - EA ACCIDENT \$ OTHER THAN EA ACC \$ AUTO ONLY: AGG \$																
	EXCESS LIABILITY <input type="checkbox"/> OCCUR <input type="checkbox"/> CLAIMS MADE <input type="checkbox"/> DEDUCTIBLE <input type="checkbox"/> RETENTION \$				EACH OCCURRENCE \$ AGGREGATE \$ \$ \$ \$																
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY				<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:10%;"></td> <td style="width:10%;">WC STATU-TORY LIMITS</td> <td style="width:10%;">OTH-ER</td> <td style="width:10%;"></td> </tr> <tr> <td></td> <td>E.L. EACH ACCIDENT</td> <td></td> <td>\$</td> </tr> <tr> <td></td> <td>E.L. DISEASE - EA EMPLOYEE</td> <td></td> <td>\$</td> </tr> <tr> <td></td> <td>E.L. DISEASE - POLICY LIMIT</td> <td></td> <td>\$</td> </tr> </table>		WC STATU-TORY LIMITS	OTH-ER			E.L. EACH ACCIDENT		\$		E.L. DISEASE - EA EMPLOYEE		\$		E.L. DISEASE - POLICY LIMIT		\$
	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.

Sample

COMMERCIAL GENERAL LIABILITY COVERAGE FORM

Various provisions in this policy restrict coverage. Read the entire policy carefully to determine rights, duties and what is and is not covered.

Throughout this policy the words "you" and "your" refer to the Named Insured shown in the Declarations, and any other person or organization qualifying as a Named Insured under this policy. The words "we", "us" and "our" refer to the company providing this insurance.

The word "insured" means any person or organization qualifying as such under Section II – Who Is An Insured.

Other words and phrases that appear in quotation marks have special meaning. Refer to Section V – Definitions.

SECTION I – COVERAGES

COVERAGE A BODILY INJURY AND PROPERTY DAMAGE LIABILITY

1. Insuring Agreement

a. We will pay those sums that the insured becomes legally obligated to pay as damages because of "bodily injury" or "property damage" to which this insurance applies. We will have the right and duty to defend the insured against any "suit" seeking those damages. However, we will have no duty to defend the insured against any "suit" seeking damages for "bodily injury" or "property damage" to which this insurance does not apply. We may, at our discretion, investigate any "occurrence" and settle any claim or "suit" that may result. But:

- (1) The amount we will pay for damages is limited as described in Section III – Limits Of Insurance; and
- (2) Our right and duty to defend ends when we have used up the applicable limit of insurance in the payment of judgments or settlements under Coverages A or B or medical expenses under Coverage C.

No other obligation or liability to pay sums or perform acts or services is covered unless explicitly provided for under Supplementary Payments – Coverages A and B.

b. This insurance applies to "bodily injury" and "property damage" only if:

- (1) The "bodily injury" or "property damage" is caused by an "occurrence" that takes place in the "coverage territory";
- (2) The "bodily injury" or "property damage" occurs during the policy period; and
- (3) Prior to the policy period, no insured listed under Paragraph 1. of Section II – Who Is An Insured and no "employee" authorized by you to give or receive notice of an "occurrence" or claim, knew that the "bodily injury" or "property damage" had occurred, in whole or in part. If such a listed insured or authorized "employee" knew, prior to the policy period, that the "bodily injury" or "property damage" occurred, then any continuation, change or resumption of such "bodily injury" or "property damage" during or after the policy period will be deemed to have been known prior to the policy period.

c. "Bodily injury" or "property damage" which occurs during the policy period and was not, prior to the policy period, known to have occurred by any insured listed under Paragraph 1. of Section II – Who Is An Insured or any "employee" authorized by you to give or receive notice of an "occurrence" or claim, includes any continuation, change or resumption of that "bodily injury" or "property damage" after the end of the policy period.

d. "Bodily injury" or "property damage" will be deemed to have been known to have occurred at the earliest time when any insured listed under Paragraph 1. of Section II – Who Is An Insured or any "employee" authorized by you to give or receive notice of an "occurrence" or claim:

- (1) Reports all, or any part, of the "bodily injury" or "property damage" to us or any other insurer;
- (2) Receives a written or verbal demand or claim for damages because of the "bodily injury" or "property damage"; or
- (3) Becomes aware by any other means that "bodily injury" or "property damage" has occurred or has begun to occur.

- e. Damages because of "bodily injury" include damages claimed by any person or organization for care, loss of services or death resulting at any time from the "bodily injury".

2. Exclusions

This insurance does not apply to:

a. Expected Or Intended Injury

"Bodily injury" or "property damage" expected or intended from the standpoint of the insured. This exclusion does not apply to "bodily injury" resulting from the use of reasonable force to protect persons or property.

b. Contractual Liability

"Bodily injury" or "property damage" for which the insured is obligated to pay damages by reason of the assumption of liability in a contract or agreement. This exclusion does not apply to liability for damages:

- (1) That the insured would have in the absence of the contract or agreement; or
- (2) Assumed in a contract or agreement that is an "insured contract", provided the "bodily injury" or "property damage" occurs subsequent to the execution of the contract or agreement. Solely for the purposes of liability assumed in an "insured contract", reasonable attorney fees and necessary litigation expenses incurred by or for a party other than an insured are deemed to be damages because of "bodily injury" or "property damage", provided:
 - (a) Liability to such party for, or for the cost of, that party's defense has also been assumed in the same "insured contract"; and
 - (b) Such attorney fees and litigation expenses are for defense of that party against a civil or alternative dispute resolution proceeding in which damages to which this insurance applies are alleged.

c. Liquor Liability

"Bodily injury" or "property damage" for which any insured may be held liable by reason of:

- (1) Causing or contributing to the intoxication of any person;
- (2) The furnishing of alcoholic beverages to a person under the legal drinking age or under the influence of alcohol; or
- (3) Any statute, ordinance or regulation relating to the sale, gift, distribution or use of alcoholic beverages.

This exclusion applies only if you are in the business of manufacturing, distributing, selling, serving or furnishing alcoholic beverages.

d. Workers' Compensation And Similar Laws

Any obligation of the insured under a workers' compensation, disability benefits or unemployment compensation law or any similar law.

e. Employer's Liability

"Bodily injury" to:

- (1) An "employee" of the insured arising out of and in the course of:
 - (a) Employment by the insured; or
 - (b) Performing duties related to the conduct of the insured's business; or
- (2) The spouse, child, parent, brother or sister of that "employee" as a consequence of Paragraph (1) above.

This exclusion applies:

- (1) Whether the insured may be liable as an employer or in any other capacity; and
- (2) To any obligation to share damages with or repay someone else who must pay damages because of the injury.

This exclusion does not apply to liability assumed by the insured under an "insured contract".

f. Pollution

- (1) "Bodily injury" or "property damage" arising out of the actual, alleged or threatened discharge, dispersal, seepage, migration, release or escape of "pollutants":
- (a) At or from any premises, site or location which is or was at any time owned or occupied by, or rented or loaned to, any insured. However, this subparagraph does not apply to:
 - (i) "Bodily injury" if sustained within a building and caused by smoke, fumes, vapor or soot produced by or originating from equipment that is used to heat, cool or dehumidify the building, or equipment that is used to heat water for personal use, by the building's occupants or their guests;
 - (ii) "Bodily injury" or "property damage" for which you may be held liable, if you are a contractor and the owner or lessee of such premises, site or location has been added to your policy as an additional insured with respect to your ongoing operations performed for that additional insured at that premises, site or location and such premises, site or location is not and never was owned or occupied by, or rented or loaned to, any insured, other than that additional insured; or
 - (iii) "Bodily injury" or "property damage" arising out of heat, smoke or fumes from a "hostile fire";
 - (b) At or from any premises, site or location which is or was at any time used by or for any insured or others for the handling, storage, disposal, processing or treatment of waste;
 - (c) Which are or were at any time transported, handled, stored, treated, disposed of, or processed as waste by or for:
 - (i) Any insured; or
 - (ii) Any person or organization for whom you may be legally responsible; or
 - (d) At or from any premises, site or location on which any insured or any contractors or subcontractors working directly or indirectly on any insured's behalf are performing operations if the "pollutants" are brought on or to the premises, site or location in connection with such operations by such insured, contractor or subcontractor. However, this subparagraph does not apply to:
 - (i) "Bodily injury" or "property damage" arising out of the escape of fuels, lubricants or other operating fluids which are needed to perform the normal electrical, hydraulic or mechanical functions necessary for the operation of "mobile equipment" or its parts, if such fuels, lubricants or other operating fluids escape from a vehicle part designed to hold, store or receive them. This exception does not apply if the "bodily injury" or "property damage" arises out of the intentional discharge, dispersal or release of the fuels, lubricants or other operating fluids, or if such fuels, lubricants or other operating fluids are brought on or to the premises, site or location with the intent that they be discharged, dispersed or released as part of the operations being performed by such insured, contractor or subcontractor;
 - (ii) "Bodily injury" or "property damage" sustained within a building and caused by the release of gases, fumes or vapors from materials brought into that building in connection with operations being performed by you or on your behalf by a contractor or subcontractor; or
 - (iii) "Bodily injury" or "property damage" arising out of heat, smoke or fumes from a "hostile fire".
 - (e) At or from any premises, site or location on which any insured or any contractors or subcontractors working directly or indirectly on any insured's behalf are performing operations if the operations are to test for, monitor, clean up, remove, contain, treat, detoxify or neutralize, or in any way respond to, or assess the effects of, "pollutants".

(2) Any loss, cost or expense arising out of any:

- (a)** Request, demand, order or statutory or regulatory requirement that any insured or others test for, monitor, clean up, remove, contain, treat, detoxify or neutralize, or in any way respond to, or assess the effects of, "pollutants"; or
- (b)** Claim or "suit" by or on behalf of a governmental authority for damages because of testing for, monitoring, cleaning up, removing, containing, treating, detoxifying or neutralizing, or in any way responding to, or assessing the effects of, "pollutants".

However, this paragraph does not apply to liability for damages because of "property damage" that the insured would have in the absence of such request, demand, order or statutory or regulatory requirement, or such claim or "suit" by or on behalf of a governmental authority.

g. Aircraft, Auto Or Watercraft

"Bodily injury" or "property damage" arising out of the ownership, maintenance, use or entrustment to others of any aircraft, "auto" or watercraft owned or operated by or rented or loaned to any insured. Use includes operation and "loading or unloading".

This exclusion applies even if the claims against any insured allege negligence or other wrongdoing in the supervision, hiring, employment, training or monitoring of others by that insured, if the "occurrence" which caused the "bodily injury" or "property damage" involved the ownership, maintenance, use or entrustment to others of any aircraft, "auto" or watercraft that is owned or operated by or rented or loaned to any insured.

This exclusion does not apply to:

- (1)** A watercraft while ashore on premises you own or rent;
- (2)** A watercraft you do not own that is:
 - (a)** Less than 26 feet long; and
 - (b)** Not being used to carry persons or property for a charge;
- (3)** Parking an "auto" on, or on the ways next to, premises you own or rent, provided the "auto" is not owned by or rented or loaned to you or the insured;
- (4)** Liability assumed under any "insured contract" for the ownership, maintenance or use of aircraft or watercraft; or

(5) "Bodily injury" or "property damage" arising out of:

- (a)** The operation of machinery or equipment that is attached to, or part of, a land vehicle that would qualify under the definition of "mobile equipment" if it were not subject to a compulsory or financial responsibility law or other motor vehicle insurance law in the state where it is licensed or principally garaged; or
- (b)** the operation of any of the machinery or equipment listed in Paragraph **f.(2)** or **f.(3)** of the definition of "mobile equipment".

h. Mobile Equipment

"Bodily injury" or "property damage" arising out of:

- (1)** The transportation of "mobile equipment" by an "auto" owned or operated by or rented or loaned to any insured; or
- (2)** The use of "mobile equipment" in, or while in practice for, or while being prepared for, any prearranged racing, speed, demolition, or stunting activity.

i. War

"Bodily injury" or "property damage", however caused, arising, directly or indirectly, out of:

- (1)** War, including undeclared or civil war;
- (2)** Warlike action by a military force, including action in hindering or defending against an actual or expected attack, by any government, sovereign or other authority using military personnel or other agents; or
- (3)** Insurrection, rebellion, revolution, usurped power, or action taken by governmental authority in hindering or defending against any of these.

j. Damage To Property

"Property damage" to:

- (1)** Property you own, rent, or occupy, including any costs or expenses incurred by you, or any other person, organization or entity, for repair, replacement, enhancement, restoration or maintenance of such property for any reason, including prevention of injury to a person or damage to another's property;
- (2)** Premises you sell, give away or abandon, if the "property damage" arises out of any part of those premises;
- (3)** Property loaned to you;
- (4)** Personal property in the care, custody or control of the insured;

- (5) That particular part of real property on which you or any contractors or subcontractors working directly or indirectly on your behalf are performing operations, if the "property damage" arises out of those operations; or
- (6) That particular part of any property that must be restored, repaired or replaced because "your work" was incorrectly performed on it.

Paragraphs (1), (3) and (4) of this exclusion do not apply to "property damage" (other than damage by fire) to premises, including the contents of such premises, rented to you for a period of 7 or fewer consecutive days. A separate limit of insurance applies to Damage To Premises Rented To You as described in Section III – Limits Of Insurance.

Paragraph (2) of this exclusion does not apply if the premises are "your work" and were never occupied, rented or held for rental by you.

Paragraphs (3), (4), (5) and (6) of this exclusion do not apply to liability assumed under a side-track agreement.

Paragraph (6) of this exclusion does not apply to "property damage" included in the "products-completed operations hazard".

k. Damage To Your Product

"Property damage" to "your product" arising out of it or any part of it.

l. Damage To Your Work

"Property damage" to "your work" arising out of it or any part of it and included in the "products-completed operations hazard".

This exclusion does not apply if the damaged work or the work out of which the damage arises was performed on your behalf by a subcontractor.

m. Damage To Impaired Property Or Property Not Physically Injured

"Property damage" to "impaired property" or property that has not been physically injured, arising out of:

- (1) A defect, deficiency, inadequacy or dangerous condition in "your product" or "your work"; or
- (2) A delay or failure by you or anyone acting on your behalf to perform a contract or agreement in accordance with its terms.

This exclusion does not apply to the loss of use of other property arising out of sudden and accidental physical injury to "your product" or "your work" after it has been put to its intended use.

n. Recall Of Products, Work Or Impaired Property

Damages claimed for any loss, cost or expense incurred by you or others for the loss of use, withdrawal, recall, inspection, repair, replacement, adjustment, removal or disposal of:

- (1) "Your product";
- (2) "Your work"; or
- (3) "Impaired property";

if such product, work, or property is withdrawn or recalled from the market or from use by any person or organization because of a known or suspected defect, deficiency, inadequacy or dangerous condition in it.

o. Personal And Advertising Injury

"Bodily injury" arising out of "personal and advertising injury".

p. Electronic Data

Damages arising out of the loss of, loss of use of, damage to, corruption of, inability to access, or inability to manipulate electronic data.

As used in this exclusion, electronic data means information, facts or programs stored as or on, created or used on, or transmitted to or from computer software, including systems and applications software, hard or floppy disks, CD-ROMS, tapes, drives, cells, data processing devices or any other media which are used with electronically controlled equipment.

Exclusions c. through n. do not apply to damage by fire to premises while rented to you or temporarily occupied by you with permission of the owner. A separate limit of insurance applies to this coverage as described in Section III – Limits Of Insurance.

COVERAGE B PERSONAL AND ADVERTISING INJURY LIABILITY

1. Insuring Agreement

- a. We will pay those sums that the insured becomes legally obligated to pay as damages because of "personal and advertising injury" to which this insurance applies. We will have the right and duty to defend the insured against any "suit" seeking those damages. However, we will have no duty to defend the insured against any "suit" seeking damages for "personal and advertising injury" to which this insurance does not apply. We may, at our discretion, investigate any offense and settle any claim or "suit" that may result. But:

- (1) The amount we will pay for damages is limited as described in Section III – Limits Of Insurance; and

- (2) Our right and duty to defend end when we have used up the applicable limit of insurance in the payment of judgments or settlements under Coverages **A** or **B** or medical expenses under Coverage **C**.

No other obligation or liability to pay sums or perform acts or services is covered unless explicitly provided for under Supplementary Payments – Coverages **A** and **B**.

- b. This insurance applies to "personal and advertising injury" caused by an offense arising out of your business but only if the offense was committed in the "coverage territory" during the policy period.

2. Exclusions

This insurance does not apply to:

a. Knowing Violation Of Rights Of Another

"Personal and advertising injury" caused by or at the direction of the insured with the knowledge that the act would violate the rights of another and would inflict "personal and advertising injury".

b. Material Published With Knowledge Of Falsity

"Personal and advertising injury" arising out of oral or written publication of material, if done by or at the direction of the insured with knowledge of its falsity.

c. Material Published Prior To Policy Period

"Personal and advertising injury" arising out of oral or written publication of material whose first publication took place before the beginning of the policy period.

d. Criminal Acts

"Personal and advertising injury" arising out of a criminal act committed by or at the direction of the insured.

e. Contractual Liability

"Personal and advertising injury" for which the insured has assumed liability in a contract or agreement. This exclusion does not apply to liability for damages that the insured would have in the absence of the contract or agreement.

f. Breach Of Contract

"Personal and advertising injury" arising out of a breach of contract, except an implied contract to use another's advertising idea in your "advertisement".

g. Quality Or Performance Of Goods – Failure To Conform To Statements

"Personal and advertising injury" arising out of the failure of goods, products or services to conform with any statement of quality or performance made in your "advertisement".

h. Wrong Description Of Prices

"Personal and advertising injury" arising out of the wrong description of the price of goods, products or services stated in your "advertisement".

i. Infringement Of Copyright, Patent, Trademark Or Trade Secret

"Personal and advertising injury" arising out of the infringement of copyright, patent, trademark, trade secret or other intellectual property rights.

However, this exclusion does not apply to infringement, in your "advertisement", of copyright, trade dress or slogan.

j. Insureds In Media And Internet Type Businesses

"Personal and advertising injury" committed by an insured whose business is:

- (1) Advertising, broadcasting, publishing or telecasting;
- (2) Designing or determining content of websites for others; or
- (3) An Internet search, access, content or service provider.

However, this exclusion does not apply to Paragraphs **14.a.**, **b.** and **c.** of "personal and advertising injury" under the Definitions Section.

For the purposes of this exclusion, the placing of frames, borders or links, or advertising, for you or others anywhere on the Internet, is not by itself, considered the business of advertising, broadcasting, publishing or telecasting.

k. Electronic Chatrooms Or Bulletin Boards

"Personal and advertising injury" arising out of an electronic chatroom or bulletin board the insured hosts, owns, or over which the insured exercises control.

l. Unauthorized Use Of Another's Name Or Product

"Personal and advertising injury" arising out of the unauthorized use of another's name or product in your e-mail address, domain name or metatag, or any other similar tactics to mislead another's potential customers.

m. Pollution

"Personal and advertising injury" arising out of the actual, alleged or threatened discharge, dispersal, seepage, migration, release or escape of "pollutants" at any time.

n. Pollution-Related

Any loss, cost or expense arising out of any:

- (1) Request, demand, order or statutory or regulatory requirement that any insured or others test for, monitor, clean up, remove, contain, treat, detoxify or neutralize, or in any way respond to, or assess the effects of, "pollutants"; or
- (2) Claim or suit by or on behalf of a governmental authority for damages because of testing for, monitoring, cleaning up, removing, containing, treating, detoxifying or neutralizing, or in any way responding to, or assessing the effects of, "pollutants".

o. War

"Personal and advertising injury", however caused, arising, directly or indirectly, out of:

- (1) War, including undeclared or civil war;
- (2) Warlike action by a military force, including action in hindering or defending against an actual or expected attack, by any government, sovereign or other authority using military personnel or other agents; or
- (3) Insurrection, rebellion, revolution, usurped power, or action taken by governmental authority in hindering or defending against any of these.

COVERAGE C MEDICAL PAYMENTS**1. Insuring Agreement**

a. We will pay medical expenses as described below for "bodily injury" caused by an accident:

- (1) On premises you own or rent;
- (2) On ways next to premises you own or rent; or
- (3) Because of your operations; provided that:
 - (1) The accident takes place in the "coverage territory" and during the policy period;
 - (2) The expenses are incurred and reported to us within one year of the date of the accident; and
 - (3) The injured person submits to examination, at our expense, by physicians of our choice as often as we reasonably require.

b. We will make these payments regardless of fault. These payments will not exceed the applicable limit of insurance. We will pay reasonable expenses for:

- (1) First aid administered at the time of an accident;
- (2) Necessary medical, surgical, x-ray and dental services, including prosthetic devices; and
- (3) Necessary ambulance, hospital, professional nursing and funeral services.

2. Exclusions

We will not pay expenses for "bodily injury":

a. Any Insured

To any insured, except "volunteer workers".

b. Hired Person

To a person hired to do work for or on behalf of any insured or a tenant of any insured.

c. Injury On Normally Occupied Premises

To a person injured on that part of premises you own or rent that the person normally occupies.

d. Workers Compensation And Similar Laws

To a person, whether or not an "employee" of any insured, if benefits for the "bodily injury" are payable or must be provided under a workers' compensation or disability benefits law or a similar law.

e. Athletics Activities

To a person injured while practicing, instructing or participating in any physical exercises or games, sports, or athletic contests.

f. Products-Completed Operations Hazard

Included within the "products-completed operations hazard".

g. Coverage A Exclusions

Excluded under Coverage A.

SUPPLEMENTARY PAYMENTS – COVERAGES A AND B

1. We will pay, with respect to any claim we investigate or settle, or any "suit" against an insured we defend:

- a. All expenses we incur.
- b. Up to \$250 for cost of bail bonds required because of accidents or traffic law violations arising out of the use of any vehicle to which the Bodily Injury Liability Coverage applies. We do not have to furnish these bonds.

- c. The cost of bonds to release attachments, but only for bond amounts within the applicable limit of insurance. We do not have to furnish these bonds.
- d. All reasonable expenses incurred by the insured at our request to assist us in the investigation or defense of the claim or "suit", including actual loss of earnings up to \$250 a day because of time off from work.
- e. All costs taxed against the insured in the "suit".
- f. Prejudgment interest awarded against the insured on that part of the judgment we pay. If we make an offer to pay the applicable limit of insurance, we will not pay any prejudgment interest based on that period of time after the offer.
- g. All interest on the full amount of any judgment that accrues after entry of the judgment and before we have paid, offered to pay, or deposited in court the part of the judgment that is within the applicable limit of insurance.

These payments will not reduce the limits of insurance.

- 2. If we defend an insured against a "suit" and an indemnitee of the insured is also named as a party to the "suit", we will defend that indemnitee if all of the following conditions are met:
 - a. The "suit" against the indemnitee seeks damages for which the insured has assumed the liability of the indemnitee in a contract or agreement that is an "insured contract";
 - b. This insurance applies to such liability assumed by the insured;
 - c. The obligation to defend, or the cost of the defense of, that indemnitee, has also been assumed by the insured in the same "insured contract";
 - d. The allegations in the "suit" and the information we know about the "occurrence" are such that no conflict appears to exist between the interests of the insured and the interests of the indemnitee;
 - e. The indemnitee and the insured ask us to conduct and control the defense of that indemnitee against such "suit" and agree that we can assign the same counsel to defend the insured and the indemnitee; and
 - f. The indemnitee:
 - (1) Agrees in writing to:
 - (a) Cooperate with us in the investigation, settlement or defense of the "suit";

- (b) Immediately send us copies of any demands, notices, summonses or legal papers received in connection with the "suit";
 - (c) Notify any other insurer whose coverage is available to the indemnitee; and
 - (d) Cooperate with us with respect to coordinating other applicable insurance available to the indemnitee; and
- (2) Provides us with written authorization to:
 - (a) Obtain records and other information related to the "suit"; and
 - (b) Conduct and control the defense of the indemnitee in such "suit".

So long as the above conditions are met, attorneys' fees incurred by us in the defense of that indemnitee, necessary litigation expenses incurred by us and necessary litigation expenses incurred by the indemnitee at our request will be paid as Supplementary Payments. Notwithstanding the provisions of Paragraph **2.b.(2)** of Section I – Coverage A – Bodily Injury And Property Damage Liability, such payments will not be deemed to be damages for "bodily injury" and "property damage" and will not reduce the limits of insurance.

Our obligation to defend an insured's indemnitee and to pay for attorneys' fees and necessary litigation expenses as Supplementary Payments ends when:

- a. We have used up the applicable limit of insurance in the payment of judgments or settlements; or
- b. The conditions set forth above, or the terms of the agreement described in Paragraph f. above, are no longer met.

SECTION II – WHO IS AN INSURED

- 1. If you are designated in the Declarations as:
 - a. An individual, you and your spouse are insureds, but only with respect to the conduct of a business of which you are the sole owner.
 - b. A partnership or joint venture, you are an insured. Your members, your partners, and their spouses are also insureds, but only with respect to the conduct of your business.
 - c. A limited liability company, you are an insured. Your members are also insureds, but only with respect to the conduct of your business. Your managers are insureds, but only with respect to their duties as your managers.

- d. An organization other than a partnership, joint venture or limited liability company, you are an insured. Your "executive officers" and directors are insureds, but only with respect to their duties as your officers or directors. Your stockholders are also insureds, but only with respect to their liability as stockholders.
- e. A trust, you are an insured. Your trustees are also insureds, but only with respect to their duties as trustees.
2. Each of the following is also an insured:
- a. Your "volunteer workers" only while performing duties related to the conduct of your business, or your "employees", other than either your "executive officers" (if you are an organization other than a partnership, joint venture or limited liability company) or your managers (if you are a limited liability company), but only for acts within the scope of their employment by you or while performing duties related to the conduct of your business. However, none of these "employees" or "volunteer workers" are insureds for:
- (1) "Bodily injury" or "personal and advertising injury":
 - (a) To you, to your partners or members (if you are a partnership or joint venture), to your members (if you are a limited liability company), to a co-"employee" while in the course of his or her employment or performing duties related to the conduct of your business, or to your other "volunteer workers" while performing duties related to the conduct of your business;
 - (b) To the spouse, child, parent, brother or sister of that co-"employee" or "volunteer worker" as a consequence of Paragraph (1)(a) above;
 - (c) For which there is any obligation to share damages with or repay someone else who must pay damages because of the injury described in Paragraphs (1)(a) or (b) above; or
 - (d) Arising out of his or her providing or failing to provide professional health care services.
 - (2) "Property damage" to property:
 - (a) Owned, occupied or used by,
 - (b) Rented to, in the care, custody or control of, or over which physical control is being exercised for any purpose by you, any of your "employees", "volunteer workers", any partner or member (if you are a partnership or joint venture), or any member (if you are a limited liability company).
 - b. Any person (other than your "employee" or "volunteer worker"), or any organization while acting as your real estate manager.
 - c. Any person or organization having proper temporary custody of your property if you die, but only:
 - (1) With respect to liability arising out of the maintenance or use of that property; and
 - (2) Until your legal representative has been appointed.
 - d. Your legal representative if you die, but only with respect to duties as such. That representative will have all your rights and duties under this Coverage Part.
3. Any organization you newly acquire or form, other than a partnership, joint venture or limited liability company, and over which you maintain ownership or majority interest, will qualify as a Named Insured if there is no other similar insurance available to that organization. However:
- a. Coverage under this provision is afforded only until the 90th day after you acquire or form the organization or the end of the policy period, whichever is earlier;
 - b. Coverage **A** does not apply to "bodily injury" or "property damage" that occurred before you acquired or formed the organization; and
 - c. Coverage **B** does not apply to "personal and advertising injury" arising out of an offense committed before you acquired or formed the organization.
- No person or organization is an insured with respect to the conduct of any current or past partnership, joint venture or limited liability company that is not shown as a Named Insured in the Declarations.
- ### SECTION III – LIMITS OF INSURANCE
1. The Limits of Insurance shown in the Declarations and the rules below fix the most we will pay regardless of the number of:
 - a. Insureds;
 - b. Claims made or "suits" brought; or
 - c. Persons or organizations making claims or bringing "suits".

2. The General Aggregate Limit is the most we will pay for the sum of:
 - a. Medical expenses under Coverage **C**;
 - b. Damages under Coverage **A**, except damages because of "bodily injury" or "property damage" included in the "products-completed operations hazard"; and
 - c. Damages under Coverage **B**.
3. The Products-Completed Operations Aggregate Limit is the most we will pay under Coverage **A** for damages because of "bodily injury" and "property damage" included in the "products-completed operations hazard".
4. Subject to 2. above, the Personal and Advertising Injury Limit is the most we will pay under Coverage **B** for the sum of all damages because of all "personal and advertising injury" sustained by any one person or organization.
5. Subject to 2. or 3. above, whichever applies, the Each Occurrence Limit is the most we will pay for the sum of:
 - a. Damages under Coverage **A**; and
 - b. Medical expenses under Coverage **C** because of all "bodily injury" and "property damage" arising out of any one "occurrence".
6. Subject to 5. above, the Damage To Premises Rented To You Limit is the most we will pay under Coverage **A** for damages because of "property damage" to any one premises, while rented to you, or in the case of damage by fire, while rented to you or temporarily occupied by you with permission of the owner.
7. Subject to 5. above, the Medical Expense Limit is the most we will pay under Coverage **C** for all medical expenses because of "bodily injury" sustained by any one person.

The Limits of Insurance of this Coverage Part apply separately to each consecutive annual period and to any remaining period of less than 12 months, starting with the beginning of the policy period shown in the Declarations, unless the policy period is extended after issuance for an additional period of less than 12 months. In that case, the additional period will be deemed part of the last preceding period for purposes of determining the Limits of Insurance.

SECTION IV – COMMERCIAL GENERAL LIABILITY CONDITIONS

1. Bankruptcy

Bankruptcy or insolvency of the insured or of the insured's estate will not relieve us of our obligations under this Coverage Part.

2. Duties In The Event Of Occurrence, Offense, Claim Or Suit

- a. You must see to it that we are notified as soon as practicable of an "occurrence" or an offense which may result in a claim. To the extent possible, notice should include:
 - (1) How, when and where the "occurrence" or offense took place;
 - (2) The names and addresses of any injured persons and witnesses; and
 - (3) The nature and location of any injury or damage arising out of the "occurrence" or offense.
- b. If a claim is made or "suit" is brought against any insured, you must:
 - (1) Immediately record the specifics of the claim or "suit" and the date received; and
 - (2) Notify us as soon as practicable.

You must see to it that we receive written notice of the claim or "suit" as soon as practicable.
- c. You and any other involved insured must:
 - (1) Immediately send us copies of any demands, notices, summonses or legal papers received in connection with the claim or "suit";
 - (2) Authorize us to obtain records and other information;
 - (3) Cooperate with us in the investigation or settlement of the claim or defense against the "suit"; and
 - (4) Assist us, upon our request, in the enforcement of any right against any person or organization which may be liable to the insured because of injury or damage to which this insurance may also apply.
- d. No insured will, except at that insured's own cost, voluntarily make a payment, assume any obligation, or incur any expense, other than for first aid, without our consent.

3. Legal Action Against Us

No person or organization has a right under this Coverage Part:

- a. To join us as a party or otherwise bring us into a "suit" asking for damages from an insured; or

- b.** To sue us on this Coverage Part unless all of its terms have been fully complied with.

A person or organization may sue us to recover on an agreed settlement or on a final judgment against an insured; but we will not be liable for damages that are not payable under the terms of this Coverage Part or that are in excess of the applicable limit of insurance. An agreed settlement means a settlement and release of liability signed by us, the insured and the claimant or the claimant's legal representative.

4. Other Insurance

If other valid and collectible insurance is available to the insured for a loss we cover under Coverages **A** or **B** of this Coverage Part, our obligations are limited as follows:

a. Primary Insurance

This insurance is primary except when **b.** below applies. If this insurance is primary, our obligations are not affected unless any of the other insurance is also primary. Then, we will share with all that other insurance by the method described in **c.** below.

b. Excess Insurance

This insurance is excess over:

- (1) Any of the other insurance, whether primary, excess, contingent or on any other basis:
 - (a) That is Fire, Extended Coverage, Builder's Risk, Installation Risk or similar coverage for "your work";
 - (b) That is Fire insurance for premises rented to you or temporarily occupied by you with permission of the owner;
 - (c) That is insurance purchased by you to cover your liability as a tenant for "property damage" to premises rented to you or temporarily occupied by you with permission of the owner; or
 - (d) If the loss arises out of the maintenance or use of aircraft, "autos" or watercraft to the extent not subject to Exclusion **g.** of Section **I** – Coverage **A** – Bodily Injury And Property Damage Liability.
- (2) Any other primary insurance available to you covering liability for damages arising out of the premises or operations, or the products and completed operations, for which you have been added as an additional insured by attachment of an endorsement.

When this insurance is excess, we will have no duty under Coverages **A** or **B** to defend the insured against any "suit" if any other insurer has a duty to defend the insured against that "suit". If no other insurer defends, we will undertake to do so, but we will be entitled to the insured's rights against all those other insurers.

When this insurance is excess over other insurance, we will pay only our share of the amount of the loss, if any, that exceeds the sum of:

- (1) The total amount that all such other insurance would pay for the loss in the absence of this insurance; and
- (2) The total of all deductible and self-insured amounts under all that other insurance.

We will share the remaining loss, if any, with any other insurance that is not described in this Excess Insurance provision and was not bought specifically to apply in excess of the Limits of Insurance shown in the Declarations of this Coverage Part.

c. Method Of Sharing

If all of the other insurance permits contribution by equal shares, we will follow this method also. Under this approach each insurer contributes equal amounts until it has paid its applicable limit of insurance or none of the loss remains, whichever comes first.

If any of the other insurance does not permit contribution by equal shares, we will contribute by limits. Under this method, each insurer's share is based on the ratio of its applicable limit of insurance to the total applicable limits of insurance of all insurers.

5. Premium Audit

- a. We will compute all premiums for this Coverage Part in accordance with our rules and rates.
- b. Premium shown in this Coverage Part as advance premium is a deposit premium only. At the close of each audit period we will compute the earned premium for that period and send notice to the first Named Insured. The due date for audit and retrospective premiums is the date shown as the due date on the bill. If the sum of the advance and audit premiums paid for the policy period is greater than the earned premium, we will return the excess to the first Named Insured.
- c. The first Named Insured must keep records of the information we need for premium computation, and send us copies at such times as we may request.

6. Representations

By accepting this policy, you agree:

- a. The statements in the Declarations are accurate and complete;
- b. Those statements are based upon representations you made to us; and
- c. We have issued this policy in reliance upon your representations.

7. Separation Of Insureds

Except with respect to the Limits of Insurance, and any rights or duties specifically assigned in this Coverage Part to the first Named Insured, this insurance applies:

- a. As if each Named Insured were the only Named Insured; and
- b. Separately to each insured against whom claim is made or "suit" is brought.

8. Transfer Of Rights Of Recovery Against Others To Us

If the insured has rights to recover all or part of any payment we have made under this Coverage Part, those rights are transferred to us. The insured must do nothing after loss to impair them. At our request, the insured will bring "suit" or transfer those rights to us and help us enforce them.

9. When We Do Not Renew

If we decide not to renew this Coverage Part, we will mail or deliver to the first Named Insured shown in the Declarations written notice of the non-renewal not less than 30 days before the expiration date.

If notice is mailed, proof of mailing will be sufficient proof of notice.

SECTION V – DEFINITIONS

1. "Advertisement" means a notice that is broadcast or published to the general public or specific market segments about your goods, products or services for the purpose of attracting customers or supporters. For the purposes of this definition:
 - a. Notices that are published include material placed on the Internet or on similar electronic means of communication; and
 - b. Regarding web-sites, only that part of a web-site that is about your goods, products or services for the purposes of attracting customers or supporters is considered an advertisement.
2. "Auto" means:
 - a. A land motor vehicle, trailer or semitrailer designed for travel on public roads, including any attached machinery or equipment; or

- b. Any other land vehicle that is subject to a compulsory or financial responsibility law or other motor vehicle insurance law in the state where it is licensed or principally garaged.

However, "auto" does not include "mobile equipment".

3. "Bodily injury" means bodily injury, sickness or disease sustained by a person, including death resulting from any of these at any time.
4. "Coverage territory" means:
 - a. The United States of America (including its territories and possessions), Puerto Rico and Canada;
 - b. International waters or airspace, but only if the injury or damage occurs in the course of travel or transportation between any places included in a. above; or
 - c. All other parts of the world if the injury or damage arises out of:
 - (1) Goods or products made or sold by you in the territory described in a. above;
 - (2) The activities of a person whose home is in the territory described in a. above, but is away for a short time on your business; or
 - (3) "Personal and advertising injury" offenses that take place through the Internet or similar electronic means of communication provided the insured's responsibility to pay damages is determined in a "suit" on the merits, in the territory described in a. above or in a settlement we agree to.
5. "Employee" includes a "leased worker". "Employee" does not include a "temporary worker".
6. "Executive officer" means a person holding any of the officer positions created by your charter, constitution, by-laws or any other similar governing document.
7. "Hostile fire" means one which becomes uncontrollable or breaks out from where it was intended to be.
8. "Impaired property" means tangible property, other than "your product" or "your work", that cannot be used or is less useful because:
 - a. It incorporates "your product" or "your work" that is known or thought to be defective, deficient, inadequate or dangerous; or
 - b. You have failed to fulfill the terms of a contract or agreement;
 if such property can be restored to use by:
 - a. The repair, replacement, adjustment or removal of "your product" or "your work"; or

- b. Your fulfilling the terms of the contract or agreement.
9. "Insured contract" means:
- a. A contract for a lease of premises. However, that portion of the contract for a lease of premises that indemnifies any person or organization for damage by fire to premises while rented to you or temporarily occupied by you with permission of the owner is not an "insured contract";
 - b. A sidetrack agreement;
 - c. Any easement or license agreement, except in connection with construction or demolition operations on or within 50 feet of a railroad;
 - d. An obligation, as required by ordinance, to indemnify a municipality, except in connection with work for a municipality;
 - e. An elevator maintenance agreement;
 - f. That part of any other contract or agreement pertaining to your business (including an indemnification of a municipality in connection with work performed for a municipality) under which you assume the tort liability of another party to pay for "bodily injury" or "property damage" to a third person or organization. Tort liability means a liability that would be imposed by law in the absence of any contract or agreement.
- Paragraph f. does not include that part of any contract or agreement:
- (1) That indemnifies a railroad for "bodily injury" or "property damage" arising out of construction or demolition operations, within 50 feet of any railroad property and affecting any railroad bridge or trestle, tracks, roadbeds, tunnel, underpass or crossing;
 - (2) That indemnifies an architect, engineer or surveyor for injury or damage arising out of:
 - (a) Preparing, approving, or failing to prepare or approve, maps, shop drawings, opinions, reports, surveys, field orders, change orders or drawings and specifications; or
 - (b) Giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage; or
 - (3) Under which the insured, if an architect, engineer or surveyor, assumes liability for an injury or damage arising out of the insured's rendering or failure to render professional services, including those listed in (2) above and supervisory, inspection, architectural or engineering activities.
10. "Leased worker" means a person leased to you by a labor leasing firm under an agreement between you and the labor leasing firm, to perform duties related to the conduct of your business. "Leased worker" does not include a "temporary worker".
11. "Loading or unloading" means the handling of property:
- a. After it is moved from the place where it is accepted for movement into or onto an aircraft, watercraft or "auto";
 - b. While it is in or on an aircraft, watercraft or "auto"; or
 - c. While it is being moved from an aircraft, watercraft or "auto" to the place where it is finally delivered;
- but "loading or unloading" does not include the movement of property by means of a mechanical device, other than a hand truck, that is not attached to the aircraft, watercraft or "auto".
12. "Mobile equipment" means any of the following types of land vehicles, including any attached machinery or equipment:
- a. Bulldozers, farm machinery, forklifts and other vehicles designed for use principally off public roads;
 - b. Vehicles maintained for use solely on or next to premises you own or rent;
 - c. Vehicles that travel on crawler treads;
 - d. Vehicles, whether self-propelled or not, maintained primarily to provide mobility to permanently mounted:
 - (1) Power cranes, shovels, loaders, diggers or drills; or
 - (2) Road construction or resurfacing equipment such as graders, scrapers or rollers;
 - e. Vehicles not described in a., b., c. or d. above that are not self-propelled and are maintained primarily to provide mobility to permanently attached equipment of the following types:
 - (1) Air compressors, pumps and generators, including spraying, welding, building cleaning, geophysical exploration, lighting and well servicing equipment; or
 - (2) Cherry pickers and similar devices used to raise or lower workers;
 - f. Vehicles not described in a., b., c. or d. above maintained primarily for purposes other than the transportation of persons or cargo.
- However, self-propelled vehicles with the following types of permanently attached equipment are not "mobile equipment" but will be considered "autos":

- (1) Equipment designed primarily for:
 - (a) Snow removal;
 - (b) Road maintenance, but not construction or resurfacing; or
 - (c) Street cleaning;
- (2) Cherry pickers and similar devices mounted on automobile or truck chassis and used to raise or lower workers; and
- (3) Air compressors, pumps and generators, including spraying, welding, building cleaning, geophysical exploration, lighting and well servicing equipment.

However, "mobile equipment" does not include any land vehicles that are subject to a compulsory or financial responsibility law or other motor vehicle insurance law in the state where it is licensed or principally garaged. Land vehicles subject to a compulsory or financial responsibility law or other motor vehicle insurance law are considered "autos".

13. "Occurrence" means an accident, including continuous or repeated exposure to substantially the same general harmful conditions.
14. "Personal and advertising injury" means injury, including consequential "bodily injury", arising out of one or more of the following offenses:
 - a. False arrest, detention or imprisonment;
 - b. Malicious prosecution;
 - c. The wrongful eviction from, wrongful entry into, or invasion of the right of private occupancy of a room, dwelling or premises that a person occupies, committed by or on behalf of its owner, landlord or lessor;
 - d. Oral or written publication, in any manner, of material that slanders or libels a person or organization or disparages a person's or organization's goods, products or services;
 - e. Oral or written publication, in any manner, of material that violates a person's right of privacy;
 - f. The use of another's advertising idea in your "advertisement"; or
 - g. Infringing upon another's copyright, trade dress or slogan in your "advertisement".
15. "Pollutants" mean any solid, liquid, gaseous or thermal irritant or contaminant, including smoke, vapor, soot, fumes, acids, alkalis, chemicals and waste. Waste includes materials to be recycled, reconditioned or reclaimed.

16. "Products-completed operations hazard":

- a. Includes all "bodily injury" and "property damage" occurring away from premises you own or rent and arising out of "your product" or "your work" except:
 - (1) Products that are still in your physical possession; or
 - (2) Work that has not yet been completed or abandoned. However, "your work" will be deemed completed at the earliest of the following times:
 - (a) When all of the work called for in your contract has been completed.
 - (b) When all of the work to be done at the job site has been completed if your contract calls for work at more than one job site.
 - (c) When that part of the work done at a job site has been put to its intended use by any person or organization other than another contractor or subcontractor working on the same project.

Work that may need service, maintenance, correction, repair or replacement, but which is otherwise complete, will be treated as completed.

- b. Does not include "bodily injury" or "property damage" arising out of:
 - (1) The transportation of property, unless the injury or damage arises out of a condition in or on a vehicle not owned or operated by you, and that condition was created by the "loading or unloading" of that vehicle by any insured;
 - (2) The existence of tools, uninstalled equipment or abandoned or unused materials; or
 - (3) Products or operations for which the classification, listed in the Declarations or in a policy schedule, states that products-completed operations are subject to the General Aggregate Limit.

17. "Property damage" means:

- a. Physical injury to tangible property, including all resulting loss of use of that property. All such loss of use shall be deemed to occur at the time of the physical injury that caused it; or

- b.** Loss of use of tangible property that is not physically injured. All such loss of use shall be deemed to occur at the time of the "occurrence" that caused it.

For the purposes of this insurance, electronic data is not tangible property.

As used in this definition, electronic data means information, facts or programs stored as or on, created or used on, or transmitted to or from computer software, including systems and applications software, hard or floppy disks, CD-ROMS, tapes, drives, cells, data processing devices or any other media which are used with electronically controlled equipment.

- 18.** "Suit" means a civil proceeding in which damages because of "bodily injury", "property damage" or "personal and advertising injury" to which this insurance applies are alleged. "Suit" includes:
 - a.** An arbitration proceeding in which such damages are claimed and to which the insured must submit or does submit with our consent; or
 - b.** Any other alternative dispute resolution proceeding in which such damages are claimed and to which the insured submits with our consent.
- 19.** "Temporary worker" means a person who is furnished to you to substitute for a permanent "employee" on leave or to meet seasonal or short-term workload conditions.
- 20.** "Volunteer worker" means a person who is not your "employee", and who donates his or her work and acts at the direction of and within the scope of duties determined by you, and is not paid a fee, salary or other compensation by you or anyone else for their work performed for you.

21. "Your product":

a. Means:

- (1)** Any goods or products, other than real property, manufactured, sold, handled, distributed or disposed of by:
 - (a)** You;
 - (b)** Others trading under your name; or
 - (c)** A person or organization whose business or assets you have acquired; and
- (2)** Containers (other than vehicles), materials, parts or equipment furnished in connection with such goods or products.

b. Includes

- (1)** Warranties or representations made at any time with respect to the fitness, quality, durability, performance or use of "your product"; and
 - (2)** The providing of or failure to provide warnings or instructions.
- c.** Does not include vending machines or other property rented to or located for the use of others but not sold.

22. "Your work":

a. Means:

- (1)** Work or operations performed by you or on your behalf; and
- (2)** Materials, parts or equipment furnished in connection with such work or operations.

b. Includes

- (1)** Warranties or representations made at any time with respect to the fitness, quality, durability, performance or use of "your work", and
- (2)** The providing of or failure to provide warnings or instructions.

POLICY NUMBER:

COMMERCIAL GENERAL LIABILITY
CG 20 10 07 04

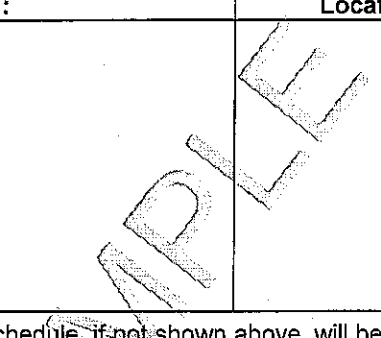
THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

**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.

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".

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 **COVERAGES A** (SECTION I), and for all medical expenses caused by accidents under **COVERAGES 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 **COVERAGES A** for damages or under **COVERAGES 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.

Sample



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	Distribution to:
		PERIOD TO:	OWNER:
FROM	VIA	CONTRACT FOR:	ARCHITECT:
CONTRACTOR:	ARCHITECT:	CONTRACT DATE:	CONTRACTOR:
		PROJECT NOS: / /	FIELD:
			OTHER:

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	\$	0.00
(Line 4 Less Line 5 Total)		
7. LESS PREVIOUS CERTIFICATES FOR PAYMENT	\$	0.00
(Line 6 from prior Certificate)		
8. CURRENT PAYMENT DUE	\$	0.00
9. BALANCE TO FINISH, INCLUDING RETAINAGE	\$	0.00
(Line 3 less Line 6)		

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.

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: _____
Project Title

This project is located at: _____
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 _____

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)

on bond of
(Insert name and address of Contractor)

, SURETY,

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

, CONTRACTOR,

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)

as set forth in said Surety's bond.

, OWNER,

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)

STORED MATERIALS

University of Maine * Location *
 * Campus Address *

Project Title: _____
 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 _____
Power of Attorney Must be Attached

By: _____
 Attorney-in-Fact

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, in compliance 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, its 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

Secretary

By: _____
President


AIA[®] Document G716™ – 2004
Request for Information (“RFI”)**TO:****FROM:****PROJECT:**

University of Maine System Project

ISSUE DATE:**RFI No.** 001**PROJECT NUMBERS:** /**REQUESTED REPLY DATE:****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.


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)


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):*

PROPOSAL REQUEST NUMBER:

DATE OF ISSUANCE:

CONTRACT FOR:

CONTRACT DATE:

ARCHITECT'S PROJECT NUMBER:

OWNER:

ARCHITECT:

CONSULTANT:

CONTRACTOR:

FIELD:

OTHER:

TO CONTRACTOR *(Name and address):*

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)


AIA Document G701™ – 2001
Change Order

PROJECT <i>(Name and address):</i> University of Maine System Project	CHANGE ORDER NUMBER: DATE:	OWNER: <input type="checkbox"/>
TO CONTRACTOR <i>(Name and address):</i>	ARCHITECT'S PROJECT NUMBER: CONTRACT DATE: CONTRACT FOR:	ARCHITECT: <input type="checkbox"/> CONTRACTOR: <input type="checkbox"/> FIELD: <input type="checkbox"/> OTHER: <input type="checkbox"/>

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 <i>(Firm name)</i>	_____ CONTRACTOR <i>(Firm name)</i>	_____ OWNER <i>(Firm name)</i>
_____ ADDRESS	_____ ADDRESS	_____ ADDRESS
_____ BY <i>(Signature)</i>	_____ BY <i>(Signature)</i>	_____ BY <i>(Signature)</i>
_____ <i>(Typed name)</i>	_____ <i>(Typed name)</i>	_____ <i>(Typed name)</i>
_____ DATE	_____ DATE	_____ DATE


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.)

**University of Maine System
Certificate of Completion
(Final)**

CONTRACT DATED:

PROJECT NAME:

SUSTANTIAL COMPLETION DATE:

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 Maine
 Date: _____


AIA[®] Document G706[™] – 1994
Contractor's Affidavit of Payment of Debts and Claims

PROJECT: <i>(Name and address)</i> University of Maine System Project	ARCHITECT'S PROJECT NUMBER:	OWNER: <input type="checkbox"/>
		ARCHITECT: <input type="checkbox"/>
		CONTRACTOR: <input type="checkbox"/>
TO OWNER: <i>(Name and address)</i>	CONTRACT FOR: General Construction	SURETY: <input type="checkbox"/>
	CONTRACT DATED:	OTHER: <input type="checkbox"/>

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:**

- 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

CONTRACTOR: *(Name and address)*

BY: _____

*(Signature of authorized representative)*_____
(Printed name and title)

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

- Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.
- 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's Affidavit of Release of Liens (AIA Document G706A).

Subscribed and sworn to before me on this date:

Notary Public:
My Commission Expires:


AIA[®] Document G706A[™] – 1994
Contractor's Affidavit of Release of Liens

PROJECT: <i>(Name and address)</i> University of Maine System Project2	ARCHITECT'S PROJECT NUMBER:	OWNER: <input type="checkbox"/>
	CONTRACT FOR: General Construction	ARCHITECT: <input type="checkbox"/>
TO OWNER: <i>(Name and address)</i> University of Maine System 16 Central Street Bangor, ME 04401-5106	CONTRACT DATED:	CONTRACTOR: <input type="checkbox"/>
		SURETY: <input type="checkbox"/>
		OTHER: <input type="checkbox"/>

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:

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

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)

on bond of
(Insert name and address of Contractor)

, SURETY,

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)

, CONTRACTOR,

as set forth in said Surety's bond.

, OWNER,

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)


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)
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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.

Init.

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User Notes:

(895711814)

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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.

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§ 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.

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§ 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.

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§ 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

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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.

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§ 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.

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§ 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

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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.

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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

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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.

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§ 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

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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.

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§ 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.

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§ 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.

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§ 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.

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§ 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

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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.

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§ 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

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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.

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§ 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.

Init.

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.

Init.

§ 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.

**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.

§ 3.4.7 Insert the following:

§ 3.4.7 The Contractor and all sub-contractors shall adhere to H.P. 960-L.D 1314 and **Sec 6. 26 MRSA §1043, sub-§11, ¶E**, regarding definition of “Independent Contractor”.

§ 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 § 4.2.1 with 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 B201-2007 and 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 . The list shall be presented at the preconstruction meeting and, when changes occur, at each requisition meeting as necessary

§ 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 Remolding 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 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.

§ 13.4.2 Insert the following:

§ 13.4.2.1 **SMOKE FREE WORKPLACE POLICY** - The Contractor and all sub-contractors shall adhere to campus 'Smoke Free Workplace' policy. Some campuses may provide exceptions, and allow 'Smoking Zones' on campus. Otherwise the University of Maine System adheres to a smoke free campus policy. Any exceptions will be discussed during the Pre-Construction meeting.

§ 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

**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
Technical Services 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 -----Bio Science Bathrooms UMS Project 6200142

Location of Project -Portland, Cumberland County

2013 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	15.50	1.21	16.71	Ironworker - Reinforcing	20.00	2.55	22.55
Asphalt Raker	14.50	0.80	15.30	Ironworker - Structural	20.00	2.45	22.45
Backhoe Loader Operator	17.00	1.97	18.97	Laborers (Incl.Helpers & Tenders)	12.25	0.24	12.49
Boilermaker	22.50	8.20	30.70	Laborer - Skilled	15.00	1.22	16.22
Boom Truck (Truck Crane) Operator	25.75	14.46	40.21	Loader Operator - Front-End	15.88	1.50	17.38
Bricklayer	23.00	0.90	23.90	Mechanic- Maintenance	22.45	3.00	25.45
Bulldozer Operator	18.00	3.16	21.16	Mechanic- Refrigeration	23.00	3.13	26.13
Carpenter	18.58	2.81	21.39	Millwright	22.50	7.34	29.84
Carpenter - Acoustical	14.75	1.99	16.74	Oil/Fuel Burner Servicer & Installer (Licensed)	22.75	3.65	26.40
Carpenter - Rough	16.94	1.95	18.89	Painter	15.00	0.00	15.00
Cement Mason/Finisher	15.75	1.40	17.15	Paver Operator	17.00	3.00	20.00
Communication Equip Installer	25.64	1.67	27.31	Pipe/Steam/Sprinkler Fitter	21.38	4.02	25.40
Crane Operator =>15 Tons)	21.00	2.70	23.70	Plumber (Licensed)	22.75	3.71	26.46
Crusher Plant Operator	16.50	2.90	19.40	Plumber Helper/Trainee (Licensed)	15.00	2.59	17.59
Diver	20.00	5.12	25.12	Propane & Natural Gas Servicer & Inst (Licensed)	20.54	2.78	23.32
Driller - Well	16.00	2.25	18.25	Rigger	19.00	4.12	23.12
Dry-Wall Applicator	19.00	1.53	20.53	Roller Operator - Earth	13.00	0.39	13.39
Dry-Wall Taper & Finisher	20.00	0.00	20.00	Roller Operator - Pavement	17.25	5.16	22.41
Electrician - Licensed	24.57	6.00	30.57	Roofer	15.00	1.50	16.50
Electrician Helper/Cable Puller (Licensed)	15.37	4.02	19.39	Sheet Metal Worker	15.50	3.58	19.08
Elevator Constructor/Installer	50.83	23.84	74.67	Sider	14.00	2.44	16.44
Excavator Operator	18.75	2.67	21.42	Stone Mason	16.75	5.61	22.36
Flagger	9.03	0.00	9.03	Tile Setter	19.00	3.63	22.63
Fence Setter	13.63	0.58	14.21	Truck Driver - Light	15.00	2.29	17.29
Floor Layer	16.00	0.00	16.00	Truck Driver - Medium	15.00	1.24	16.24
Glazier	17.50	2.12	19.62	Truck Driver - Heavy	14.00	0.34	14.34
HVAC	22.50	4.01	26.51	Truck Driver - Tractor Trailer	15.00	3.76	18.76
Insulation Installer	18.00	1.92	19.92	Truck Driver - Mixer (Cement)	13.29	2.90	16.19

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.

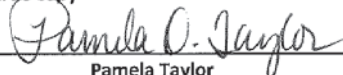
Welders are classified in the trade to which the welding is incidental.

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: B2-014-2013
Filing Date: January 10, 2013
Expiration Date: 12-31-2013
BLS 424BU (R2013) (Building 2 Cumberland)

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

SECTION 011000 - 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. Division 01 Section "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: Symmes Maini & McKee Assoc., Inc.

1.04 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Identification:
 - 1. Project Location: Bioscience Building - 70 Falmouth St, Portland Maine
 - 2. Description: Toilet Room Fit Up, Second, Third and Fifth Floors

1.05 TYPE OF CONTRACT

- A. Project will be constructed under a single prime contract, design bid build.

1.06 WORK SCHEDULE

- A. Permitting
 - 1. Permitting for the project shall begin immediately after the project is awarded.
 - 2. Obtaining the building permit is the responsibility of the general contractor.
- B. Substantial completion date for the work:
 - 1. The building and site shall be substantially complete on March 14, 2014.

- C. Final completion, including completion of interior punch list items shall be done on March 31, 2014.
- D. 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.

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.
- E. Contractor will be provided with one set of keys and security cards necessary to access all areas of the project site. Contractor shall be responsible for, and keep keys and security cards in his possession, for the duration of the project. Final payment to contractor will not be released until keys and cards are returned to USM.

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 011000

SECTION 01 26 00
CONTRACT MODIFICATION 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 for handling and processing Contract modifications.

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 01 26 00

SECTION 01 29 00 - 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.

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.
 - 1. Use Payment Application Form AIA G703 Continuation Sheets for Schedule of Values.
 - 2. 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. For Division 23 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.
 - 4. Documentation: Submit proper documentation for the amounts being requisitioned from subcontractors and material suppliers with each Application for Payment.
 - 5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 - 6. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

- a. Differentiate between items stored on-site and items stored off-site. If 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.
 - 7. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
 - 8. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
 - 9. 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.
 - 10. 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 preceded 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 Waiver 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, 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.
 6. Wage and benefit records of Contractor and all subcontractors and sub-subcontractors for the period covered by the Application for Payment.
- 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. Mechanical commissioning completed and all systems in full compliance.
 3. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 4. Updated final statement, accounting for final changes to the Contract Sum.
 5. University of Maine System - Certificate of Completion.
 6. University of Maine System - Waiver of Lien.

7. Separate Releases of Waivers of Liens from Subcontractors and material and equipment suppliers.
8. AIA Document G707, "Consent of Surety to Final Payment."
9. Evidence that claims have been settled.
10. Submission of Waste Reporting Sheets and Waste Handling Certificates.
11. 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.
12. Final, liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

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.

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. LEED requirements.
 - l. Integrated Deliverables and Testing (IDAT).
 - m. Preparation of Record Documents.
 - n. Use of the premises.
 - o. Work restrictions.
 - p. Owner's occupancy requirements.
 - q. Responsibility for temporary facilities and controls.
 - r. Construction waste management and recycling.
 - s. Parking availability.
 - t. Office, work, and storage areas.
 - u. Equipment deliveries and priorities.
 - v. First aid.
 - w. Security.

- x. Progress cleaning.
 - y. Working hours.
 - z. 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 01 31 00

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.

1.03 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.

1.04 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.

1.05 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, LEED Documentation Progress. 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 01 32 00

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.
- B. Related Sections include the following:
 - 1. Section 01 29 00 "Payment Procedures" for submitting Schedule of Values and Applications for Payment.
 - 2. Section 01 31 00 "Project Management and Coordination" for submitting Coordination Drawings.
 - 3. Section 01 32 00 "Construction Progress Documentation" for submitting Contractor's Construction Schedule and Submittals Schedule.
 - 4. Section 01 40 00 "Quality Requirements," for submitting test and inspection reports and Delegated-Design submittals.
 - 5. Section 01 77 00 "Closeout Procedures" for submitting Warranties and Project Record Documents.
 - 6. Section 01 78 23 for submitting Operation and Maintenance Manuals.
 - 7. Division 2 through 28 sections for listings of submittals required.

1.02 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Architect's responsive action; Product Data, Shop Drawings, and Samples are typical Action Submittals.
- B. Informational Submittals: Written information that does not require Architect's approval. Submittals may be rejected for not complying with requirements.
- C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.03 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. Digital Drawing Software Program: The Contract Drawings are available in AutoCAD 2011.
 - c. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Owner and Architect.
2. Contractor will be required to pay a nominal fee to reimburse the Architect for its services in assembling the documents, formatting them for Contractor's use, and delivering them to the Contractor.
 3. Drawings will be in Architect's standard format and will be the Drawings as issued for construction.
 4. Do not extract dimensions from the CAD drawings; refer to the written dimensions, and check for internal consistency; verify in field as work progresses. The Contractor and the subcontractor, fabricator, or other entity preparing shop drawings, remain responsible for the information on the shop 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. 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. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.
- D. Processing Time: Allow enough 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.
1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. 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 the same manner as the initial submittal.
 3. Resubmittal Review: Allow 15 days minimum for review of each resubmittal.

4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days minimum for review of submittals.
 5. Submittals with color selections: Deliver to Architect a list of submittals required for the interior color package. The Architect needs to coordinate colors and will hold submittals with color selections until all materials in the interior color package have been received. Allow 15 days minimum after the last item has been submitted for return of interior color selections. Careful coordination of the Submittal Schedule by the Contractor is required so as not to delay the Work.
- E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 2. Name file with submittal number or other unique identifier, including revision identifier.
 - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
 3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
 4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner, containing the following information:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name of Contractor.
 - e. Name of firm or entity that prepared submittal.
 - f. Names of subcontractor, manufacturer, and supplier.
 - g. Category and type of submittal.
 - h. Submittal purpose and description.
 - i. Specification Section number and title.
 - j. Specification paragraph number or drawing designation and generic name for each of multiple items.
 - k. Drawing number and detail references, as appropriate.
 - l. Location(s) where product is to be installed, as appropriate.
 - m. Related physical samples submitted directly.
 - n. Indication of full or partial submittal.
 - o. Transmittal number, numbered consecutively.
 - p. Submittal and transmittal distribution record.
 - q. Other necessary identification.
 - r. Remarks.
 5. Metadata: Include the following information as keywords in the electronic submittal file metadata:

- a. Project name.
 - b. Number and title of appropriate Specification Section.
 - c. Manufacturer name.
 - d. Product name.
- F. Options: Identify options requiring selection by Architect.
- G. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- H. Resubmittals: Make resubmittals in same form as initial submittal.
- 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- I. Distribution: Furnish electronic copy of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.
- K. Material Safety Data Sheets (MSDSs): Do not submit MSDS to Architect. Architect will not review submittals that include MSDSs and will return the entire submittal for resubmittal.
- L. Transmittals to the Owner: As requested.
- M. Resubmittals: Make resubmittals in same form 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 approved."
- N. Distribution: Furnish electronic copy 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.
- O. Use for Construction: Use only final submittals with mark indicating approval by Architect.

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.

2.02 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections. Use dark colored pen for marking selections to permit photocopying; do not use highlighter.
- 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 printed 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 written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Standard color charts.
 - e. Manufacturer's catalog cuts.
 - f. Wiring diagrams showing factory-installed wiring.
 - g. Printed performance curves.
 - h. Operational range diagrams.
 - i. Mill reports.
 - j. Standard product operating and maintenance manuals.
 - k. Compliance with recognized trade association standards.
 - l. Compliance with recognized testing agency standards.
 - m. Application of testing agency labels and seals.
 - n. Notation of coordination requirements.
 - 4. Submit Product Data prior to or concurrent with Samples.
 - 5. Number of Copies: Submit electronic copy of Product Data, unless otherwise indicated. Architect will return one copy to the Contractor for reproduction and distribution. Place one copy in the Project Record Documents 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.
 - 1. Preparation: Include the following information, as applicable:

- a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
 - f. Shopwork manufacturing instructions.
 - g. Templates and patterns.
 - h. Schedules.
 - i. Design calculations.
 - j. Compliance with specified standards.
 - k. Notation of coordination requirements.
 - l. Notation of dimensions established by field measurement.
 - m. Relationship to adjoining construction clearly indicated.
 - n. Seal and signature of professional engineer if specified.
 - o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
- 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
 - 3. Submit electronic copy: Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
- D. Samples: Submit Samples for review of workmanship, 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 appropriate Specification Section.
 - 3. 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.
 - 4. 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 three sets; architect will retain one and return one.

5. 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 and return the third.
 - 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 or List: 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.
 2. Number and name of room or space.
 3. Location within room or space.
 4. Submit electronic copy: Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
- F. Submittals Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."
- G. Application for Payment: Comply with requirements specified in Division 1 Section "Payment Procedures."
- H. Schedule of Values: Comply with requirements specified in Division 1 Section "Payment Procedures."
- I. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 2. Number and title of related Specification Section(s) covered by subcontract.
 3. Drawing number and detail references, as appropriate, covered by subcontract.
 4. Submit electronic copy: Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2.03 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
 - 1. Number of Copies: Submit electronic copy of each submittal, unless otherwise indicated. Architect will not return copies.
 - 2. Certificates and Certifications: Provide a notarized 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.
 - 3. Test and Inspection Reports: Comply with Section 01 40 00, "Quality Requirements."
- B. Coordination Drawings: Comply with requirements specified in Division 1 Section "Project Management and Coordination."
- C. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."
- D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- F. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized by manufacturer for this specific Project.
- G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.
- H. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- I. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- J. Material Test Reports: Prepare 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.
- K. Product Test Reports: Prepare written reports indicating 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.

- L. Research/Evaluation Reports: Prepare 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.
- M. Schedule of Tests and Inspections: Comply with requirements specified in Division 1 Section "Quality Requirements"
- N. Preconstruction Test Reports: Prepare 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.
- O. Compatibility Test Reports: Prepare 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.
- P. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, 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.
- Q. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Division 1 Section "Operation and Maintenance Data."
- R. Design Data: Prepare 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.
- S. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
 - 1. Preparation of substrates.
 - 2. Required substrate tolerances.
 - 3. Sequence of installation or erection.
 - 4. Required installation tolerances.
 - 5. Required adjustments.
 - 6. Recommendations for cleaning and protection.

- T. **Manufacturer's Field Reports:** Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
 - 1. Name, address, and telephone number of factory-authorized service representative making report.
 - 2. Statement on condition of substrates and their acceptability for installation of product.
 - 3. Statement that products at Project site comply with requirements.
 - 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - 6. Statement whether conditions, products, and installation will affect warranty.
 - 7. Other required items indicated in individual Specification Sections.
- U. **Insurance Certificates and Bonds:** Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
- V. **Material Safety Data Sheets (MSDS):** Submit information directly to Owner at end of the project; do not submit to Architect. Maintain copy at the site for the duration of the construction. If submitted to Architect, Architect will not review this information but will return it with no action taken.

2.04 DELEGATED DESIGN

- 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 Submittal:** In addition to Shop Drawings, Product Data, and other required submittals, submit electronic copy of a statement, 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. **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.**
 - 1. The Contractor shall review submittals for completeness and compliance with the Contract Documents. If submittal contains substitutions, Contractor shall process

substitutions in accordance with Section 01 60 00, "Product Requirements," and not as part of specified Shop Drawings or Product Data submittals. Contractor is responsible for keeping subcontractors on time with the submittal schedule.

2. If the Contractor submits submittals that are repeatedly rejected, requiring the Architect to perform multiple reviews of the same submittal because of the failure to properly prepare and complete the submittals, Owner will compensate Architect for such additional services and the Owner will deduct the amount of such compensation from the final payment to the Contractor.

B. 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.

1. Stamp or statement shall include the following: "The Contractor represents that he or she has determined and verified all materials, field measurements, and field construction criteria related thereto, and that he or she has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents."

3.02 ARCHITECT'S ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

1. Approved: Final Unrestricted Release. Work may proceed, provided it complies with the Contract Documents.
2. Approved as Corrected: Final but conditional release. Work may proceed, provided it complies with the notations and corrections on submittals and with Contract Documents. Architect's comments shall be considered a part of the original submittal. Should Contractor disagree with any such comments, so notify the Architect within 14 days after receipt of such transmittal and before commencing work on the items in question. Failing this, Contractor shall be deemed to have agreed to such comments by the Architect and to have accepted full responsibility for implementing them at no additional cost to the Owner.
3. Revise and Resubmit: Returned for resubmittal. Do not proceed with the work at the site or allow submittal at site. Fabrication in shop or factory may proceed on items not affected by the Architect's comments only. Revise submittal in accordance with notations thereon, and resubmit without delay to obtain a different action marking. Revise and Resubmit
4. Not Approved: Resubmit using a specified item. Where submittal is rejected and returned for resubmittal of a specified product. Consult product section for list of

acceptable manufacturers or where submittal is returned for other reasons, with Architect's explanation included.

- C. Informational Submittals: Architect will review each submittal and will not return it, or will reject and return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- D. Partial submittals are not acceptable, will be considered non-responsive, and will be returned without review.
- E. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

END OF SECTION 01 33 00

SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Work Specified in Other Sections:
 - 2. Divisions 2 through 28 Sections for specific test and inspection requirements.

1.02 REGULATORY REQUIREMENTS

- A. Building Codes: The following codes are the principal codes applicable to this Project:
 - 1. State Building Code: International Building Code, IBC-2003.
 - 2. Electrical Code: National Electrical Code, NFPA-70 (2005)
 - 3. Plumbing and Fuel Gas Code: Maine Internal Plumbing Code (based on the 2000 Uniform Plumbing Code).
 - 4. Mechanical Systems Code: International Mechanical Code, IMC-2003.
- B. Copies of Codes and Regulations: Obtain copies of the regulations listed above and retain at Project site to be available for reference by parties who have a reasonable need.

1.03 DEFINITIONS OF TERMS USED IN THIS SECTION

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and ensure that proposed construction complies with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with requirements. Services do not include contract enforcement activities performed by Architect.

- C. Mockups: Full-size, physical example assemblies to illustrate finishes and materials. Mockups are used to verify selections made under Sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Mockups establish the standard by which the Work will be judged.
- D. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.04 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 the date of the Contract Documents, unless otherwise indicated.
- C. Conflicting Requirements: Where compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.
 - 1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to Architect for a decision before proceeding.
- D. Copies of Standards: Each entity engaged in construction on Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from the publication source and make them available on request.
- E. Abbreviations and Names: Abbreviations and acronyms are frequently used in the Specifications and other Contract Documents to represent the name of a trade association, standards-developing organization, authorities having jurisdiction, or other entity in the context of referencing a standard or publication. Where abbreviations and acronyms are used in the Specifications or other Contract Documents, they mean the recognized name of these entities. Refer to Gale Research's "Encyclopedia of Associations," or Columbia Books' "National Trade & Professional Associations of the U.S.," which are available in most libraries.

1.05 DELEGATED DESIGN

- 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.

1.06 SUBMITTALS

- A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- B. Delegated-Design Submittal: For each product and system specifically assigned to the Contractor to Contractor to be designed or certified by a design professional, in addition to Shop Drawings, Product Data, and other required submittals, submit a statement, signed and sealed by the responsible design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.
- C. Reports: Prepare and submit certified written reports that include the following:
 1. Date of issue.
 2. Project title and number.
 3. Name, address, and telephone number of testing agency.
 4. Dates and locations of samples and tests or inspections.
 5. Names of individuals making tests and inspections.
 6. Description of the Work and test and inspection method.
 7. Identification of product and Specification Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Ambient conditions at time of sample taking and testing and inspecting.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.
- E. Coordination Drawings: As described elsewhere in this Section.

1.07 QUALIFICATIONS

- A. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- B. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

- C. **Installer Qualifications:** A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- D. **Manufacturer Qualifications:** A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance.
- E. **Professional Engineer Qualifications:** Where Contract Documents require Contractor to provide the services of a professional engineer, this shall mean a Professional Engineer who is legally qualified to practice in the Commonwealth of Massachusetts and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
- F. **Specialists:** Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirement for specialists shall not supersede building codes and similar regulations governing the Work, nor interfere with local trade-union jurisdictional settlements and similar conventions.
- G. **Testing Agency Qualifications:** An agency with the experience and capability to conduct testing and inspecting indicated, as documented by ASTM E 548, and that specializes in types of tests and inspections to be performed.

1.08 PRECONSTRUCTION TESTING

- A. When preconstruction testing to demonstrate compliance with specified requirements is required by these Contract Documents, comply with the following procedures:
 - 1. Contractor's responsibilities include the following:
 - a. Provide test specimens and assemblies representative of proposed materials and construction. Provide sizes and configurations of assemblies to adequately demonstrate capability of product to comply with performance requirements.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. When testing is complete, remove assemblies; do not reuse materials on Project.
 - 2. **Testing Agency Responsibilities:** Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

1.09 COORDINATION DRAWINGS

- A. **General:** Wherever close and careful coordination is required among the work of several subcontractors, fabricators or suppliers, with regard to configurations and dimensions of products or equipment, prepare, or require the appropriate subcontractor to prepare, Coordination Drawings which clearly indicated in detail the relationship between systems, materials and components of the Work.

1. Prepare Coordination Drawings for HVAC, plumbing, fire protection and electrical work
 2. Submit Coordination Drawings to the Architect before beginning fabrication or installation of the work represented in the Coordination Drawings.
 3. Format: Reproducible drawings at not less than 1/4" = 1'-0" scale; with details at not less than 3/8" = 1'-0" scale.
 4. Show in detail the relationship of components shown on separate Shop Drawings.
 5. Indicate required installation sequences.
- B. HVAC, Plumbing, Fire Protection and Electrical Work: Using CADD, prepare complete coordination drawings showing principal components and interrelationship of systems listed below, and showing the relationship of these components to other components of the Work, and to existing building systems.
1. Systems: As a minimum, show the following systems:
 - a. Structural members above the ceiling.
 - b. Ceiling suspension members.
 - c. Heating, ventilating and air conditioning.
 - d. Fire protection sprinkler systems.
 - e. Building plumbing.
 - f. Electrical systems and components.
 2. Use architectural reflected ceiling plans as a base for these Coordination Drawings. Show location of mechanical rooms, electrical rooms, and electrical closets. Indicate location of structure and partitions. Indicate ceiling heights. Indicate locations of fire-rated construction, fire-separation walls, and fire walls.
 - a. Access: Show the location of dampers, valves, and other operating devices to which access will be required after building is completed. Show the location and size of access doors and removable ceiling panels required to provide access to such devices.
 3. Sequence of Preparation:
 - a. Require the Heating, Ventilating and Air-Conditioning Subcontractor to first prepare CADD files showing ductwork, water piping for HVAC equipment, and other heating lines. Show locations of air outlets and returns.
 - b. Include a signature block on each plot with space for signatures of the HVAC, Plumbing, Fire Protection and Electrical subcontractors, and space for the Contractor to certify coordination.
 - c. Transfer the electronic file, with a hard copy plot for reference, to the Plumbing subcontractor, and require the Plumbing subcontractor to add plumbing equipment and plumbing piping to the electronic document.
 - d. Transfer the electronic file, with a hard copy plot for reference, to the Fire Protection subcontractor, and require the Fire Protection subcontractor to add fire-protection equipment, water lines, and sprinkler heads to the electronic document.
 - e. Transfer the electronic file, with a hard copy plot for reference, to the Electrical subcontractor and require the Electrical subcontractor to add electrical equipment,

- conduit, cable trays, panels, pull boxes, lighting fixtures, and communication equipment components to the electronic document.
- f. The Contractor shall then plot the combined documents for the purpose of coordination, and shall coordinate the work of the subtrades with building structure and architectural finish, and add indication of these materials to the CADD file and to the plots where they have not been otherwise addressed.
4. In addition to reflected ceiling plans, if necessary to describe the relationship of mechanical and electrical systems to structural components, shafts, walls, suspended ceilings, and other components which abut or may conflict with mechanical work, or to resolve conflicts, prepare and submit floor plans, building sections, wall sections, elevations, and details.
 5. Supplementary Information: Include the following notations and details; prepare details on separate sheets keyed to the plans and section drawings.
 - a. Clearances for installing and maintaining insulation.
 - b. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.
 - c. Equipment connections and support details.
 - d. Exterior wall and foundation penetrations.
 - e. Fire-rated wall and floor penetrations.
 - f. Sizes and location of required concrete pads and bases.
 - g. Valve stem movement.
 6. Identify locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work.
 7. Describe scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
- C. Coordination and Signatures: Resolve conflicts among the trades, have each subcontractor sign a hard copy of the drawings to indicate that their agreement that all conflicts have been resolved. Endorse the drawings with the notation "Drawings Have Been Checked and Coordinated with All Trades"; stamp with Contractor's review stamp and sign the Drawings.
- D. Architect's Review: Submit the Coordination Drawings to the Architect before beginning work shown on the Drawings. The Architect will review the coordination Drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are the Contractor's responsibility.
1. If the Architect determines that the coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, the Architect will so inform the Contractor, who shall make changes as directed and resubmit.
 2. Contractor shall not purchase, fabricate nor install Work which requires coordination drawings until the Architect has accepted the coordination drawings. Work begun before the coordination drawings are accepted by the Architect will not be processed for payment by the Owner. In addition, work performed prior to acceptance of the coordination drawings which is deemed to be non-conforming, shall be removed and rebuilt by the Contractor with no change to the Contract Price or the Contract Time.

3. Architect's acceptance of Coordination Drawings shall not relieve the Contractor from its overall responsibility for coordination of the Work.

E. Coordination drawings are for Contractor's use during construction, and will not be accepted as the Record Drawings required by Section 01770, "Closeout Procedures and Submittals."

1.10 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are specifically indicated as Owner's responsibility, and where authorities having jurisdiction specifically require the Owner to provide testing and inspection services, the Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of the types of testing and inspecting they are engaged to perform.

2. The Testing agency will notify Architect and the Owner promptly of irregularities and deficiencies observed in the Work during performance of its services.

B. Contractor Responsibilities: Provide all other quality control services required under the Contract, including quality-control services specified and required by authorities having jurisdiction. Engage a qualified testing agency to perform these services.

1. Contractor shall not employ the same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.

3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.

4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.

5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

6. Retesting: After correcting or replacing construction that failed to comply with requirements established by the Contract Documents, arrange for and pay for retesting and reinspection, regardless of whether the original testing was the Owner's responsibility or the Contractor's.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.

D. Responsibilities of the Contractor's Testing Agency: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 3. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 4. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
 5. Do not perform any duties of Contractor.
- E. Associated Services: The Contractor shall cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field-curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- F. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 MOCK-UPS

- A. Required mock-ups are described in the technical sections, Divisions 2 through 16.
- B. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work.

- C. Notify Architect seven days in advance of dates and times when mockups will be constructed. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
- D. Build mockups in location and of size indicated or, if not indicated, as directed by Architect. Unless otherwise indicated, mock-up a complete unit of work, including back-up materials, anchors, fasteners, flashing, trim and closure pieces, and similar accessories as applicable to the type of work.
 - 1. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 2. Unless mock-ups are constructed inside the fully enclosed and weatherproofed building shell, protect mock-ups from the elements with weather-resistant membrane.
 - 3. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 4. Demolish and remove mockups when directed, unless otherwise indicated in the Section requiring the mock-up. Mock-ups shall be demolished and removed no later than the time of Substantial Completion, unless the Architect specifically directs the Contractor to leave the mock-up in place for a longer time.

3.02 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Comply with the Contract Document requirements for cutting and patching specified in Section 01731, "Cutting and Patching."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 SUMMARY

- 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 and distribution.
 - 2. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
 - 3. Heating and cooling facilities.
 - 4. Ventilation.
 - 5. Electric service.
 - 6. Lighting.
 - 7. Telephone service.
- C. Support facilities include, but are not limited to, the following:
 - 1. Waste disposal facilities.
 - 2. Field offices.
 - 3. Storage and fabrication sheds.
 - 4. Lifts and hoists.
 - 5. Temporary elevator usage.
 - 6. Temporary stairs.
 - 7. Construction aids and miscellaneous services and facilities.
- D. Security and protection facilities include, but are not limited to, the following:
 - 1. Barricades and warning signs.
 - 2. Temporary partitions.
 - 3. Temporary fire protection.
- E. Other temporary controls include:
 - 1. Conservation of materials.
- F. Related Sections include the following:
 - 1. Section 01 33 00, "Submittal Procedures." for procedures for submitting copies of implementation and termination schedule and utility reports.
 - 2. Section 01 74 19 for construction waste management.
 - 3. Divisions 2 through 28 for temporary heat, ventilation, and humidity requirements for products in those Sections.

1.02 USE CHARGES

- A. Water Service: Use water from Owner's existing water system without metering and without payment of use charges.

- B. Electric Power Service: Use electric power from Owner's existing system without metering and without payment of use charges.

1.03 QUALITY ASSURANCE

- A. Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA 241.
 - 1. Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with trade regulations and union jurisdictions.
 - 2. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

1.04 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.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Architect. Provide materials suitable for use intended.
- B. Tarpaulins: Fire-resistive labeled with flame-spread rating of 15 or less.
- C. Water: Potable.

2.02 EQUIPMENT

- A. General: Provide equipment suitable for use intended.
- B. 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.

- C. 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.
- D. Drinking-Water Fixtures: Containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.
- E. 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.
- F. Power Distribution System Circuits: Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 125-V ac, 20-A rating, and lighting circuits may be nonmetallic sheathed cable.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.02 TEMPORARY UTILITIES

- A. Temporary Heat: Provide temporary heat as required during construction to permit proper conditioning, installation, curing, and subsequent protection of materials in accordance with environmental conditions specified in the Project Manual, or with manufacturer's recommendations, whichever is more stringent.
 - 1. Contractor may use the permanent heating and ventilating system, subject to the following conditions:
 - a. Do not operate the permanent heating system without filters. Install temporary filters, of at least 30% efficiency and properly sized to fit the permanent equipment.
 - b. Maintain the filters during construction so that the ventilating system is operating at full efficiency. Replace filters as required.
 - c. Immediately before the Architect's inspection at time of Substantial Completion, require the HVAC subcontractor to remove the temporary filters and install the permanent filters, specified in Division 15.
- B. Water Service: Use existing water service inside the building. Keep facilities clean and maintain in a condition acceptable to Owner. At Substantial Completion, restore permanent facilities to condition existing before initial use.
 - 1. Do not waste water; put in place controls to assure that water use is minimized and supply is turned off when not actually in use. If Owner considers that water use is excessive or wasteful, make adjustments required by the Owner. If usage is not reduced,

Owner may require the Contractor to put in a temporary meter and pay for water consumed.

- 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: Use of Owner's existing toilet facilities is permitted. Toilets and facilities must be kept clean.
 - 3. Drinking-Water Facilities: Provide bottled-water, drinking-water units.
- D. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment from that specified that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- E. Electric Power Service: Use of Owner's existing electric power service will be permitted, as long as equipment is maintained in a condition acceptable to Owner.
- F. Electric Distribution: Provide receptacle outlets adequate for connection of power tools and equipment.
- G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
 - 2. Use energy-saving compact fluorescent lamps for temporary lighting. For general lighting, provide illumination equal to 100-W incandescent lamp per 500 sq. ft. (45 sq. m), uniformly distributed, for every 50 feet (15 m) in corridors, and per story in stairways and ladder runs, located to illuminate each landing and flight. Provide higher levels of illumination if required for safety.
 - 3. During application of interior finishes, including but not limited to resilient flooring, carpet, and paints, and for architect's inspection of interior finishes, have permanent lighting in operation or provide temporary lighting which simulates the permanent lighting.
- H. Telephone Service: Provide temporary telephone service throughout construction period for common-use facilities used by all personnel engaged in construction activities. Cell or mobile phones will be acceptable.

1. Prepare and distribute a list of important telephone numbers; also post this list beside hard-wired telephones, and at central locations for ready reference by individuals with cell or mobile phones.
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Architect's office.
 - e. Engineers' offices.
 - f. Owner's office.
 - g. Principal subcontractors' field and home offices.
2. Provide an answering machine on superintendent's telephone.

3.03 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access.
2. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines. Comply with NFPA 241.
3. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. 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 Section 01700, "Execution Requirements" for progress cleaning requirements.

1. If required by authorities having jurisdiction, provide separate containers, clearly labeled, for each type of waste material to be deposited.
2. Develop a waste management plan for Work performed on Project. Indicate types of waste materials Project will produce and estimate quantities of each type. Provide detailed information for on-site waste storage and separation of recyclable materials. Provide information on destination of each type of waste material and means to be used to dispose of all waste materials.

C. Contractor's Field Office and Storage Space: Coordinate with the Owner. If possible, space will be provided inside the building. If Owner agrees to the use of trailers, locate them in the parking area adjacent to the building as directed by the Owner.

D. Lifts and Hoists: Provide facilities for hoisting materials and personnel. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

E. Elevator Usage: The existing elevator may be used for construction purposes, subject to the following conditions:

1. Protect elevator and hoistway entrances from damage. Install protective blankets and provide other protection necessary to protect elevator car and entrance doors and frame from damage.
 2. If, despite such protection, the car or hoistway entrances are damaged, at or before the date of Substantial Completion restore to pre-construction condition.
- F. Use of Stairs: Provide protective coverings on landing floors, treads, railings, and walls, as required to protect stairs from damage by Construction activities. At Substantial Completion, restore this stairway to condition existing before initial use.

3.04 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near Project site.
- B. Barricades and Warning Signs: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard.
- C. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure at openings cut into the building exterior. (These requirements are intended to supplement but not replace OSHA safety requirements.)
1. Close openings in floor and roof decks with load-bearing wood framed construction and provide safety railings and/or temporary warning signs conforming to OSHA requirements.
 2. Install tarpaulins securely using fire-retardant-treated wood framing and other materials.
 3. Where temporary wood or plywood enclosure exceeds 100 sq. ft. (9.2 sq. m) in area, use fire-retardant-treated material for framing and main sheathing.
- D. Temporary Partitions: Where existing doors and partitions are inadequate for containment, erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise. Provide plastic sheets or tarps with taped edges to contain dust and debris. Enclose new openings with plastic or plywood until permanent partitions and doors are in place.
1. During construction of the addition, provide dustproof partition isolating the existing building for the duration of construction.
- E. Temporary Fire Protection: Until completion of the work, install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

1. Provide fire extinguishers, visible and accessible from space being served, with sign mounted above.
 - a. Class ABC dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for exposures.
 - b. 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.
2. Store combustible materials in containers in fire-safe locations.
3. 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.
4. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition.
5. 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.
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.

3.05 TEMPORARY CONTROLS

- A. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work in accordance with Contractor's Waste Management Plan.

3.06 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
- C. Environmental Controls: Operate and maintain heating, cooling, humidity control, and ventilation on a 24-hour per day, 7-days a week basis, where required to maintain appropriate temperatures for conditioning, installation, and curing, and to avoid the possibility of damage after installation.
- D. Temporary Facility Changeover: Except for using permanent fire protection as soon as available, do not change over from using temporary facilities to permanent facilities until Substantial Completion.

- 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."

END OF SECTION 01 50 00

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following administrative and procedural requirements: selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.
- B. Related Sections include the following:
 - 1. Submittal of Shop Drawings, Product Data, Samples: Section 01 33 00.
 - 2. Applicable industry standards for products specified: Section 01 40 00, "Quality Requirements."

1.02 DEFINITIONS

- A. Products: Items purchased 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, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. 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. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
- C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," 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 other named manufacturers.
- D. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

- E. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

1.03 SUBMITTALS

- A. For procedural requirements for Submittals required in conjunction with specified products, refer to Section 01 33 00.
- B. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use form provided at end of Section.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified material or product cannot be provided.
 - b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
 - i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
 - j. Cost information, including a proposal of change, if any, in the Contract Sum.
 - k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
 - l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
 - 3. Provide additional information requested by Architect to facilitate Architect's evaluation of the substitution request.

1.04 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.
- B. Products with asbestos: Asbestos containing materials are not to be purchased or installed in this project.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
 - 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 ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
 - 5. Store products to allow for inspection and measurement of quantity or counting of units.
 - 6. Store materials in a manner that will not endanger Project structure.
 - 7. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
 - 8. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 - 9. Protect stored products from damage.
- B. Storage: Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.06 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.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Specified Form: Forms are included with the Specifications. Prepare a written document using appropriate form properly executed.
 3. Refer to Divisions 2 through 33 Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 01 77 00, "Closeout Procedures."

PART 2 - PRODUCTS

2.01 PRODUCT OPTIONS

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged, and unless otherwise indicated, that 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," Architect will make selection.
 5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
 6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
 7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved substitute" or approved," comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
- B. Product Selection Procedures: Procedures for product selection include the following:
1. Product: Where Specification paragraphs or subparagraphs titled "Product" name a single product and manufacturer, provide the product named.
 2. Manufacturer/Source: Where Specification paragraphs or subparagraphs titled "Manufacturer" or "Source" name single manufacturers or sources, provide a product by the manufacturer or from the source named that complies with requirements.

3. Products: Where Specification paragraphs or subparagraphs titled "Products" introduce a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
4. Manufacturers: Where Specification paragraphs or subparagraphs titled "Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
5. Basis-of-Design Products: "Basis-of-Design Product" means that the named product has been used as the basis for drawing details and for specification characteristics. Provide either the basis-of-design product, or one of the other named products (if products are named), or an equal product by one of the other named manufacturers (if manufacturers are named but not products) which complies with the specifications; minor variations that are particular to each manufacturer and that do not, in the opinion of the Architect, alter the design intent will be acceptable.
6. Visual Matching: Where Specifications require matching an established Sample, or matching a pattern, color, texture or similar properties described by reference to one manufacturer's products, select a product (and manufacturer) that complies with requirements and that matches the referenced sample or product in appearance.
 - a. Architect's decision will be final on whether a proposed product matches satisfactorily.
 - b. If no product available from the proposed manufacturer satisfactorily provides the required appearance, the Architect will reject the proposed product and manufacturer, and the Contractor shall provide a product from a different manufacturer capable of matching the established Sample.

2.02 PRODUCT SUBSTITUTIONS

- A. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 2. Requested substitution does not require extensive revisions to the Contract Documents.
 3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 4. Substitution request is fully documented and properly submitted.
 5. Requested substitution will not adversely affect Contractor's Construction Schedule.
 6. Requested substitution has received necessary approvals of authorities having jurisdiction.

7. Requested substitution is compatible with other portions of the Work.
8. Requested substitution has been coordinated with other portions of the Work.
9. Requested substitution provides specified warranty.
10. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

2.03 LIMITS ON VOC CONTENT; RESTRICTED MATERIALS

- A. For interior applications use adhesives and sealants that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA method 24). VOC limits listed are from South Coast Air Quality Management District Rule #1168 for adhesives and from Bay Area Air Quality Management District Regulation 8, Rule 51, for sealants and sealant primers.
 1. Wood glues: 30 g/L.
 2. Metal to metal adhesives: 30 g/L.
 3. Adhesives for porous materials other than wood: 50 g/L.
 4. Plastic foam adhesives: 50 g/L.
 5. Carpet adhesives: 50 g/L.
 6. VCT and cove base adhesives: 50 g/L.
 7. Gypsum board adhesives: 50 g/L.
 8. Rubber floor adhesives: 60 g/L.
 9. Multipurpose construction adhesives: 70 g/L.
 10. Contact adhesive: 250 g/L.
 11. Plastic cement welding compounds: 350 g/L.
 12. ABS Welding Compounds: 400 g/L.
 13. CPVC Welding Compounds: 490 g/L.
 14. PVC Welding Compounds: 510 g/L.
 15. Adhesive Primer for Plastic: 650 g/L.
 16. Sealants: 250 g/L.
 17. Sealant Primers for Nonporous Substrates: 250 g/L.
 18. Sealant Primers for Porous Substrates: 775 g/L.
- B. For interior applications use paints and coatings that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA method 24):
 1. Flat Paints and Coatings: VOC not more than 50 g/L.
 2. Non-Flat Paints and Coatings: VOC not more than 150 g/L.
 3. Anti-Corrosive Coatings: VOC not more than 250 g/L.
 4. Varnishes and Sanding Sealers: VOC not more than 350 g/L.
 5. Stains: VOC not more than 250 g/L.
- C. Paints and Coatings, Restricted Components: For interior applications, use paints and coatings that comply with the following chemical restrictions:
 1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).

2. Paints and coatings shall not contain any of the following:
 - a. Acrolein.
 - b. Acrylonitrile.
 - c. Antimony.
 - d. Benzene.
 - e. Butyl benzyl phthalate.
 - f. Cadmium.
 - g. Di (2-ethylhexyl) phthalate.
 - h. Di-n-butyl phthalate.
 - i. Di-n-octyl phthalate.
 - j. 1,2-dichlorobenzene.
 - k. Diethyl phthalate.
 - l. Dimethyl phthalate.
 - m. Ethylbenzene.
 - n. Formaldehyde.
 - o. Hexavalent chromium.
 - p. Isophorone.
 - q. Lead.
 - r. Mercury.
 - s. Methyl ethyl ketone.
 - t. Methyl isobutyl ketone.
 - u. Methylene chloride.
 - v. Naphthalene.
 - w. Toluene (methylbenzene).
 - x. 1,1,1-trichloroethane.
 - y. Vinyl chloride.

PART 3 - EXECUTION (Not Used)

SECTION CONTINUES WITH SUBSTITUTION REQUEST FORM

SUBSTITUTION REQUEST FORM

Project: USM Portland/Biosciences Institute Substitution Request Number: _____.

To: _____ From: _____.

Re: _____ Date: _____.

Specification Title: _____ Description: _____.

Section: _____ Page: _____ Article/Paragraph: _____.

Proposed Substitution: _____.

Manufacturer: _____ Address: _____ Phone: _____.

Trade Name: _____ Model No. _____.

Attach:

1. Product description, specifications, drawings, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.
2. List of similar installations for complete projects with names and addresses of project, owner, architect.
3. Description of changes to the Contract Documents that the proposed substitution will require for its proper installation, including changes to the Contract Price and the Contract Time.

The Undersigned certifies:

1. The proposed substitution offers a substantial advantage to the Owner, as described in Section 01600.
2. The product is consistent with the Contract Documents, compatible with other portions of the Work and, when installed, it will provide a result of equal or better quality than the product(s) specified.
3. The substitution will not adversely affect the Contractor's Construction Schedule or the Contract Time.
4. The proposed substitution has received the necessary approvals of authorities having jurisdiction.
5. The same warranty will be provided for the Substitution as for the specified Product.
6. Contractor has coordinated or will coordinate installation with all affected trades and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
7. Contractor will waive claims for additional costs or time extension that may subsequently become apparent.

Submitted By: _____.

Signed By: _____.

Firm: _____.

Address: _____.

Telephone: _____ Fax: _____.

A/E's REVIEW AND ACTION

Submission approved - Make submittals in accordance with Specification Section 01330.

Submission approved as noted - Make submittals in accordance with Specification Section 01330.

Submission rejected - Use specified materials.

Submission request received too late - Use specified materials.

Signed by: _____ Date: _____.

Supporting Data Attached: Drawings Product Data Samples Tests Reports

Other _____

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for 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. Related Requirements:
 - 1. Section 024119 "Selective Demolition" for disposition of waste resulting from partial demolition of buildings, structures, and site improvements.
 - 2. Refer to drawings for additional information.

1.3 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. 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.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Reused or Salvaged: Recovery of demolition or construction waste and subsequent sale, donation, or reuse in another facility or incorporated into the Work.
- F. 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>

- G. 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>

1.4 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.

1.5 SUBMITTALS

- A. Submit 'Anticipated Project Waste Sheet' before commencement of work.
- B. Submit 'Waste Reporting Sheet' monthly with each Pay Requisition during the course of the project and prior to Final Requisition.
 - 1. Include the following information on Waste Reporting Sheet:
 - a. Date of disposal
 - b. Type of material(s)
 - c. Method(s) of disposal: recycled, reused/salvaged, landfilled, incinerated.
 - d. Weight(s): attach copies of scale tickets to form (see below)
- C. 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.
- D. 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.
- E. 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.

1.6 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 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 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.

3.2 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 017419



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

SECTION 01 77 00
CLOSEOUT 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 includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
1. Inspection procedures.
 2. Warranties.
 3. Final cleaning.
- B. Related Sections include the following:
1. Division 01 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
 2. Division 01 Section "Integrated Deliverables and Testing (IDAT)" for submitting, checklists, schedules and reports.
 3. Division 01 Section "Execution Requirements" for progress cleaning of Project site.
 4. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 5. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 6. Divisions 02 through 33 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.03 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
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. 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 WARRANTIES

- A. 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.
1. Unless indicated otherwise, all warranties shall commence on the date of Substantial Completion.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
1. Submit final warranties as a package for the entire project, assembled and identified as described below.
 2. 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.
 3. 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.
 4. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

5. 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.
- D. Provide additional electronic media copies of each warranty to include in operation and maintenance manuals.

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 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.
 - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - o. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - p. Replace parts subject to unusual operating conditions.
 - q. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - r. Replace disposable air filters and clean permanent air filters that are exposed to the work. Clean exposed surfaces of diffusers, registers, and grills.
 - s. Clean ducts, blowers, and coils if units were operated without filters during construction.
 - t. 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.
 - u. 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 01 77 00

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 01 78 23

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. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 3. 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 to Architect to such that the Architect can develop electronic copies for delivery to the owner.
- 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 typewritten pages indicating drawing titles, descriptions of contents, and Record Shop Drawings and Product Data locations drawing 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 01 78 39

SECTION 01 79 00
DEMONSTRATION AND TRAINING

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. 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.

1.3 SUBMITTALS

- A. Attendance Record: For each training session, submit list of participants.

1.4 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.

1.5 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

2.1 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. Conveying systems, including elevators .
 2. HVAC systems equipment.
 3. 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

3.1 PREPARATION

- A. Assemble materials necessary for instruction.
- B. Set up instructional equipment at instruction location.

3.2 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 017900

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The general provisions of the Contract, including General and Supplementary Conditions and Division 1 - General Requirements, apply to work specified in this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Wood nailers and blocking for attachment of roofing.
 - 2. Wood grounds, nailers and blocking for attachment of support of other work.
 - 3. Backing panels for support of telephone, electrical, and communication equipment.
- B. Related Work Specified in Other Sections:
 - 1. Nonstructural carpentry: Section 06 40 00, Finish Carpentry and Architectural Woodwork.

1.03 REFERENCED STANDARDS

- A. U. S. Department of Commerce Product Standards:
 - 1. PS 1, "U. S. Product Standard for Construction and Industrial Plywood."
 - 2. PS 2, "Performance Standard for Wood-Based Structural Use Panels."
 - 3. PS-20, "American Softwood Lumber Standard."
- B. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
 - 2. SPIB - Southern Pine Inspection Bureau.
 - 3. WWPA - Western Wood Products Association.
 - 4. WCLIB - West Coast Lumber Inspection Bureau.
- C. American Wood Preservers Association:
 - 1. AWWA C2: Lumber, Timbers, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Process.
 - 2. AWWA C20: Structural Lumber - Fire-Retardant Treatment by Pressure Process.
 - 3. AWWA C27: Plywood - Fire-Retardant Treatment by Pressure Process.

1.04 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.

2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
4. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Model Code Evaluation/Research Reports: Where model code evaluation/research reports are required by authorities having jurisdiction as evidence of compliance with the International Building Code, provide products for which such evaluation reports exist. Reports may be required for the following items:

1. Fire retardant treatment.
2. Power driven fasteners.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Keep materials under cover and dry.
- B. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.01 WOOD PRODUCTS, GENERAL

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

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
3. Provide dressed lumber, S4S.

2.02 MISCELLANEOUS LUMBER

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

1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.

- B. For items of dimension lumber size, provide lumber of any species, in Construction or No. 2 per SPIB rules or Standard, Stud, or No. 3 grade lumber per WCLIB or WWPA rules; with 19 percent maximum moisture content.
- C. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- D. Treat with preservative:
 - 1. Wood curbs, nailers, equipment support bases, blocking, and similar members in connection with roofing and flashing.
 - 2. Other items indicated on the Drawings.
- E. Treat for fire-retardance concealed blocking in walls and other items indicated on Drawings.

2.03 PLYWOOD BACKING PANELS

- A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, 3/4 inch thick.

2.04 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, provide fasteners with a hot-dip zinc coating per ASTM A 153 or of AISI Type 304 stainless steel.
- B. Nails, Wire, Brads, and Staples: FS FF-N-105.
- C. Power Driven Fasteners: National Evaluation Report NER-272.
- D. Wood Screws: ANSI B18.6.1.
- E. Steel Stud Screws: Corrosion-resistant screws with bugle-shaped head, self-drilling points; minimum length long enough to penetrate stud 1/2":
 - 1. ASTM C 954 for steel studs 0.033 to 0.112 inch thick.
 - 2. ASTM C 1002 for lighter-gauge steel studs.
- F. Lag Bolts: ANSI B18.2.1.
- G. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and where indicated, flat washers.

2.05 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWWA C2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWWA C31 with inorganic boron (SBX).
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

2.06 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Comply with performance requirements in AWPA C20 (lumber) and AWPA C27 (plywood). Use Interior Type A.
- B. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
- B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- C. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- D. Fastening: Securely attach rough carpentry work to substrate by anchoring and fastening as indicated.
 - 1. Where nailing is indicated, use common wire nails, unless otherwise indicated. Countersink nail heads on exposed carpentry work and fill holes.
 - 2. Select fasteners of size that will not penetrate members where opposite side is exposed or will receive finish materials.
 - 3. Install fasteners without splitting wood; predrill as required.
 - 4. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.

3.02 WOOD NAILERS AND BLOCKING FOR INTERIOR AND WALL-MOUNTED ITEMS

- A. Install wood nailers and blocking where shown and where required for attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.

1. Provide blocking for support of wall-mounted items such as bumper rails, markerboard and tack-board trim, plumbing fixtures, cabinets and casework, adjustable shelving, fire extinguisher cabinets and brackets, vertical blinds, and light fixtures, whether or not shown.
 2. Provide blocking for wall- and ceiling-mounted items which are going to be installed by the Owner, such as window blinds and toilet accessories. If locations of these items is not shown on Drawings, obtain information about intended location before enclosing partitions where blocking has to be installed.
 3. Provide blocking of size shown, or if not shown, of size required to support load and not less than 3/4" thick.
- B. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces.
- 3.03 WOOD BLOCKING AND NAILERS FOR ATTACHMENT OF ROOFING
- A. General: Install nailers and blocking for attachment of roofing and flashing and for support or attachment of rooftop equipment. Fabricate from pressure-preservative treated lumber of sizes indicated and into shapes shown.
 - B. Install continuous blocking or nailers where shown, where required by the roofing manufacturer's standard details, and at other locations required by field conditions for nailing membrane edges and for securing gravel stops, copings and similar sheet metal work.
 1. Principal application applicable to this Project will be around penetrations which are 12" or larger in any dimension.
- 3.04 INSTALLATION OF CONSTRUCTION PANELS
- A. General: Comply with applicable recommendations contained in APA E30 and APA T625 for types of construction panels and applications indicated.
 - B. Electrical and Telephone Backing Panels: Screw or bolt plywood backing panels to blocking. Provide sufficient fasteners to support weight of equipment which is going to be mounted on the backing panel.
- 3.05 CLEAN UP
- A. As work progresses, and at the end of each day's work, remove scraps of wood, loose fasteners, and other debris; sweep clean; and leave the work area safe and free of debris such as screws and nails that may damage other Work in place.

END OF SECTION 06 10 00

SECTION 06 40 00
FINISH CARPENTRY AND ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

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

1.02 SUMMARY

- A. Work Included:
 - 1. Interior standing and running trim.
 - 2. Laminate clad counters.
- B. Related Work Specified in Other Sections:
 - 1. Furring, blocking, and other carpentry work that is not exposed to view: Section 06 10 00, "Rough Carpentry."
 - 2. Wood doors: Section 08 14 00.

1.03 REFERENCED STANDARDS

- A. American National Standards Institute (ANSI)/Builders Hardware Manufacturer's Association, Inc. (BHMA): ANSI/BHMA A156 Series standards for hardware and specialties.
 - 1. ANSI/BHMA A156.9, "American National Standard for Cabinet Hardware."
 - 2. ANSI/BHMA A156.11, "American National Standard for Cabinet Locks."
 - 3. ANSI/BHMA A156.16, "American National Standard for Auxiliary Hardware."
- B. Architectural Woodwork Institute (AWI): "Architectural Woodwork Quality Standards."
- C. Hardwood Plywood and Veneer Association (HPVA): HP-1-1993, "Interim Voluntary Standard for Hardwood and Decorative Plywood."
- D. U. S. Department of Commerce Product Standards: PS-20, "American Softwood Lumber Standard."

1.04 SUBMITTALS

- A. Product data: Submit manufacturer's illustrated product literature, specifications and installation instructions for each type of manufactured product and process specified in this section.
- B. Shop drawings: Submit shop drawings for the following fabrications. Show location of each item; include dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Laminate clad cabinets.
 - 2. Laminate clad countertops.

C. Samples:

1. For initial selection, submit manufacturer's color charts or chains, showing full range of colors, textures, and patterns available for each type of material indicated.
 - a. Plastic laminate.
2. For verification, submit the following samples:
 - a. Lumber with or for transparent finish, 50 square inches, for each species and cut, finished on one side and one edge.
 - b. Laminate clad panel products, 8-1/2 inches, by 11 inches for each type, color, pattern, and surface finish, with separate samples of unfaced panel product used for core.
 - c. Samples showing cabinet corner construction.
 - d. Miter joints for standing trim.
 - e. Exposed cabinet hardware, one unit of each type and finish.

D. Product certificates signed by woodwork manufacturer certifying that products comply with specified requirements.

E. Qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, and other information specified.

1.05 QUALITY ASSURANCE

A. Fabricator and Installer Qualifications: Firm experienced in successfully producing and installing architectural woodwork similar to that indicated for this Project, with sufficient production capacity to produce required units without causing delay in the Work. The fabricator shall assume undivided responsibility for woodwork specified in this section, including fabrication, finishing, and installation.

B. Materials and Fabrication Quality Standard: Comply with applicable requirements of AWI "Quality Standards," except as otherwise indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect woodwork during transit, delivery, storage, and handling to prevent damage, soilage, and deterioration.

B. Do not deliver woodwork until painting, wet work, grinding, and similar operations that could damage, soil, or deteriorate woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas whose environmental conditions meet requirements specified in "Project Conditions."

1.07 PROJECT CONDITIONS

A. Environmental Conditions for Interior Woodwork: Obtain and comply with Woodwork Manufacturer's recommendations for temperature and humidity conditions for woodwork during its storage and installation. Do not install woodwork until these conditions have been stabilized inside the building, so that woodwork is within plus or minus 1.0 percent of optimum moisture content from date of installation through remainder of construction period.

- B. Field Measurements: Where woodwork is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before manufacturing woodwork; show recorded measurements on final shop drawings. Coordinate manufacturing schedule with construction progress to avoid delay of Work.

PART 2 - PRODUCTS

2.01 SOLID LUMBER

- A. Solid Lumber, Transparent Finish: Select White Maple, plain sawn, AWI Grade I.

2.02 PANEL PRODUCTS

- A. General: Provide materials that comply with requirements of the AWI quality standard for each type of woodwork and quality grade indicated.
- B. Panel Core Materials: Provide type of material specified under fabrication or noted on the drawings, complying with the following:
 - 1. Furnish panel core materials which comply with the following standards with respect to properties other than recycled material and urea formaldehyde content:
 - a. Medium-Density Fiberboard: ANSI A208.2, Grade MD.
 - b. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
 - 2. Furnish panel core materials which are made of 100% recycled wood fiber and which contain no added urea formaldehyde. Available products include the following:
 - a. Roseburg "Skyblend" Particleboard.
 - b. SierraPine "Meditate II" panels for dry applications; "Medex" panels for counters with sinks.
- C. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.
 - 1. Color: As selected by Architect from manufacturer's full range.
- D. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.
 - 1. Manufacturer: Subject to compliance with requirements, provide high-pressure decorative laminates by one of the following:
 - a. Formica Corporation.
 - b. Nevamar Company, LLC; Decorative Products Div.
 - c. Pionite Decorative Surfaces; Panolam Industries International Incorporated.
 - d. Wilsonart International; Div. of Premark International, Inc.
 - 2. Colors, Patterns, and Finishes: As selected by Architect from manufacturer's full range of colors and finishes in solid or pattern.

2.03 CABINET HARDWARE

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.
- B. Hardware Standard: Comply with BHMA A156.9 for items indicated by referencing BHMA numbers or items referenced to this standard.
- C. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 135 degrees of opening.
- D. Wire Pulls: Back mounted, 5 inches long, 2-1/2 inches deep, and 5/16 inches in diameter.
- E. Catches: Push-in magnetic catches, BHMA A156.9, B03131.
- F. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.
- G. Drawer Slides: Side-mounted, full-extension, zinc-plated steel drawer slides with steel ball bearings, BHMA A156.9, B05091. Furnish box drawer slides rated for 100 lbf, minimum.
- H. Door Locks: BHMA A156.11, E07121.
- I. Drawer Locks: BHMA A156.11, E07041.
- J. Grommets for Cable Passage through Countertops: 2-inch OD, black, molded-plastic grommets and matching plastic caps with slot for wire passage.
- K. Exposed Hardware Finish: For exposed hardware, provide stainless steel hardware with satin finish that complies with BHMA A156.18 for BHMA 630.
- L. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.04 ACCESSORY MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln-dried to less than 15 percent moisture content, conforming to Section 06100.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and for mounting carpentry items inside toilet rooms. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.
- C. Screws: Select material, type, size, and finish required for each use. Comply with FS FF-S-111 for applicable requirements.
- D. Adhesives:
 - 1. Do not use adhesives that contain urea formaldehyde.
 - 2. VOC Limits: For adhesives and glues used in assemblies which will be installed inside the building, whether shop- or field-fabricated, use products which comply with

limitations on VOC content of adhesives as specified in Section 01600, "Product Requirements."

3. Adhesive for Bonding Plastic Laminate: Contact cement. For bonding edges, use hot-melt adhesive.

2.05 FABRICATION, GENERAL

- A. Interior Woodwork Grade: AWI Premium Grade.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard.
- C. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to 1/16 inch radius, unless other radius is indicated on the drawings.
- D. Complete fabrication, including assembly, finishing, and hardware application, before shipment to project site to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- E. Factory-cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs. Seal edges of openings in countertops with a coat of varnish.
 1. When fabricating countertops for sinks, coordinate with dimensions and clearance requirements for sinks, drains and faucets.

2.06 LAMINATE CLAD CABINETS

- A. Quality Standard: Comply with AWI Section 400 requirements for laminate cabinets.
- B. AWI Type of Cabinet Construction: Flush overlay.
- C. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
 1. Vertical Surfaces: VGS, 0.028 inch thick.
 2. Horizontal Surfaces Other Than Tops: HGS, 0.05 inch thick.
 3. Edges: Match laminate surface in Grade, color, pattern, and finish.
- D. Materials for Semiexposed Surfaces: Provide surface materials indicated below:
 1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade VGS or thermoset decorative panels.
 - a. Shelf Edges: Match face laminate in thickness, color and finish.
 - b. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade VGS.
 2. Drawer Sides and Backs: Thermoset decorative panels.
 3. Drawer Bottoms: Hardwood plywood or thermoset decorative panels.
- E. Concealed Backs of Panels with Exposed Plastic Laminate Surfaces: High-pressure decorative laminate, Grade BKL.

2.07 LAMINATE-CLAD CABINET TOPS AND COUNTERS

- A. Quality Standard: Comply with AWI Section 400 requirements for high-pressure decorative laminate countertops.
- B. High-Pressure Decorative Laminate Grade: HGS, 0.048 inch thick.
- C. Edge Treatment: As indicated.
- D. Core Material: Particleboard or medium-density fiberboard; except at counters with sinks, use particleboard made with exterior glue or medium-density fiberboard made with exterior glue.

2.08 FACTORY FINISHING OF ARCHITECTURAL WOODWORK

- A. Quality Standard: Comply with AWI Section 1500 unless otherwise indicated.
- B. Finish architectural woodwork at factory. Defer only final touch-up, cleaning, and polishing until after installation.
- C. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces and similar preparations for finishing of architectural woodwork, as applicable to each unit of work.
- D. Transparent Finish for Closed-Grain Woods: AWI Catalyzed Polyurethane finish system, Premium grade; satin sheen, 30°-50° on 60° Gloss Meter (ASTM D 523).

2.09 SHELVING AND SUPPORTS

- A. Closet and Storage Shelving: Particleboard overlaid with low-pressure decorative laminate such as "melamine"; white color. Finish both faces and all four edges.
- B. Shelving Supports: Heavy-duty 16-gauge steel double-slotted standards and 12 inch deep steel shelf brackets; chrome finish; equal to Knappe & Vogt 85 ANO standard with 185LL ANO brackets.
- C. Closet Rods: Stainless steel clad tubing, 1-1/16" diameter, 0.087 inch minimum wall thickness; with polished chrome escutcheon supports. One of the following or approved equal.
 - 1. Knappe & Vogt #660 rods with #735 and 735 supports.
 - 2. EPCO (The Engineered Products Co.) #870 rods with #850 and 860 supports.
- D. Supports for Open Front Counters: Bent strap steel brackets, dimensions as shown on Drawings, pre-drilled with pair of screw holes at each end of the strap; minimum 400 lb. capacity per pair; Doug Mockett & Co. Model SWS4 or equal.
 - 1. Metal Finish: Shop-finished with manufacturer's standard powder-coat in color selected by Architect from standard color options.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Condition woodwork to average prevailing humidity conditions in installation areas before installing.
- B. Deliver concrete inserts and similar anchoring devices to be built into substrates well in advance of time substrates are to be built.
- C. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including back priming and removal of packing.

3.02 INSTALLATION, GENERAL

- A. Quality Standard: Install woodwork to comply with AWI Section 1700 for same grade specified in Part 2 of this section for type of woodwork involved.
- B. Install woodwork plumb, level, true, and straight with no distortions. Shim as required with concealed shims. Install to a tolerance of 1/8 inch in 8'-0" for plumb and level (including tops) and with no variations in flushness of adjoining surfaces.
- C. Scribe and cut woodwork to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.
- D. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Except where prefinished matching fastener heads are required, use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork and matching final finish where transparent finish is indicated.

3.03 STANDING AND RUNNING TRIM

- A. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to the greatest extent possible. Stagger joints in adjacent and related members. Cope at returns and miter at corners.

3.04 LAMINATE-CLAD CABINETS AND TOPS

- A. Cabinets: Install without distortion so that doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete the installation of hardware and accessory items as indicated. Maintain veneer sequence matching (if any) of cabinets with transparent finish.
- B. Tops and Counters: Anchor securely to base units and other support systems as indicated, using concealed fasteners.
 - 1. Laminate-Clad Splashback: Unless shown otherwise, install 4-inch high splashback wherever top or counter meets a vertical surface. Bed splashback in a continuous bead of sealant.

3.05 MISCELLANEOUS CARPENTRY

- A. Closet Shelving and Poles: Install level. Mount poles at 48 inch height to comply with accessibility requirements, unless other height is shown. Mount shelf 2-1/2 to 3 inches above centerline of pole to allow adequate clearance for hangers, unless other height is shown. Support on three sides with 1 x 2 wood set on edge under shelf and screwed to blocking in wall.
- B. Storage Shelving: Install in shelf supports in accordance with manufacturer's instructions. Locate standards as required so that each shelf unit is supported on at least two supports, one located near each end of each shelf unit, and with intermediate supports spaced as recommended by the manufacturer of the standards and brackets to support the design loads specified in Part 2 of this Section. Space shelves vertically as shown, or if not shown, at nominal 12 inch center to center spacing.

3.06 ADJUSTMENT AND CLEANING

- A. Repair damaged and defective woodwork to eliminate defects functionally and visually; where not possible to repair to Architect's satisfaction, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean and adjust hardware.
- C. Clean woodwork on exposed and semiexposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

3.07 PROTECTION

- A. Protect finish carpentry and casework and maintain environmental conditions in a manner acceptable to manufacturer and Installer, to ensure that woodwork is without damage or deterioration at time of Substantial Completion.

END OF SECTION 06 40 00

SECTION 07840
THROUGH-PENETRATION FIRESTOP SYSTEMS

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The general provisions of the Contract, including General and Supplementary Conditions and Division 1 - General Requirements, apply to work specified in this Section.

1.02 SUMMARY

- A. This Section includes through-penetration firestop systems for penetrations through, and at the top of, the following fire-resistance-rated assemblies, including both empty openings and openings containing penetrating items:
1. Floors.
 2. Walls and partitions.
 3. Smoke barriers.
 4. Construction enclosing compartmentalized areas.
- B. Related Sections include the following:
1. Division 23 Sections for sleeve and piping penetrations.
 2. Division 26 Sections specifying cable and conduit penetrations.

1.03 DEFINITIONS

- A. Firestops: Specially tested materials used to reestablish the integrity of a fire rated wall, floor, or other partition after the structure has been breached for the through-penetration of building.
- B. Through Penetration: Pipes, conduits, ducts, cable trays, cable, wire or other element passing completely through an opening in a fire rated barrier/assembly.
- C. Membrane Penetration: Penetration of a fire rated barrier that breaches on side, but does not pass completely through to the other side.
- D. System: The combination of specific materials and/or devices, including the penetrating item(s) required to complete the firestop, as tested by an independent third party test facility.
- E. Barrier/Assembly: A wall, floor, or other partition with a fire – smoke rating of 1, 2, or 3 hours.
- F. F-Rating: The time a firestop (penetrating item/building material/firestop material) can withstand direct flame without a burn through as tested to ASTM E814 / UL 1479.
- G. T-Rating: The amount of time a through-penetration firestop limits the temperature rise on the cold side (outside the test furnace) as tested to ASTM E814 / UL 1479.
- H. L-Rating: The L-Rating criteria determines the amount of air leakage, in cubic feet per minute, per square foot of opening (CFM/sq. ft). through the firestop system at ambient and/or 400 degrees F. air temperature at an air pressure differential of 0.30in. W.C. L-Ratings are used to determine the suitability of a firestop to stop smoke and toxic gases in accordance with NFPA Life Safety Code, 101.

1.04 PERFORMANCE REQUIREMENTS

- A. General: For the following constructions, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated.
 - 1. Fire-resistance-rated load-bearing walls, including partitions, with fire-protection-rated openings.
 - 2. Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings.
 - 3. Fire-resistance-rated floor assemblies.
- B. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
- C. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, as determined per ASTM E 814, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
 - 1. Penetrations located outside wall cavities.
 - 2. Penetrations located outside fire-resistive shaft enclosures.
 - 3. Penetrations located in construction containing fire-protection-rated openings.
 - 4. Penetrating items larger than 4-inch-diameter nominal pipe or 16 sq. in. overall cross-sectional area.
- D. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.
 - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 - 2. For floor penetrations with annular spaces exceeding 4 inches (100 mm) in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means.
 - 3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
 - 4. For firestop systems exposed to view, provide acrylic based product for compatibility with finish painting.
- E. For through-penetration firestop systems exposed to view, provide products with flame-spread ratings of less than 25 and smoke-developed ratings of less than 450, as determined per ASTM E 84.

1.05 SUBMITTALS

- A. Product Data: For each type of through-penetration firestop system product indicated. Literature shall indicate product characteristics, typical uses, performance and limitation criteria, and test data.
- B. Shop Drawings: For each through-penetration firestop system, show each kind of construction condition penetrated, relationships to adjoining construction, and kind of penetrating item.

Include UL Tested System designation that evidences compliance with requirements for each condition indicated.

1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
 2. Engineering Judgments: Where Project conditions require modification of qualified testing and inspecting agency's illustration to suit a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer.
- C. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed through-penetration firestop systems similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, from a single manufacturer.
- C. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in "Performance Requirements" Article:
1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
 2. Through-penetration firestop systems are identical to those tested per ASTM E 814. Provide rated systems complying with the following requirements:
 - a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
 - b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by U.L. in the "Fire Resistance Directory."
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
- E. Special Inspections: Allow for one of each type of firestopping system to be removed and inspected for conformance with approved submittals. All firestopping shall be inspected prior to the installation of ceilings.
- F. Above Ceiling Review: Prior to the installation of ceilings, a review of construction completion shall be done for firestopping and other items that will not be visible when the ceilings have been installed.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.
- B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.08 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.09 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- C. Notify Architect at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.
- D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until Architect and building inspector, if required by authorities having jurisdiction, have examined each installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Hilti Construction Chemicals, Inc.
 2. 3M Fire Protection Products.
 3. Nelson Firestop Products.
 4. RectorSeal Corporation (The).
 5. Specified Technologies Inc.

2.02 FIRESTOPPING, GENERAL

- A. Compatibility: Provide through-penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through-

penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

- B. Accessories: Provide forming and damming materials, substrate primers, metal collars and sleeves, and other accessories that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated.

2.03 FILL MATERIALS

- A. General: Provide the types of fill, void or cavity materials used in the referenced U.L. tested and approved Through-Penetration Firestop System.
- B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- C. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.
- D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.
- F. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- H. Mortars: Prepackaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- I. Pillows/Bags: Reusable, heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.
- J. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- K. Silicone Sealants: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealants. Furnish pourable (self-leveling) formulation for use in openings in floors and other horizontal surfaces, and furnish nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.

2.04 MIXING

- A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with written recommendations of firestop system manufacturer and the following requirements:
 - 1. Remove foreign materials that could interfere with adhesion of firestop system materials.
 - 2. Clean surfaces of substrates and penetrating, to ensure optimum bond with firestop system components. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Mask adjoining surfaces that will remain exposed on completion of Work and that may be permanently stained or damaged by contact with firestopping materials, or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.03 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

- A. General: Install through-penetration firestop systems to comply with "Performance Requirements" Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Provide through-penetration firestop systems for conditions specified whether or not firestopping is indicated.
 - 1. Through-Penetrations: Install through-penetration firestop systems in all open penetrations and in the annular space in all penetrations in fire-rated barriers.

2. Install through-penetration firestop systems in rated walls. Where required by code, provide products that meet the requirements of third party time/temperature testing.
 3. Smoke Stopping: Provide smoke stops for through-penetrations, membrane penetrations, and construction gaps with a material approved and tested for such applications.
- C. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
1. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- D. Install fill materials for firestop systems by proven techniques to produce the following results:
1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.04 FIELD QUALITY CONTROL

- A. Prior to installation of ceilings, inspect penetrations requiring firestopping to verify complete installation of firestopping materials. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued.
- B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.
- C. Reinstall firestopping materials that have been removed for inspection.

3.05 IDENTIFICATION

- A. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:
 1. The words: "Warning--Through-Penetration Firestop System--Do Not Disturb. Notify Building Management of Any Damage."
 2. Contractor's name, address, and phone number.
 3. Through-penetration firestop system designation of applicable testing and inspecting agency.
 4. Date of installation.
 5. Through-penetration firestop system manufacturer's name.
 6. Installer's name.

3.06 CLEANING AND PROTECTION

- A. Clean off excess fill materials and sealants from adjacent surfaces as work progresses, using cleaning materials and methods approved by manufacturer of firestopping products and which will not harm surfaces in which opening and joints occur.
- B. After firestopping has cured, remove temporary forming and damming materials.
- C. Protect firestopping during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to produce firestopping complying with specified requirements.

END OF SECTION 07840

SECTION 07 92 00
JOINT SEALANTS

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 General Requirements, apply to work specified in this Section.

1.02 SUMMARY

- A. Work Includes: Joint sealants and sealant backers. Refer to drawings and to the schedules at the end of this section for typical sealant applications included in this Section.
- B. Related Work Specified in Other Sections:
 - 1. Fire-stopping sealants: Section 07 84 00, "Firestop Systems."
 - 2. Glazing sealants: Section 08 80 00, "Glazing."
 - 3. Concealed acoustical sealant: Section 09 29 00, "Gypsum Board Systems."

1.03 SUBMITTALS

- A. Product data: Submit technical specifications and manufacturers handling and installation instructions for each joint sealant product and accessory required.
- B. Samples:
 - 1. For selection of color, submit manufacturer's standard bead samples of actual sealant, showing full range of colors available.
 - 2. Samples for verification: Install joint sealant samples in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- C. Product Certificates: Signed by manufacturers of joint sealants certifying that products furnished comply with requirements and are suitable for the use indicated.
- D. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners.
- E. Field Test Reports: For pre-installation and post-installation testing specified in the "Field Quality Control Article."
 - 1. Pre-Installation Testing: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates.
 - 2. Post-Installation Testing: Include information specified in "Field Quality Control" Article.

- F. Compatibility and Adhesion Test Reports: From sealant manufacturer indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants and interpreting
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- G. Product Test Reports: From a qualified testing agency indicating sealants comply with requirements, based on comprehensive testing of current product formulations.
- H. Closeout Submittals: Special warranties specified in this Section.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who specializes in installing joint sealants similar in material, design, and extent to that indicated for this Project and whose work has resulted in joint sealant installations with a record of successful in-service performance.
- B. Source Limitations: Obtain each type of joint sealant materials through one source and from a single manufacturer.
- C. Preconstruction Compatibility and Adhesion Testing: Submit to joint sealant manufacturers samples of materials that will contact or affect joint sealants for compatibility and adhesion testing as indicated below. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - 1. Use manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - 2. Submit not fewer than 9 pieces of each type of material, including joint substrates, shims, joint sealant backings, secondary seals, and miscellaneous materials.
 - 3. For materials failing tests, obtain joint sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.
 - 4. Testing will not be required if joint sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.
- D. Product Testing: Submit results of testing of current sealant formulations performed by a testing agency within the previous 36-month period.
 - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
 - 2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.
 - 3. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.

- E. Pre-Installation Conference: Conduct conference at Project site to comply with requirements of Section 01310, "Project Management and Coordination."

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project 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. Store and handle materials in compliance with manufacturer's written instructions to prevent deterioration or damage. Protect from moisture, temperatures outside limits set by sealant manufacturer, contaminants, and other potential causes of deterioration.

1.06 PROJECT CONDITIONS

- A. Environmental Conditions: Proceed with installation of joint sealants only when substrates are dry, and when ambient and substrate temperature conditions are within the limits permitted by joint sealant manufacturer or above 40°F (4.4°C), whichever is more stringent.
- B. Joint Width Conditions: Do not proceed with installation of joint sealants unless joint widths are within the range allowed by joint sealant manufacturer for application indicated.
- C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors: As scheduled in the Sealant Schedule at the end of this Section. Where color is not indicated, Architect will select colors from manufacturer's full range of standard colors for products which are exposed to view in the finished work.
- C. Elastomeric Sealant Standard: Comply with ASTM C 920, including requirements referencing ASTM C 920 classifications for type, grade, class, and uses, and with other requirements indicated for each liquid-applied chemically curing sealant.
- D. Movement Capability: Where movement capability greater than $\pm 25\%$ is required, provide elastomeric sealants with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at the time of installation and remain in compliance with other requirements of ASTM C 920 for uses indicated.

2.02 JOINT SEALANTS

- A. Silicone Construction Sealant: One-part silicone sealant complying with ASTM C920, Type S, Grade NS, Class 50 or better; low-modulus, neutral cure. Choose from the following:

1. Dow Corning "790"
 2. Tremco "Spectrem 1"
 3. GE Silicones "Silpruf" or "UltraPruf SCS2300."
 4. Sonneborn Building Products Div., ChemRex Inc., "Omniseal."
- B. Sanitary Silicone Sealant: Mildew resistant 1-part silicone sealant complying with ASTM C920, Type S, Grade NS, Class 25, Uses NT, G, A, and other non-porous substrates. Choose from the following:
1. Dow Corning "786 Mildew Resistant"
 2. GE Silicones, "Sanitary 1700"
 3. Tremco "Tremsil 200"
- C. Acrylic-Emulsion Sealant: ASTM C 834 non sag, mildew-resistant, paintable latex sealant, capable of accommodating joint movement of 5 percent in both extension and compression for a total of 10 percent. Choose one of the following:
1. "AC-20," Pecora Corp.
 2. "Sonolac," Sonneborne Building Products Div., ChemRex, Inc.
 3. "Tremco Acrylic Latex 834," Tremco, Inc.

2.03 JOINT SEALANT BACKING

- A. General: Provide sealant backings which are non staining; compatible with joint substrates, sealants, primers and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330-96, Type B (bicellular with a surface skin) or Type C (closed cell with surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.04 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint sealant manufacturer to promote adhesion, as determined from preconstruction joint sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming in any way joint substrates and adjacent nonporous surfaces, and formulated to promote optimum adhesion of sealants with joint substrates.
- C. Masking Tape: Non staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealant performance.
- B. Proceed with installation of joint sealants only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. In preparation for Alternate 6, should this Alternate be selected by the Owner, remove the existing sealant from concrete control joints and prepare joint substrates for new sealant under this Section.
- B. Perform preinstallation field testing specified in "Field Quality Control" article. Begin installation only after testing has been completed and adjustments made to ensure adhesion.
- C. Surface Cleaning: Clean out joints immediately before installing joint sealants.
 - 1. Remove foreign material that could interfere with adhesion, including surface dirt, old joint sealant, dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), oil, grease, waterproofing, water repellents, water, and frost.
 - 2. Clean porous joint surfaces, such as concrete and masonry, by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
 - 3. Remove laitance and form release agents from concrete.
 - 4. Clean non-porous surfaces such as glazed tile with chemical cleaners or by other means that do not stain or harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- D. Joint Priming: Prime joint substrates where recommended by joint sealant manufacturer. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.
- E. Masking: Mask surfaces adjoining joint with masking tape to prevent contact of sealant when adjoining surfaces might be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.03 INSTALLATION OF JOINT SEALANTS

- A. Do not begin installation of sealant until mock-up and test installation have been approved for that type of sealant.

- B. Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, unless more stringent requirements apply. Maintain correct sealant depth to joint width ratio for optimum performance.
- C. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
 - 1. Identify field test sample areas as a standard for acceptable workmanship. Maintain level of workmanship approved in field test sample throughout the installation.
- D. Sealant Backings: Install sealant backings in joints where required to support sealants during application, to control joint depth, and to eliminate back bond. Butt ends-to-end joints of backings snugly; do not leave gaps between ends. Do not stretch, twist, puncture or tear sealant backings.
 - 1. Where width of joint is 1/2 in. or less, place cylindrical sealant backing so that depth of sealant bead will be approximately equal to the joint width.
 - 2. Where width of joint is greater than 1/2 inch, place cylindrical sealant backing so that depth of sealant bead will be 1/2 inch.
 - 3. Where joint is not deep enough to accommodate cylindrical sealant backing and proper depth of sealant, omit cylindrical sealant backing and install bond breaker tape.
 - 4. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- E. Bond Breakers: Where cylindrical sealant backings are not used, install bond breaker tape between sealants and joint fillers or back of joints.
- F. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- G. Tooling: Immediately after sealant application and before skinning or curing begins, tool non-sag sealants to form smooth, uniform beads with slightly concave profile, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
 - 1. Provide joint configurations of types indicated in accordance with Figures in ASTM C 1193. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
- H. Preparation of Gypsum Board: Prepare interior drywall surfaces to be painted by sealing cracks and gaps at perimeter of drywall, around hollow metal frames, and at similar locations to seal out dust and provide a smooth surface for finish painting. Tool beads to insure full, firm contact with both faces of the joints, strike off excess sealant, and finish to a smooth, wrinkle-free, slightly concave surface.

- I. Clean surfaces adjacent to the joint as the work progresses. Remove sealant smears by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.04 FIELD QUALITY CONTROL

- A. Preinstallation Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to joint substrates using sealant manufacturer's standard methods.
 1. If sealant fails to adhere to joint substrates or if it tears before reaching maximum movement capability, modify substrate preparation techniques, or change to another acceptable sealant, and retest.
- B. Acceptance of Workmanship: Sealant bead shall be uniform in appearance, relationship to the face of the wall, width and depth of sealant bead, straightness of bead edges, uniformity of tooled profile, surface free of drips, bulges, tears and skips, and even appearance for the entire length of the joint.
 1. Remove samples which do not meet acceptance standards, clean edges of test joint, and install additional samples until workmanship is approved. Modify installation methods if necessary to achieve an appropriate degree of control and uniformity.
- C. Post-Installation Field-Adhesion Testing: During and after installation, monitor quality of materials and workmanship by field-testing adhesion of sealant to joint substrates as follows:
 1. Extent of Testing: Test completed elastomeric sealant joints as follows:
 - a. Perform 10 tests for the first 1000 feet (300 m) of joint length for each type of elastomeric sealant and joint substrate.
 - b. Perform one test for each 1000 feet (300 m) of joint length thereafter or one test per each floor per elevation.
 2. Test Method: Test joint sealants by hand-pull method described above.
 3. Inspect joints and report on the following:
 - a. Sealant completely filling joint cavities, absence of voids.
 - b. Sealant dimensions and configurations complying with specified requirements.
 - c. For tested joints, report on whether sealants connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field- adhesion hand-pull test criteria.
 4. Report observations during inspection and record test results in a field adhesion test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
 5. Repair sealants pulled from test area by applying new sealants following same procedures used to originally seal joints. Ensure that original sealant surfaces are clean and new sealant contacts original sealant.
- D. Evaluation of Field-Test Results: Sealants which pass field adhesion testing and which comply with other indicated requirements, will be considered satisfactory. Remove sealants that fail to

adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.05 PROTECTION AND REPAIR

- A. Protect joint sealants during and after curing period from contamination and from damage, so that sealants are without deterioration or damage at time of Substantial Completion.
- B. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants and repair so that repaired areas are indistinguishable from original work.

3.06 SEALANT SCHEDULE

- A. Install sealants at all interior joints, including joints between new and existing construction, as necessary to make building interior construction under this Contract air-tight, light-tight, and water-tight where applicable. Without limitation, seal interior expansion joints and control joints, fill gaps and joints in surfaces in preparation for interior painting, and seal joints at changes of materials.
- B. The following schedule specifies the type of sealant to be used at specific locations.

<u>Typical Applications</u>	<u>Joint Sealant</u>
1. Exterior joints:	Silicone construction sealant
2. Joints between interior wall surfaces and metal frames of exterior doors and windows:	Paintable acrylic latex sealant.
3. Joints between interior wall surfaces and metal frames of interior doors and windows:	Paintable acrylic latex sealant.
4. Control joints in tile:	Sanitary silicone sealant.
5. Joints between interior wall surfaces and casework and countertops in laboratories:	Sanitary silicone sealant.
6. Joints between interior wall surfaces and casework and countertops in kitchen:	Sanitary silicone sealant.
7. Joints between interior wall surfaces and casework and countertops other areas:	Paintable acrylic latex sealant.
8. Joints between plumbing fixtures and adjacent wall and floor surfaces:	Sanitary silicone sealant.

END OF SECTION 07 92 00

DOOR SCHEDULE

DOOR		LOCATION				DOOR			FRAME			HDWR	REMARKS
NO.	TO	FROM	SIZE	MAT'L	TYPE	LABEL	SIZE	TYPE	MAT'L	SET		(Note)	
SECOND FLOOR													
297	MEN 297	CORRIDOR	3'-0" x 7'-0"	WD.	A		3'-4" x 7'-2"	1	HM	1			
X298	JAN 298	CORRIDOR	3'-0" x 7'-0"	WD.	EXISTING		3'-4" x 7'-2"	EXISTING		2		Existing door and drame, relocated to position indicated on plan.	
299	WOMEN 299	CORRIDOR	3'-0" x 7'-0"	WD.	A		3'-4" x 7'-2"	1	HM	1			
THIRD FLOOR													
397	WOMEN 397	CORRIDOR	3'-0" x 7'-0"	WD.	A		3'-4" x 7'-2"	1	HM	1			
X398	JAN 398	CORRIDOR	3'-0" x 7'-0"	WD.	EXISTING		3'-4" x 7'-2"	1	HM	2		Existing door and drame, relocated to position indicated on plan.	
399	MEN 399	CORRIDOR	3'-0" x 7'-0"	WD.	A		3'-4" x 7'-2"	1	HM	1			
FIFTH FLOOR													
597	MEN 597	CORRIDOR	3'-0" x 7'-0"	WD.	A		3'-4" x 7'-2"	1	HM	1			
598	JAN 598	CORRIDOR	3'-0" x 7'-0"	WD.	A		3'-4" x 7'-2"	1	HM	2			
599	WOMEN 599	CORRIDOR	3'-0" x 7'-0"	WD.	A		3'-4" x 7'-2"	1	HM	1			

SECTION 08 11 13
STEEL DOOR FRAMES

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 General Requirements, apply to work specified in this Section.

1.02 SUMMARY

- A. Work includes hollow metal frames and mullions for doors, sidelights, and interior fixed windows.
- B. Related Work Specified in Other Sections:
 - 1. Door Schedule: Section 08 00 00.
 - 2. Wood doors: Section 08 14 00.
 - 3. Steel access doors: Section 08 31 00.
 - 4. Door hardware: Section.08 71 00
 - 5. Glass and glazing into hollow metal frames: Section 08 80 00.
 - 6. Painting primed frames: Section 09 90 00.

1.03 REFERENCE STANDARDS

- A. American National Standards Institute (ANSI)/Door and Hardware Institute (DHI):
 - 1. ANSI/DHI A115 Series, preparation for bolts, closers, latches, locks, in steel frames.
 - 2. ANSI/DHI A115.IG, "Installation Guide for Doors and Hardware."
 - 3. ANSI A250.8, "Recommended Specifications for Standard Steel Doors and Frames."
- B. Steel Door Institute (SDI)
 - 1. SDI-105, "Recommended Erection Instructions for Steel Frames."
 - 2. SDI-111 Series, "Recommended Details, Steel Doors and Frames."
 - 3. SDI-117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
 - 4. SDI-122, "Installation and Trouble-Shooting Guide for Standard Steel Doors and Frames."

1.04 SUBMITTALS

- A. Product Data: Submit, for each type of frame, manufacturer's illustrated literature, including details of construction, materials, dimensions, hardware preparation, core, profiles, and finishes.
- B. Shop Drawings: Show fabrication and installation of steel frames. Include details, elevations, conditions at openings, details of construction, location and installation requirements of door hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.
 - 1. Note glass thickness and setting method to confirm that glazing frames and stops have been coordinated with glass and glazing requirements.

- C. Door Schedule: Use same reference designations indicated on Drawings in preparing schedule for doors and frames.

1.05 QUALITY ASSURANCE

- A. Source Limitations: Provide hollow metal frames manufactured by a single firm specializing in the production of this type of work, unless otherwise acceptable to the Architect.
- B. Steel Door and Frame Standard: Comply with ANSI A250.8, unless more stringent requirements are indicated.
- C. Steel Sheet Thicknesses: Thickness dimensions, including those referenced in ANSI A250.8, are minimums as defined in referenced ASTM standards for both uncoated steel sheet and the uncoated base metal of metallic-coated steel sheets.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished frames.
- B. Inspect frames upon delivery for damage and notify shipper and supplier if damage is found. Minor damages may be repaired provided refinished items are equal in all respects to new work and acceptable to Architect. Remove and replace damaged items that cannot be repaired as directed.
- C. Store frames at building site under cover. Place units on minimum 4-inches high wood blocking. Avoid use of non-vented plastic or canvas shelters which could create humidity chamber.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide standard steel frames by one of the following:
 1. Amweld Building Products
 2. Ceco Corp.
 3. Curries Company.
 4. Republic Builders Products.
 5. Steelcraft Manufacturing Co.

2.02 MATERIALS

- A. Hot-Rolled Steel Sheets: ASTM A 569/A 569M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- B. Cold-Rolled Steel Sheets: ASTM A 366/A 366M, Commercial Steel (CS), or ASTM A 620/A 620M, Drawing Steel (DS), Type B; stretcher-leveled standard of flatness.

2.03 PRESSED METAL FRAMES

- A. General: Provide steel frames for wood doors, sidelights and fixed glazing that comply with ANSI A250.8 and with details indicated for type and profile. Conceal fastenings, unless otherwise indicated. For exposed fasteners, provide countersunk flat head screws and bolts.
- B. Interior Frames: Fabricated from cold-rolled steel sheet.
 - 1. Fabricate frames as knocked down unless otherwise indicated.
 - 2. Frames for Wood Doors: 0.053-inch-thick steel sheet.
- C. Silencers: Drill stops to receive 3 silencers on strike jambs of single-door frames and 2 silencers on heads of double-door frames.
- D. Plaster Guards: Provide 0.016-inch-thick, steel sheet plaster guards or mortar boxes to close off interior of openings; place at back of hardware cutouts where mortar or other materials might obstruct hardware operation.
- E. Supports and Anchors: Fabricated from not less than 0.042-inch-thick, electrolytic zinc-coated or metallic-coated steel sheet.
- F. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where zinc-coated items are to be built into exterior walls, comply with ASTM A 153/A 153M, Class C or D as applicable.

2.04 FABRICATION

- A. Fabricate steel door frame units to comply with ANSI A250.8 and to be rigid, neat in appearance and free from defects including warp or buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory-assembled before shipment, to assure proper assembly at project site.
- B. Clearances: Specified in Section 08210.
- C. Tolerances: Comply with SDI 117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- D. Fabricate concealed stiffeners, reinforcement and moldings from either cold- or hot-rolled steel.
- E. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.
- F. Frame Construction: Fabricate frames to shapes and sizes shown.
 - 1. Provide knock down frames.
- G. Finish Hardware, General: Locate hardware as indicated on final shop drawings or, if not indicated, in accordance with DHI "Recommended Locations for Builder's Hardware on Standard Steel Doors and Frames" and ANSI A205.8.
- H. Hardware Preparation: Prepare hollow metal frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware

supplier. Comply with applicable requirements in ANSI A250.6 and ANSI A115 Series specifications for door and frame preparation for hardware.

1. Reinforce frames at finish hardware locations with steel reinforcing plates complying with ANSI A205.8-1998 for minimum thicknesses and dimensions.
 - a. Hinges: 0.123 inch (12 MSG)
 - b. Lock Face, Flush and Surface Bolts: 0.067 inch (14 MSG)
 - c. Surface-Applied Closers, Hold-Open Arms, and Exit Devices: 0.067 inch (14 MSG)
 - d. Pull Plates and Bars: 0.053 inch (16 MSG) on door only.
 - e. Floor checking hinges and pivot hinges: 0.167 inch (7 MSG)
 - f. Other Surface-Mounted Hardware: 0.053 inch (16 MSG).
 - I. Reinforce door frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.
 - J. Glazing Stops: Manufacturer's standard, formed from 0.032-inch-thick steel sheet.
 1. Provide nonremovable glazing stops on secure side of interior door openings; provide screw-applied, removable glazing stops on inside/non-secure side.
 2. Drill stops and frame to receive countersunk flat-head machine screws spaced uniformly not more than 12 inches on center. Furnish flat head machine screws of appropriate size for fastening stops to frame.
- 2.05 FINISHES
- A. Shop Painting, General: Clean, treat, and paint exposed surfaces of hollow metal frame units, including galvanized surfaces.
 - B. Preparation: Clean steel surfaces to remove mill scale, rust, oil, grease, dirt, and other foreign materials before application of paint.
 - C. Prime Finish: Manufacturer's standard, factory-applied coat of rust-inhibiting primer complying with ANSI A250.10 for acceptance criteria.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Install hollow metal frames, and accessories in accordance with final shop drawings, manufacturer's installation instructions, and these specifications.
- B. Placing Frames: Comply with provisions of ANSI/SDI A250.8-2003 unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.
 1. Place frames prior to construction of enclosing walls and ceilings.

2. In metal stud partitions, provide at least three wall anchors per jamb; install wall anchors adjacent to location on hinge jamb and at corresponding heights on strike jamb, and fasten to the studs with screws.

3.02 ADJUSTING AND CLEANING

- A. Prime Coat Touch-up: Immediately after installation, sand smooth rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.
- B. C. Just prior to the inspection at the time of Substantial Completion, clean frames.

END OF SECTION 08 11 13

SECTION 08 14 00
WOOD DOORS

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 General Requirements, apply to work specified in this Section.

1.02 SUMMARY:

- A. This Section specifies solid core flush wood doors with wood veneer faces.
- B. Other work included in this section:
 - 1. Factory-finishing.
 - 2. Factory fitting to frames and factory machining for hardware.
- C. Related Work Specified in Other Sections:
 - 1. Door Schedule: Section 08 00 00.
 - 2. Metal door frames for flush wood doors: Section 08 11 13
 - 3. Glazing of wood doors: Section 08 80 00.

1.03 REFERENCED STANDARDS

- A. American National Standards Institute (ANSI): See joint ANSI/DHI and ANSI/HPVA references listed below.
- B. Architectural Woodwork Institute (AWI): "Architectural Woodwork Quality Standards"; Section 1300 "Architectural Flush Doors"
- C. Door and Hardware Institute (DHI):
 - 1. ANSI/DHI A115-W (1988): "Wood Door Preparation Standards."
 - 2. DHI WDHS-3 (1993): "Recommended Hardware Locations for Wood Flush Doors."
- D. Hardwood Plywood Veneer Association (HPVA): ANSI/HPVA HP-1-1994, Standard for Hardwood and Decorative Plywood.
- E. National Wood Window and Door Association (NWWDA): NWWDA I.S.1 "Industry Standard for Wood Flush Doors."

1.04 SUBMITTALS:

- A. Product Data: Manufacturer's technical data for each type of door, including details of core and edge construction, trim for openings and louvers, and factory-finishing specifications.
- B. Shop Drawings: Indicate location, size and hand of each door, elevation of each kind of door, construction details not covered in Product Data, location and extent of hardware blocking, fire ratings, dimensions and locations for mortises and holes for hardware, requirements for veneer matching, factory finishing and other pertinent data.

- C. Samples for Initial Selection: Color charts consisting of actual materials in small sections for faces of factory-finished doors with transparent finish. Show the full range of colors available for stained finishes.
- D. Samples for Verification:
 - 1. Corner sections of flush doors, approximately 12 inches square, with door faces and edges representing the typical range of color and grain for each species of veneer and solid lumber. Finish sample with same materials proposed for factory-finish.
 - a. Finish sample with same materials proposed for factory-finished doors.
 - 2. Frames for light openings, 6 inches long, for each material, type, and finish required.

1.05 QUALITY ASSURANCE

- A. Source Limitations: Obtain all doors of each type from a single manufacturer.
- B. Architectural Woodwork Institute (AWI): Comply with "Architectural Woodwork Institute Quality Standards," Section 1300 "Architectural Flush Doors."

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Protect doors during transit, storage and handling to prevent damage, soiling and deterioration. Comply with requirements of referenced standards and manufacturer's written instructions.
 - 1. Individually package doors in plastic bags or cardboard cartons.
- B. Mark each door with individual opening numbers used on Shop Drawings. Use removable tags or concealed markings.

1.07 PROJECT CONDITIONS

- A. Conditioning: Do not deliver or install doors until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels, or at indoor relative humidity of at least 25% and not more than 55%, during the remainder of the construction period.

1.08 WARRANTY

- A. Door Manufacturer's Warranty: Submit written agreement on door manufacturer's standard form signed by manufacturer, Installer, and Contractor, agreeing to repair or replace defective doors that have warped (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section or that show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span, or do not conform to tolerance limitations of referenced quality standards.
 - 1. Warranty shall be in effect during the Life of the Installation.
- B. Contractor's Responsibilities: Replace or refinish doors where Contractor's work contributed to rejection or to voiding of manufacturer's warranty.

- C. Door manufacturer's warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

- A. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
 1. Algoma Hardwoods, Inc.
 2. Eggers Industries, Architectural Door Division.
 3. Marshfield Door Systems, Inc..
 4. VT Industries, Inc.

2.02 INTERIOR WOOD DOORS

- A. General: Fabricate wood doors to comply with AWI Section 1300, and as specified in this article.
- B. Doors for Transparent Finish: AWI Premium Grade, 5-ply flush wood doors, as follows:
 1. Faces: Select White Maple, plain sliced; HPVA Grade A, face veneer at least 1/50 inch thick to preclude sandthrough. Center match and book match veneer slices. **(Oak doors shall be used on the 3rd Floor to match the adjacent oak doors)**
 2. Construction: 5 plies, faces bonded to core by hot-press glue method.
 3. Core: 1-LD-2 particleboard core.
 4. Bonding: Stiles and rails bonded to core, then entire unit abrasive planed before veneering.
- C. Pairs of Doors: Furnish pairs of doors matched for appearance of color and grain and match grain across the pair on both sides of the door.
- D. Factory fit wood doors to fit frame opening sizes, with the clearances and bevels as specified in the referenced AWI standard.
- E. Factory machine doors for mortised hardware; perform fitting and machining for surface mounted hardware at the job site. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame shop drawings, DHI A115-W series standards and hardware templates.
 1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before proceeding with factory machining.
- F. Vision Glass Openings: Trim openings with moldings of same wood species as face veneer. Ship stops loose for glazing in the field.

2.03 FACTORY FINISHING

- A. General: Comply with referenced AWI quality standard, including Section 1500 "Factory Finishing".
- B. Finish wood doors at factory. Finish both faces and vertical edges of door. Seal door top and bottom unless stiles are a material such as stranded lumber that doesn't require finishing to seal out moisture.
- C. Transparent Finish: AWI Catalyzed Polyurethane system, Premium Grade, stained, and finished with satin sheen.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine installed door frames prior to hanging door: Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with jambs plumb and heads level. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Inspect doors prior to hanging. Reject doors with defects.

3.02 INSTALLATION

- A. Hardware: For installation see Section 08710, "Finish Hardware."
- B. Manufacturer's Instructions: Install wood doors to comply with manufacturer's instructions, referenced AWI standards, and as indicated.
- C. Factory Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory-Finished Doors: Restore finish before installation, if fitting or machining is required at the job site.

3.03 ADJUSTING AND PROTECTION

- A. Rehang or replace doors which do not swing or operate freely.
- B. Refinish or replace doors where finish was damaged during installation.
- C. Protect doors from damage until time of Substantial Completion.
- D. Just prior to the inspection at the time of Substantial Completion, check and readjust operating hardware. Remove and replace doors that are warped, bowed, or otherwise unacceptable. Rehang or replace doors which do not swing or operate freely.

END OF SECTION 08 14 00

SECTION 08 31 00
ACCESS DOORS

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

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

1.02 SUMMARY

- A. Work Included: Access doors for access to concealed mechanical and electrical equipment and controls.
- B. Provide an access door, complying with these specifications, for each location where access is required for operation and maintenance of concealed equipment, valves, controls and the like, even if not shown on the drawings.
 - 1. Access doors required for access to mechanical and electrical work shall be furnished by the trade installing equipment which requires access.
 - 2. Access door shall be installed by the trade installing the surrounding wall construction, in accordance with this section of the Specifications.
- C. Related Work Specified in Other Sections:
 - 1. Installation of access doors: Section 09 29 00, Gypsum Board.
 - 2. Field painting of access doors is specified in Section 09 90 00.
 - 3. Furnishing access panels: Division 23 and Division 26 Sections.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data and installation instructions for each type of access door assembly, including setting drawings, templates, and installation instructions.
- B. Shop Drawings: Submit shop drawings for fabrication and installation of customized access doors and frames, including details of each frame type, elevations of door design types, anchorage and accessory items.
- C. Schedule: Provide complete door and frame schedule, including types, general locations, sizes, construction details, latching or locking provisions, and other data pertinent to installation.

1.04 QUALITY ASSURANCE

- A. Single-Source Responsibility: Obtain access doors from one source from a single manufacturer.
- B. Fire-Resistance Ratings: Where a fire-resistance classification is indicated, provide access door assembly with panel door, frame, hinge, and latch from manufacturer listed in Underwriters

Laboratories, Inc.'s "Building Materials Directory" for rating shown. Provide UL label on each fire-rated access door.

- C. Size Variations: Obtain Architect's acceptance of manufacturer's standard size units, which may vary slightly from sizes indicated.

1.05 PROJECT CONDITIONS

- A. Verification: Obtain specific locations and sizes for required access doors from trades requiring access to concealed equipment, and indicate on submittal schedule.
- B. Special-Size Access Doors: Use where required or requested; indicate on schedule.

1.06 COORDINATION

- A. Advise Installers about specific requirements relating to access door installation, including sizes of openings to receive access door and frame, as well as locations of supports, inserts, and anchoring devices.
- B. Furnish inserts and anchoring devices for access doors that must be built into other construction. Coordinate delivery with other work to avoid delay.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with requirements, provide access doors by one of the following:
 1. J.L. Industries
 2. Karp Associates, Inc.
 3. Larsen's
 4. Milcor, Inc.

2.02 MATERIALS

- A. Stainless-Steel Sheet: ASTM A 167, Type 304 with No. 4 finish according to ASTM A 480/A 480M.
- B. Steel Sheet: ASTM A 366/A 366M commercial-quality, cold-rolled steel sheet with baked-on, rust-inhibitive primer.
- C. Zinc-Coated Steel Sheet: ASTM A 591/A 591M, Electrolytic zinc-coated steel sheet with Class C coating and phosphate treatment to prepare surface for painting.

2.03 ACCESS DOORS, GENERAL

- A. Furnish each access door assembly manufactured as an integral unit, complete with all parts and hardware, and ready for installation.
- B. Fabricate units of continuous welded steel construction, unless otherwise indicated. Grind welds smooth and flush with adjacent surfaces.

- C. Size: As shown on Drawings or, if not shown, as required for access, but in no case smaller than 16" x 15" in walls and 24" x 24" in ceilings.
- D. Locking device: Furnish flush, key-operated cam locks of number required to hold door in flush plane when closed.

2.04 ACCESS DOORS, PRIMED STEEL

- A. Insulated, Fire-Rated Access Doors: Self-latching units consisting of frame, trim, door, insulation, and hardware, including automatic closer, interior latch release, and complying with the following requirements:

1. Frame with Exposed Trim: Perimeter frame with integral exposed trim.
 - a. Metal: 0.0598-inch- (1.52-mm-) thick zinc-coated steel sheet.
 - b. Trim: 1-inch (25.4-mm) flange overlapping surfaces surrounding door frame.
2. Door: 0.0359-inch- (0.91-mm-) thick steel sheet, welded pan type, insulated with 2-inch- (50.8-mm-) thick mineral-fiber insulation.
3. Hardware: Continuous hinges; latch bolt operated by either a ring turn or flush key device (keyed alike), and automatic spring closing mechanism.
4. Fire-Protection Rating: Match the assembly into which the door is installed.
6. Acceptable Products: Karp KRP-150-FR, Milcor UFR, JL Model FD.

- B. Flush Access Doors with Exposed Trim: Units consisting of frame with exposed trim, door, hardware, and complying with the following requirements:

1. Frame: 0.0598-inch-thick zinc-coated steel sheet.
2. Door: 0.0747-inch-thick zinc-coated steel sheet.
3. Trim: Flange integral with frame, 3/4 inch wide, overlapping surrounding finished surface.
4. Hinge: Continuous type.
5. Acceptable Products: Milcor M, Karp DSC-214M, and J.L. Model TM.

2.05 ACCESS DOORS, STAINLESS STEEL

- A. Insulated, Fire-Rated Access Doors: Self-latching units consisting of frame, trim, door, insulation, and hardware, including automatic closer, interior latch release, and complying with the following requirements:

1. Frame with Exposed Trim: Perimeter frame, fabricated from minimum 0.0625-inch-thick stainless-steel sheet, with integral 1-inch wide exposed flange overlapping surfaces surrounding door frame.

2. Door: 0.0375-inch-thick stainless-steel sheet, welded pan type, insulated with 2-inch-thick mineral-fiber insulation.
 3. Hardware: Continuous hinges; latch bolt operated by either a ring turn or flush key device (keyed alike), and automatic spring closing mechanism.
 4. Fire-Protection Rating for Walls: 1-1/2 hours.
 5. Available Products: KRP-150-FR (stainless steel), Milcor Fire Rated (stainless steel), JL Model FDSS, and Larsen's L-FRAPSS.
- B. Flush Access Doors with Exposed Trim: Units consisting of frame, trim, door and hardware, complying with the following requirements:
1. Frame: Fabricated from minimum 0.0625-inch-thick stainless-steel sheet
 2. Door: 0.0781-inch-thick stainless-steel sheet.
 3. Trim: Flange integral with frame, 3/4 inch wide, overlapping surrounding finished surface.
 4. Hinge: Continuous type.
 - 5 Available Products: Milcor MS, Karp DSC-214M (stainless steel), or J.L. Model TMS.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Scope: Install stainless steel access doors in toilet rooms and kitchen. Install primed steel access doors at other locations.
- B. Comply with manufacturer's instructions for installation of access doors.
- C. Coordinate installation with work of other trades.
- D. Set frames accurately in position and securely attach to supports with face panels plumb or level in relation to adjacent finish surfaces.

3.02 ADJUST AND CLEAN

- A. Adjust hardware and panels after installation for proper operation.
- B. Remove and replace panels or frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08 31 00

SECTION 08 71 00
FINISH HARDWARE

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The general provisions of the Contract, including General and Supplementary Conditions and Division 1 - General Requirements, apply to work specified in this Section.

1.02 SUMMARY

- A. Work included: Furnish and install hardware for all doors except as noted on the door schedule and/or drawings, including electrified hardware components required for security doors.
 - 1. Furnish necessary and special screws, regular and special bolts, expansion shields, drop plates, and other devices necessary for the proper application of the hardware.
 - 2. Provide hardware supplier with schedule of door and frame supplier(s) to review related work to insure hardware will be properly reinforced and applied in accordance with each manufacturers instructions.
- B. Work by Owner:
 - 1. Final keying.
 - 2. Card readers, both on-line and off-line types.
- C. Related work in other Sections:
 - 1. Door Schedule: Section 08 00 00
 - 2. Hardware for millwork: Section 06 40 00
 - 3. Steel Door and Frames: Section 08 11 13
 - 4. Wood Doors: Section 08 14 00

1.03 REFERENCE STANDARDS

- A. Standards:
 - 1. ANSI/BHMA A156.1 Butts and Hinges
 - 2. ANSI/BHMA A156.2 Bored and Pre-assembled Locks and Latches
 - 3. ANSI/BHMA A156.4 Door Controls – Closers
 - 4. ANSI/BHMA A156.5 Auxiliary Locks and Associated Products
 - 5. ANSI/BHMA A156.6 Architectural Door Trim
 - 6. ANSI/BHMA A156.7 Template Hinge Dimensions
 - 7. ANSI/BHMA A156.8 Door Controls – Overhead Holders
 - 8. ANSI/BHMA A156.15 Life Safety Closer/Holder/Release Devices
 - 9. ANSI/BHMA A156.18 Materials and Finishes
 - 10. ANSI A117.1 Accessible and Usable Buildings and Facilities.
- B. NFPA – National Fire Protection Association:
 - 1. NFPA 101 Life Safety Code

- C. DHI – Door and Hardware Institute:
 - 1. "Recommended Locations"
 - 2. Abbreviations and symbols.
 - 3. Sequence and format for the hardware schedule.
 - 4. Recommended procedure for processing hardware schedules and templates.
 - 5. Keying systems and nomenclature.
- D. ADA – The American Disabilities Act – Title III – Public Accommodations.
- E. U.L. – Underwriters Laboratories.

1.04 SUBMITTALS

- A. Product Data: Manufacturer's illustrated product literature and specifications for each item of hardware.
- B. Hardware Schedule: Submit for review, within 21 days of award of contract, an electronic copy of a complete, properly itemized schedule of Finish Hardware. Refer to each item using manufacturer's code letters and numbers. Use same set numbers used on door schedule on Drawings. Identify lockset functions. List the actual product series numbers.
- C. Samples: If requested, submit to the Architect for approval, a complete line of samples. Samples shall be plainly marked giving hardware number used in this specification, the manufacturer's numbers, types and sizes. Approved samples will be returned to the Contractor for incorporation into the work.
- D. Keying Schedule: After a keying meeting between representatives of the Owner, Architect, and the Hardware Supplier, provide a keying schedule, listing the levels of keying, an explanation of the key system's function, the key symbols used, and the door numbers controlled. This schedule can be submitted as a part of the Hardware Schedule or as a separate schedule.
- E. Templates: Within ten days after approval of the Hardware Schedule by the Architect, furnish the Contractor with complete template information necessary for the fabrication of doors and frames. Do not furnish templates before the hardware schedule is approved.
- F. Closeout Submittals:
 - 1. Installation and repair manuals for locksets and closers.
 - 2. Extra materials for maintenance.

1.05 QUALITY ASSURANCE

- A. Hardware supplier shall have in his employ one or more members of the Door and Hardware Institute to include at least one Certified Architectural Hardware Consultant in good standing, who shall be responsible for preparation of the Finish Hardware Schedule. This Consultant shall be acceptable to the Architect and is to ensure that the intent requirement of this specification is fulfilled, and to certify that the work of this section meets or exceeds the requirements specified in this section and the requirements of authorities having jurisdiction.
- B. Responsibility for Sizing Hardware: Hardware supplier shall determine conditions and materials of doors and frames for proper application of hardware. Follow manufacturers' catalogue requirement for the actual size of door closers, brackets and holders. Door sizes are as

noted on the Door Schedule and the hardware shall be in strict accordance with requirements of height, width, and thickness.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Clearly label each package to indicate the portion of the work for which it is intended.
- B. Package hardware in biodegradable packs such as paper or cardboard boxes and wrapping. If non-biodegradable packing such as plastic, plastic bags, or large amounts of styrofoam are used, then dispose of the non-biodegradable packing to a collector licensed to recycle the packing.
- C. Require the Hardware Supplier to deliver hardware to the project site in accordance with the instructions of the Contractor.
- D. Unless otherwise acceptable to the Owner, Contractor shall provide a locked storage area with adequate shelving exclusively for hardware.
- E. The Contractor shall furnish the Hardware Supplier with receipts for all hardware and accessory items received, and shall send copies of these receipts to the Architect, if requested.

1.07 WARRANTY

- A. Hardware supplier shall warrant and guarantee, in writing, that hardware supplied is free of defective material and workmanship. Supplier shall further warrant and guarantee for a period of one year from Owner's Use and Occupancy that the hardware shall function in a satisfactory manner without binding, collapse, or dislodging of its parts, provided the installation is made to the manufacturer's recommendations.

1.08 REGULATORY REQUIREMENTS

- A. Conform to all applicable codes. Provide throws, projections, coatings, knurling, opening and closing forces, and other special functions required by the State of Maine and Local Building Codes, and applicable Access Code requirements, including ADA.

1.09 COORDINATION

- A. Hardware Supplier shall determine conditions and materials of all doors and frames for proper application of hardware.

1.10 MAINTENANCE MATERIALS AND TOOLS

- A. Provide adjusting tools and wrenches for the following operating products:
 - 1. Locksets (all types)
 - 2. Door Closers

PART 2 --PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with requirements, furnish products by the following manufacturers. Where only one manufacturer is listed, new hardware has to match existing hardware in the building and substitutions will not be considered. Furnish all hardware of each type from a single manufacturer.

1.	Hinges	McKinney Hager Bommer	Scranton, PA St. Louis, MO Landrum, SC
2.	Locksets	Schlage	Colorado Springs, CO
3.	Door Closers	LCN	Princeton, IL
4.	Door Stops	Ives Rockwood	New Haven, CT Rockwood, PA
5.	Protective Plates	Rockwood Burns	Rockwood, PA Erie, PA
6.	Silencers	Ives Rockwood	New Haven, CT Rockwood, PA

2.02 MATERIALS AND QUALITY

- A. All hardware shall be of the best grade of solid metal entirely free from imperfections in manufacturer and finish.
- B. Qualities, weights, and sizes specified in this Section are the minimum that will be accepted. It is the responsibility of the Hardware Supplier to supply the specified size and weight of hardware and the proper function of hardware in each case.
- C. Modifications to hardware that are necessary to conform to construction shown or specified shall be provided as required for the specified operation and functional features.
- D. Follow manufacturer's catalog requirements for the actual size of door closers, brackets and holders.

2.03 FASTENERS

- A. Manufacture hardware to conform to published templates, generally prepared for machine screw installation.
- B. Furnish screws for installation, with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Furnish exposed screws to match the hardware finish, or, if exposed in surfaces of other work, to match the finish of such other work as closely as possible, except as otherwise indicated.

- C. Provide concealed fasteners for hardware units which are exposed when the door is closed, except to the extent no standard manufactured units of the type specified are available with concealed fasteners. Do not use thru-bolts unless specifically approved by the Architect.
- D. Use only the fasteners supplied by manufacturers of specific products.
- E. All hardware shall have the required screws, bolts and fastenings necessary for proper installation and shall be wrapped in the same package as the hardware item for which it is intended,

2.04 SCHEDULED HARDWARE

A. Hinges:

- 1. Number of hinges per door: Provide two hinges for doors up to and including five feet in height, and an additional hinge for each two-and-one-half feet or fraction thereof, of the height of the door.
- 2. Interior Doors: Furnish steel hinges with oil-impregnated bearings, flush bearings and button tips, sized as follows:

<u>Door Thickness</u>	<u>Door Width</u>	<u>Hinge Weight</u>	<u>Hinge</u>
1-3/4"	40" and under	Regular	4-1/2"
1-3/4"	Over 40"	Extra heavy	5 x 4-1/2"

Width of hinge shall be determined by trim conditions

- 3. Products: Subject to selection of appropriate material and size, furnish one of the following:

<u>McKinney</u>	<u>Hager</u>	<u>Bommer</u>
T2714	1279	5000
TA2714	BB1279	BB5000
T4A3786	BB1168	BB5004

- B. Door Closers: Hydraulic closers, with full rack and pinion action, 1-1/2" diameter cylinder body, and double heat treated pinion 11/16" in diameter. Closers shall have separate adjustment for latch speed, general speed, and hydraulic back-check. Provide metal covers on all surface-mounted closers.

- 1. Hydraulic fluid shall be of a type requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
- 2. Closers shall conform to applicable code requirements relative to setting closing speeds for closers and maximum operating pressure. Spring power shall be continuously adjustable over the full range of closer sizes, and allow for reduced opening force for accessibility. Hydraulic regulation shall be by tamper-proof, non-critical valves.
- 4. Arms: Solid forged steel main arms (and forged forearms for parallel arm closers).
- 5. Metal Finish: Powder coating on closer arms and on metal covers.
- 6. Provide drop, mounting plates where required.

7. Do not locate closers on the side of doors facing corridors, passageways or similar areas. Where it is necessary, due to certain conditions and approval of the Architect, to have closers in corridors, provide such closers with parallel or track type arms.
 8. Adjust door closers in accordance with the manufacturer's templates and written instructions. Adjust back-check feature on closers with parallel arms prior to installation.
 9. Products: LCN 4011 and 4111, or equal by one of the other named manufacturers.
- C. Lock Sets, Latch Sets: Cylindrical heavy-duty ANSI A156.2, Series 4000, Grade 1, 2-3/4" backset, interchangeable core cylinder, with lever handles. No substitutions.
1. Manufacturer and Product: Schlage "Series D" with RHO lever.
 2. Lock Functions: Per door hardware set schedule
 3. Cylinders: Schlage I/C core six pin cylinders with EF keyway to match existing doors for keying by Owner
- D. Kick Plates: 0.050 inch thick, beveled 4 edges, furnish with oval head counter-sunk screws for fastening; 8-inches high by width 2 in. less the width of door.
- E. Stops: Furnish at all doors. Wherever an opened door or any item of hardware thereon strikes a wall, at 90 degrees, provide wall bumpers, unless otherwise indicated in hardware sets.
1. Where wall bumpers cannot be effectively used, provide a floor stop.
 2. Provide roller bumpers for each door where two doors interfere with each other in swinging.
 - a. Wall Bumpers: Rockwood 409 or Ives WS407CCV.
 - b. Floor Stops: Rockwood 440 or 442 or Ives FS436, FS438.
 - c. Roller Bumpers: Rockwood 456 or Ives RB470 Series.
 3. Overhead Door Stops: Surface mounted type; Glynn Johnson GJ900S, Sargent 590S or ABH 9020.
- F. Silencers: Ives SR64/SR65 or Rockwood 608/609. Provide silencers on all door frames.

2.05 FINISHES

- A. Materials and finish:
1. Interior Butts: US26D (BHMA 652)
 2. Door Closers: Sprayed to match hardware finish
 3. Kick Plates: US32D (BHMA 630)
 4. All other hardware: US26D (BHMA 626), or as scheduled.

2.06 KEYS AND KEYING

- A. Require the hardware supplier to review the specific hardware functions with the Owner to assure the appropriateness of each of the hardware functions. Failure to make this review does not relieve the hardware supplier from providing the proper functions.

- B. Key System: Lockset cylinders shall be of the interchangeable core type. Furnish temporary construction cores for use by the Contractor during the construction period. Permanent cores will be furnished and installed by the Owner, keyed to the existing system.
 - 1. Furnish 3 control keys for the removal of the construction cores and 5 construction keys. Return temporary construction cores to the Hardware Distributor.

PART 3 - EXECUTION

3.01. INSPECTION

- A. Inspect door openings and doors to determine that each door and door frame has been properly prepared for the required hardware. If errors in dimensions or preparation are encountered, they are to be corrected by the responsible parties prior to the installation of hardware.

3.02 PREPARATION

- A. All doors and frames, requiring field preparation for finish hardware, shall be carefully mortised, drilled for pilot holes, or tapped for machine screws for all items of finish hardware in accordance with the manufacturers templates and instructions.

3.03 INSTALLATION/ADJUSTMENT/LOCATION

- A. Install materials in a workmanlike manner following the manufacturer's recommended instructions.
- B. Install exit devices carefully to permit friction free operation of crossbar, touch bar, lever. Latching mechanism shall also operate freely without friction or binding.
- C. Install door closers in accordance with the manufacturer's instructions. Install each door closer carefully, at the degree of opening indicated on the hardware schedule. Arm position shall be as shown on the instruction sheets and required by the finish hardware schedule.
- D. Require the hardware installer to adjust door closers at the time of installation of the door closer. Adjust the closing speed and the latching speed valves individually to provide a smooth, continuous closing action without slamming. Adjust the delayed action feature or back check valve to permit the correct delayed action cycle or hydraulic back check cushioning of the door in the opening cycle.
 - 1. Each door closer has adjustable spring power capable of being adjusted in the field, from size 2 thru 6. It shall be the installer's responsibility to adjust the spring power for each door closer in exact accordance with the spring power adjustment chart illustrated in the door closer installation sheet packed with each door closer.
- E. Carefully coordinate installation of other hardware, including locksets, overhead holders, door stops, plates and other items, with the hardware schedule and the manufacturer's instruction sheets.

- F. Locate finish hardware in accordance with dimensions listed in the pamphlet "Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames" published by the Door and Hardware Institute.

3.04 FIELD QUALITY CONTROL

- A. Upon completion of the installation of the finish hardware, require a representative of the finish hardware supplier to visit the project and to examine the hardware for each door on which he or she has provided hardware, to verify that all hardware is in proper working order, and to report to the Contractor in writing, any problems observed, with a recommendation for the measures which should be taken to correct the problem.
- B. Make adjustments and replace malfunctioning hardware as recommended.

3.05 PROTECTION

- A. Carefully protect exposed surfaces of finish hardware, by use of cloth, adhesive backed paper or other materials, immediately after installation of the hardware item on the door. The finish shall remain protected until completion of the project. Just prior to the inspection at the time of Substantial Completion, remove the protective material.

3.06 CLEANING

- A. Clean finish hardware and remove remaining pieces of protective materials and labels.

3.07 HARDWARE SETS

- A. Each Hardware Set listed below represents the complete hardware requirements for one opening (single door or pair of doors). Furnish the quantities required for each set for the work.

Set No. 1

Hinges

- 1 – Lockset (Passage Function)
- 1 – Door Stop
- 1 – Door Closer (Reg. arm)
- 1 – Kick Plate
- 3 – Silencers

Set No. 2

Hinges

- 1 – Lockset (Storeroom Function)
- 1 – Overhead Door Stop
- 3 – Silencers
- 1 – Door Closer

END OF SECTION 08 71 00

SECTION 08 83 00
MIRRORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Procurement and Contracting Requirements and Division 01 General Requirements apply to this Section.

1.02 SUMMARY

- A. Section includes the following types of silvered flat glass mirrors:
 - 1. Laminated glass mirrors qualifying as safety glazing.
- B. Related Sections:
 - 1. Division 08 Section "Glazing" for standard glass.
 - 2. Division 10 Section "Toilet, Bath, and Laundry Accessories" for metal-framed mirrors.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- A. Sustainable Design:
 - 1. Complete "Sustainable Materials Attributes Submittal Form", VOC Reporting Form and Concrete Tracking Form, as applicable which are attached to Section 01 81 13 "Sustainable Design Requirements". Applicable attributes may include recycled content, and regional, reused, rapidly renewable, or low-emitting materials.
 - 2. Provide supporting documentation from manufacturer for materials attributes data submitted; for Low-Emitting Materials and FSC-Certified Wood products include certificates as specified in Section 01 81 13.
- B. Shop Drawings: Include mirror elevations, edge details, holes and cutouts, and mirror hardware, and attachments to other work.
- C. Samples: For each type of the following products:
 - 1. Mirrors: 12 inches square, including edge treatment on two adjoining edges.
 - 2. Mirror Trim: 12 inches long.

1.04 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of mirror and mirror mastic, from manufacturer.
- B. Preconstruction Test Reports: From mirror manufacturer indicating that mirror mastic was tested for compatibility and adhesion with mirror backing and substrates on which mirrors are installed.
- C. Warranty: Sample of special warranty.

1.05 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For mirrors to include in maintenance manuals.

1.06 QUALITY ASSURANCE

- A. Source Limitations for Mirrors: Obtain mirrors from single source from single manufacturer.
- B. Source Limitations for Mirror Accessories: Obtain mirror glazing accessories from single source.
- C. Glazing Publications: Comply with the following published recommendations:
 - 1. GANA's "Glazing Manual" unless more stringent requirements are indicated. Refer to this publication for definitions of glass and glazing terms not otherwise defined in this Section or in referenced standards.
 - 2. GANA Mirror Division's "Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors."
- D. Safety Glazing Products: For laminated mirrors, provide products complying with testing requirements in 16 CFR 1201 for Category II materials.
- E. Preconstruction Mirror Mastic Compatibility Test: Submit mirror mastic products to mirror manufacturer for testing to determine compatibility of mastic with mirror backing and substrates on which mirrors are installed.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect mirrors according to mirror manufacturer's written instructions and as needed to prevent damage to mirrors from moisture, condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with mirror manufacturer's written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors.

1.08 COORDINATION

- A. Coordinate fabrication of notches and holes with installation of ballet barre bar specified in Division 11 Section "Gymnasium Equipment."

1.09 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install mirrors until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

PART 2 - PRODUCTS

2.01 SILVERED FLAT GLASS MIRRORS

- A. Glass Mirrors, General: ASTM C 1503.
- B. Laminated Mirrors: ASTM C 1172, Kind LM.
 - 1. Clear Glass for Outer Lite: Mirror Glazing Quality.
 - 2. Nominal Thickness for Outer Lite: 3.0 mm.
 - 3. Glass for Inner Lite: Annealed float glass; ASTM C 1036, Type I (transparent flat glass), Quality-Q3; Class 1 (clear).
 - 4. Nominal Thickness: 3.0 mm.
 - 5. Interlayer: Mirror manufacturer's standard 0.030-inch- thick, clear polyvinyl-butyril interlayer with a proven record of showing no tendency to delaminate from, or cause damage to, silver coating.

2.02 MISCELLANEOUS MATERIALS

- A. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- B. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at mirrored glass edges.
- C. Mirror Mastic: An adhesive setting compound, asbestos-free, produced specifically for setting mirrors and certified by both mirror manufacturer and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Franklin International; Titebond Division.
 - b. Laurence, C. R. Co., Inc.
 - c. Macco Adhesives; Liquid Nails Division.
 - d. OSI Sealants, Inc.
 - e. Palmer Products Corporation.
 - f. Pecora Corporation.
 - g. Royal Adhesives & Sealants; Gunther Mirror Mastics Division.
 - h. Sommer & Maca Industries, Inc.
- D. Film Backing for Safety Mirrors: Film backing and pressure-sensitive adhesive; both compatible with mirror backing paint as certified by mirror manufacturer.

2.03 MIRROR HARDWARE

- A. Top and Bottom Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover bottom and top edges of each mirror in a single piece.
 - 1. Bottom Trim: J-channels formed with front leg and back leg not less than 3/8 and 7/8 inch in height, respectively.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Laurence, C. R. Co., Inc.; CRL Standard "J" Channel.

- 2) Sommer & Maca Industries, Inc.; Aluminum Shallow Nose "J" Moulding Lower Bar.
 - 3) Sommer & Maca Industries, Inc.; Heavy Gauge Aluminum Shallow Nose "J" Moulding Lower Bar.
2. Top Trim: J-channels formed with front leg and back leg not less than 5/8 and 1 inch in height, respectively.
- a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Laurence, C. R. Co., Inc.; CRL Deep "J" Channel.
 - 2) Sommer & Maca Industries, Inc.; Aluminum Deep Nose "J" Moulding Upper Bar.
 - 3) Sommer & Maca Industries, Inc.; Heavy Gauge Aluminum Deep Nose "J" Moulding Lower Bar.
3. Finish: Clear bright anodized.
- B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.
- C. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

2.04 FABRICATION

- A. Mirror Sizes: To suit Project conditions, cut mirrors to final sizes and shapes.
- B. Cutouts: Fabricate cutouts for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrors.
- C. Mirror Edge Treatment: Flat polished.
 - 1. Seal edges of mirrors with edge sealer after edge treatment to prevent chemical or atmospheric penetration of glass coating.
 - 2. Require mirror manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance of the Work.
- B. Verify compatibility with and suitability of substrates, including compatibility of mirror mastic with existing finishes or primers.
- C. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces are dry.

3.02 PREPARATION

- A. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating substrates with mastic manufacturer's special bond coating where applicable.

3.03 INSTALLATION

- A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.
- B. Provide a minimum air space of 1/8 inch between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.
- C. Wall-Mounted Mirrors: Install mirrors with mastic and mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.
 - 1. Top and Bottom Aluminum J-Channels: Provide setting blocks 1/8 inch thick by 4 inches long at quarter points. To prevent trapping water, provide, between setting blocks, two slotted weeps not less than 1/4 inch wide by 3/8 inch long at bottom channel.
 - 2. Top Channel/Cleat and Bottom Aluminum J-Channels: Fasten J-channel directly to wall and attach top trim to continuous cleat fastened directly to wall.
 - 3. Install mastic as follows:
 - a. Apply barrier coat to mirror backing where approved in writing by manufacturers of mirrors and backing material.
 - b. Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.
 - c. After mastic is applied, align mirrors and press into place while maintaining a minimum air space of 1/8 inch between back of mirrors and mounting surface.

3.04 CLEANING AND PROTECTION

- A. Protect mirrors from breakage and contaminating substances resulting from construction operations.
- B. Do not permit edges of mirrors to be exposed to standing water.
- C. Maintain environmental conditions that will prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.
- D. Wash exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash mirrors as recommended in writing by mirror manufacturer.

END OF SECTION 08 83 00

ROOM FINISH SCHEDULE

ROOM NO.	ROOM NAME	FLOOR	BASE	WALLS				CEILINGS	NOTES
				NORTH	EAST	SOUTH	WEST	MATERIAL	
SECOND FLOOR									
297	Men's Room	CT - 1/2	CT - 3	CT - 3 / 4 / 5 on wet walls/ GWB PNT on all other wall surfaces				ACP-1	2
298	Janitor's Closet	PC	RB	GWB PNT				EXP	
299	Women's Room	CT - 1/2	CT - 3	CT - 3 / 4 / 5 on wet walls/ GWB PNT on all other wall surfaces				ACP-1	2
THIRD FLOOR									
397	Women's Room	CT - 1/2	CT - 3	CT - 3 / 4 / 5 on wet walls/ GWB PNT on all other wall surfaces				ACP-1	2
398	Janitor's Closet	PC	RB	GWB PNT				EXP	
399	Men's Room	CT - 1/2	CT - 3	CT - 3 / 4 / 5 on wet walls/ GWB PNT on all other wall surfaces				ACP-1	2
FIFTH FLOOR									
597	Men's Room	CT - 1/2	CT - 3	CT - 3 / 4 / 5 on wet walls/ GWB PNT on all other wall surfaces				ACP-1	2
598	Janitor's Closet	PC	RB	GWB PNT				EXP	
599	Women's Room	CT - 1/2	CT - 3	CT - 3 / 4 / 5 on wet walls/ GWB PNT on all other wall surfaces				ACP-1	2

LEGEND AND NOTES

ROOM FINISH SCHEDULE LEGEND

ACP - 1	ACOUSTICAL CEILING PANEL			GWB	GYPSUM WALL BOARD
				PC	PAINTED CONCRETE
CT-1/2	TILE; 2 x 2 MOSAIC (1 main color, 1 accent)			PNT.	PAINT/PAINTED
CT-3/4/5	CERAMIC TILE; 4 x 4 GLAZED (1 main color, 2 accents)				
				RB	RUBBER BASE
EXP.	EXPOSED STRUCTURE				

FINISH SCHEDULE NOTES

- 1 - PAINT G.W.B. SOFFITS
- 2 - SEE ELEVATIONS FOR TILE LOCATIONS

SECTION 09 29 00
GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 General Requirements, apply to work specified in this Section.

1.02 SUMMARY:

- A. This Section includes the following types of gypsum board construction:
1. Steel framing members to receive gypsum board.
 2. Gypsum board screw-attached to steel framing and furring members.
 3. Other panels screw-attached to steel framing members.
 4. Tile backer board.
 5. Acoustical insulation.
 6. Installation of access panels in gypsum drywall construction.
 7. Cutting and patching of existing gypsum board assemblies as required for installation of new work.
- B. Related Work Specified in Other Sections:
1. Wood Blocking: Section 06 10 00, Rough Carpentry.
 2. Wood trim: Section 06 40 00, Finish Carpentry and Architectural Woodwork.
 2. Firestopping and firesafing of gypsum board systems: Section 07 84 00.

1.03 REFERENCED STANDARDS

- A. Gypsum Board Construction Terminology: Refer to ASTM C 11 and GA 505 for definitions of terms for gypsum board construction not otherwise defined in this section or other referenced standards.
- B. American Society for Testing and Materials (ASTM): The principal standards for installation of metal framing and gypsum board which are referenced in this section are:
1. ASTM C 11, "Terminology Relating to Gypsum and Related Building Materials and Systems."
 2. ASTM C 754, "Installation of Steel Framing Members to Receive Screw-Attached Gypsum."
 3. ASTM C 840, "Specification for Application and Finishing of Gypsum Board."
 4. ASTM C 919, "Practice for Use of Sealants in Acoustical Applications."
- C. Gypsum Association (GA): GA-214, Levels of Gypsum Board Finish.

1.04 SYSTEM PERFORMANCE REQUIREMENTS

- A. When cutting and patching existing fire-rated construction, maintain the existing fire resistance ratings rating. No new construction is fire-rated.

1.05 SUBMITTALS

- A. Product data : Manufacturer's specifications, installation and maintenance instructions for each type of product specified.
- B. Product certificates signed by manufacturers of gypsum board assembly components certifying that their products comply with specified requirements.
- C. Submit layout drawings showing locations of wall board control joints.

1.06 QUALITY ASSURANCE

- A. Fire-Resistance Ratings: Where patching of fire-rated gypsum board assemblies is indicated or required, provide materials and construction identical to the existing assembly in order to maintain the fire-resistance rating.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic and other causes. Neatly stack gypsum boards flat to prevent sagging.
- C. Handle gypsum boards to prevent damage to edges, ends, and surfaces. Do not bend or otherwise damage metal corner beads and trim.

1.08 PROJECT CONDITIONS

- A. Establish and maintain environmental conditions for application and finishing gypsum board to comply with ASTM C 840 and with gypsum board manufacturer's recommendations.
- B. Room Temperatures: Maintain not less than 40°F during installation of gypsum board. For finishing of gypsum board maintain not less than 50°F for 48 hours prior to application and continuously thereafter until drying is complete.
- C. Ventilate building spaces to enable joint treatment materials to dry. Avoid drafts during dry, hot weather to prevent materials from drying too rapidly.

1.09 SCHEDULING

- A. Coordinate erection of steel stud partitions with installation of wood blocking specified in Section 06100, to make sure required blocking is in place before partitions are closed in with gypsum board.

PART 2 - PRODUCTS

2.01 STEEL FRAMING FOR PARTITIONS:

- A. Metal Framing, General: Furnish steel studs, runners, furring channels, furring brackets and related components complying with ASTM C 645, manufactured from cold-rolled steel, ASTM A 568 or A525, with ASTM A 525 zinc coating.
 - 1. Minimum Base Metal Thickness: 0.0209 inch minimum thickness, individual measurement, before application of protective coating.
 - 2. Protective Coating: ASTM A525 G40 zinc coating, except G60 zinc coating in the animal facility areas and glass washing room
- B. Shaftwall Studs: ASTM C 645, galvanized steel, with ASTM A 525 G60 galvanized coating, in special shape to permit gypsum boards to be installed from outside the shaft. Match existing shaftwall framing with respect to stud type/shape, gauge/thickness, and depth.
- C. Steel Studs and Runners: Fabricate from steel no less than 0.0359 inch base metal thickness; provide heavier gauge framing where indicated on drawings.
 - 1. Stud Shape: C-Shape, with punched web, and with flange edges bent back 90 deg and doubled over to form 3/16" minimum lip (return).
 - 2. Depth: As shown.
 - 3. Runners: Same gauge as studs.
- D. Deep-Leg Deflection Track: ASTM C 645 top runner with 2-inch-deep flanges.
- E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated; minimum base metal thickness 0.0312 inch.
- F. Cold-Rolled Furring Channels: 0.0538-inch bare steel thickness, with minimum 1/2-inch-wide flange; depth as shown indicated.
 - 1. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare steel thickness of 0.0312 inch.
 - 2. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch- (1.59-mm-) diameter wire, or double strand of 0.0475-inch- (1.21-mm-) diameter wire.
- G. Fasteners: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

2.02 GYPSUM BOARD

- A. Gypsum Wallboard: ASTM C 36 or C 1396, paper face; edges tapered and featured (rounded or beveled) for prefilling; thickness shown on Drawings.
- B. Gypsum Backing Board for Multi-Layer Applications: ASTM C 442 or, where backing board is not available from manufacturer, gypsum wallboard, ASTM C 36. Thickness shown on Drawings.

- C. Tile Backing Board: Gypsum backer board with coated glass-fiber face that protects the core from moisture; complying with ASTM C 1178/C 1178M; "DensShield Tile Guard" by G-P Gypsum. Core thickness shown on Drawings.
- D. Fire-Rated Applications: Provide fire-rated gypsum wallboard.
- E. Gypsum Shaftwall/Liner Panel: ASTM C 442 Type X liner panel or coreboard designed for shaft wall construction, with moisture-resistant paper facings. Match thickness of existing.
- F. Provide gypsum board in maximum lengths available to minimize end-to-end joints.
- G. Fasteners: Corrosion-resistant screws with bugle-shaped head, self-drilling points; minimum 1" long for 1/2" sheathing.
 - 1. For fastening gypsum board to steel framing less than 0.033 inch thick (24 gauge and lighter), furnish screws conforming to ASTM C1002, Type S points; equal to U.S.G. "Super-Tite Screws."
 - 2. For fastening gypsum board to steel framing 0.033 to 0.112 inch thick (22 to 12 gauge), furnish screws conforming to ASTM C954; equal to U.S.G. "Super-Tite Driller Screws".
 - 3. For fastening second layer of gypsum board to first layer in 2-layer assemblies, furnish screws conforming to ASTM C1002, Type G.
 - 4. For fastening gypsum board to wood blocking, furnish screws conforming ASTM C1002, Type W, cadmium-plated or other corrosion resistant, self-drilling bugle-head screws, length to penetrate wood at least 7/8".

2.03 METAL TRIM AND JOINT FINISHING MATERIALS

- A. Metal Trim: ASTM C 1047, hot-dip zinc-coated steel, with perforated and embossed flanges suitable for screw-attachment to metal studs (not crimp-on type) and for bedding in joint compound. Furnish the following types of trim; USG numbers are used to identify shapes:
 - 1. Corner Bead: 1" x 1" corner bead with smooth rigid nose; USG "Dur-A-Bead" (100 series). For installation on curved edges, provide corner bead with flanges that can be notched and bent to curvature radius.
 - 2. Control joints: One-piece formed with V-shaped slot, with removable strip covering the slot opening; USG No.093.
 - 3. Edge moldings: L-bead casing molding; USG "200 Series."
- B. Gypsum Board Joint Treatment Materials: Comply with ASTM C 475 and the recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.
 - 1. Joint Tape: Perforated paper reinforcing tape, unless otherwise indicated.
 - 2. Joint Compound, Chemical Hardening Type: Factory-packaged, job-mixed, chemical-hardening powder products formulated for uses indicated. Furnish sandable formulation for use as topping.

3. Joint Compound, Drying-Type: Factory-mixed, vinyl-based products. Furnish compound formulated for taping or topping, as applicable, or furnish all-purpose compound formulated for both taping and topping for both applications.

2.04 ACOUSTICAL BLANKET INSULATION AND ACOUSTICAL SEALANT

- A. Acoustical Insulation: ASTM C 665, Type 1, unfaced glass fiber blanket insulation; width equal to distance between studs, except where otherwise specified; thickness equal to depth of studs, unless otherwise shown.
- B. Acoustical Sealant for Exposed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and demonstrated, by testing representative assemblies per ASTM E 90, to be effective in reducing airborne sound transmission through perimeter joints and openings in building construction.
 1. Acceptable Products: AC-20 FTR Acoustical and Insulation Sealant; Pecora Corp.; SHEETROCK Acoustical Sealant; United States Gypsum Company.
- C. Acoustical Sealant for Concealed Joints: Manufacturer's standard nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound.
 1. Acceptable Products: BA-98; Pecora Corp.; Tremco Acoustical Sealant; Tremco, Inc.

2.05 SPECIAL PANELS

- A. Melamine Coated Plywood: 1/2" thick flexible plywood, with white melamine coating on one face.
- B. Corrugated Polycarbonate Sheet: Impact resistant, formed polycarbonate panels; McMaster-Carr 85795K35, wave pattern, opaque white color. Furnish in 8' x 42" sheets.

2.06 GLASS FIBER REINFORCED GYPSUM (FRG) COLUMN COVERS

- A. Manufacturers: Formglas Inc.; Plastrglas, Inc.; or Pittcon
- B. Material: High density (90 lbs./cu. ft. minimum density) gypsum plaster reinforced with glass fibers or glass fiber mat.
- C. Fabrication: Preformed in column shape; diameter as shown; 1/4" minimum shell thickness; smooth, even finish which will be suitable for painting with only minor filling and spackling. Fabricate column in two halves (divided vertically) for installation around a structural column. Provide cast-in wood or steel reinforcement as required for strength of the fabrication and to prevent bowing.
- D. Fabrication Tolerances:
 1. Dimension: $\pm 3/16$ "
 2. Thickness: $1/4" \pm 1/8$ "
 3. Warp or Bowing: No more than 1/8 inch per foot of column length, nor more than 1" over the full height of the column.

- E. Accessories: Furnish with fasteners and accessories necessary for assembly and mounting.

2.07 MISCELLANEOUS MATERIALS

- A. Spot Grout: ASTM C 475, setting-type joint compound of type recommended for spot grouting hollow metal door frames.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. With Installer present, examine the spaces in which, and the substrates to which gypsum drywall systems are to be applied and the conditions under which gypsum drywall systems are to be installed.
 - 1. Steel Frames: Examine preset hollow metal frames for compliance with installation tolerances.
 - 2. Blocking: Do not install gypsum board until blocking is in place for proper support of items which are to be mounted on drywall walls.
- B. Do not proceed with the installation until unsatisfactory conditions have been corrected.

3.02 TOLERANCES FOR GYPSUM DRYWALL WORK

- A. Walls: For plumbness, do not exceed a variation of 3/16" in 8'-0". Finished wall surface shall not deviate from the surface of a flat plane by more than 1/8 inch, and high and low points shall be at least 20 feet apart, so that surface is flat in appearance.
- B. Joints between panels: Flush to within 1/16 of an inch before filling and finishing.

3.03 INSTALLATION OF STEEL FRAMING FOR WALLS

- A. Steel Framing Installation Standard: Install steel framing to comply with ASTM C 754 and with ASTM C 840 requirements that apply to framing installation.
- B. General:
 - 1. Install metal framing and accessories in accordance with manufacturer's printed instructions and referenced standards, except where more stringent requirements are shown or specified.
 - 2. Space studs no farther apart than 16 inches on center. Stud gauges indicated are minima and spacing indicated is maximum; subject to Architect's approval, modify as necessary to meet performance requirements.
 - 3. Extend partitions full height to the underside of floor or roof deck above, unless drawings explicitly indicate partitions terminating at a different location.
 - 4. Install steel framing and furring member so that fastening surfaces do not vary more than 1/8 inch from the plane formed by the faces of adjacent framing.

5. Isolation of Partitions: Where partitions abut ceiling or deck construction or horizontal structural elements provide slip or cushion-type joint between metal framing and structure as recommended by manufacturer to prevent transfer of structural loads or movements to partitions, except as otherwise indicated.
 6. Lay out framing to accommodate fire suppression system sprinkler heads.
 7. Align punch-outs in stud webs, including box studs at jamb openings, so that electrical conduit can be run continuously within the stud space.
- C. Install runners (tracks) at floors and at deck or floor at top of partition, and structural walls and columns where gypsum board stud assemblies abut other construction. Align runner tracks to the partition layout at both base and top of the partition. Secure runner tracks as recommended by the stud manufacturer; do not exceed 24 inches between securement devices.
1. Install deep flange deflection track at top of partition where partition extends to underside of structure or underside of floor or roof deck above.
 2. Attach runners to concrete subfloor and structure or deck above with fasteners located 2 inches from ends and spaced 24 inches o.c.
- D. Studs: Use full length studs between runner tracks wherever possible. If the height of a partition makes it necessary to use more than one length of stud, splice studs by nesting with 8" laps, with 2 screws through each flange. Mechanically attach stud to runner tracks at partition corners and intersections and adjacent to openings; use 3/8" self-tapping screws or clinch both flanges of studs using stud clinching tool.
1. Frame inside and outside corners with 3 studs. Provide additional studs at partition intersections, terminations of partitions and both sides of control joints. Fasten multiple studs together with screws to ensure composite action. (Refer to article on gypsum board installation for location of control joints, if joints are not shown on drawings.)
 2. Where partition extends to underside of structure above, cut studs 1/2 inch short of full height to allow for deflection of structure above.
 3. Where ducts, structural members, or similar items penetrate partitions, frame the opening to provide support for gypsum board.
- E. Frame door openings to comply with details indicated, and as specified below. Attach vertical studs at jambs with screws, either directly to frames or to jamb anchor clips on door frames. Install runner track section (for cripple studs) at head and secure to jamb studs.
1. Doors up to 4'-0" wide and weighing 300 lbs or less: Two 20 gauge studs each side of door, either nested or with open sides abutting. Anchor strut studs securely to top and bottom runners with screws.
 2. Doors wider than 4'-0" or heavier than 300 lbs and double doors: Design framing to meet load conditions, but no less than two 20 gauge studs each side of door.
 3. Screw multiple studs to each other to ensure composite action.

- F. Rough Framing at Other Openings: Install full-length studs adjacent to jambs. Between jamb studs, install horizontal header and sill tracks. Cut horizontal tracks to length, split flanges and bend webs at ends for flange overlap and screw to jamb studs. Install cut-to-length, intermediate studs above and below openings, at same spacing as full-length studs.
- G. Metal Furring: Install furring vertically, 16 inches on center,
- H. Install supplementary framing and bracing as required at penetrations and terminations of gypsum wallboard assemblies.

3.04 INSTALLATION OF GYPSUM BOARD

- A. Gypsum Board Installation Standard: Install and finish gypsum board to comply with ASTM C 840.
- B. Types of Board: Except as specified below, or otherwise noted on drawings, install standard gypsum wallboard at interior walls, ceilings, and soffits.
 - 1. Glass-Faced Gypsum Backer Board: Install as a backer board where tile is to be applied as a finish over gypsum board. Do not use this board exposed to view or for ceiling applications.
 - 2. Double-Layer Application: Install gypsum backing board for base layer and gypsum wallboard for face layer.
 - 3. Fire-Rated Construction: Install Type-X board where fire-rated partition or ceiling construction is indicated, and at other locations shown or scheduled on drawings.
- C. Cull damp and damaged boards.
- D. Butt boards together for a light contact at edges and ends with not more than 1/16 inch open space between boards. Do not force into place. Position boards so that like edges abut, tapered edges against tapered edges and mill-cut or field-cut ends against mill-cut or field-cut ends. Do not place tapered edges against cut edges or ends.
- E. Partitions/Walls:
 - 1. To minimize end joints, use floor-to-ceiling length boards, if possible and apply vertically. Locate edge joint over supports, but offset at least one stud space on opposite faces of partitions/walls.
 - 2. On high walls, where more than one length of board would be required if board were to be installed vertically, apply gypsum board horizontally, locating long joints generally at 4' and 8' above finish floor so they do not fall at eye level. Use maximum practical length of board and locate end joints over supports. Stagger joints at least 24 inches in alternate courses of board. Stagger vertical (end joints) over different studs on opposite sides of partitions.
 - 3. Cover both faces of steel stud partition framing with gypsum board in concealed spaces (above ceilings, etc.), except in chase walls which are braced internally.
 - a. Fit gypsum board around ducts, pipes, and conduits.

- b. Where partitions are perpendicular to steel deck flutes, cut gypsum board to fit profile of flutes and allow 1/4 to 1/2 inch wide joint for sealant, except where approved firestopping design incorporates a different top-of-partition detail.
- 4. Where framing is indicated to be isolated from the structure, also leave a 1/4 inch to 1/2 inch gap between drywall and surrounding construction.
- 5. Control Joints: Install control joints at intervals of approximately 30 feet, at locations shown on drawings; if no control joints are shown in long runs of drywall, consult Architect for placement.
- F. On metal furring, install wallboard vertically with no end joints.
- G. Fastening to Framing: Fasten drywall to steel framing and furring with power-driven screws. Seat heads slightly below the surface of the board but do not break the paper. Place screws at least 3/8" from edge of board.
 - 1. Single Layer: Space screws 16" o.c. max for walls; 12" o.c. max for ceilings.
 - 2. Double Layer: Comply with drywall manufacturer's instructions for spacing of fasteners, but no less than the following:
 - a. For attachment of base layer, space 24" o.c., with screws staggered on adjoining edges and ends.
 - b. For attachment of face layer, space screws 36" o.c. along edges, within 2" of joint and 12" of both ends. In field of panel, space screws along centerline, 48" o.c. max and within 24" of both ends.
- H. At openings and cutouts, fasten gypsum board to supplementary framing and blocking provided for additional support.
- I. Control Joints: Fasten gypsum board to separate studs on each side of control joint. Leave space between boards to receive specified control joint trim.

3.05 FIRE-RATED CONSTRUCTION

- A. Install gypsum board as specified in the preceding article, with additional details as specified in this article.
- B. Use Type X or Fire Code gypsum board.
- C. Use other materials and details which conform to the same U.L. design as the existing assembly, or to an equivalent assembly acceptable to the authorities having jurisdiction.
- D. Coordinate construction closely with recessed and penetrating work and with firestopping work specified in Section 07840 so that completed construction will provide a continuous smoke and fire barrier with the specified fire-rating.
- E. Wherever boxes or recessed equipment is set into recesses with face opening larger than 144 square inches, close the sides and back of the recess with gypsum board to box in the item.

- F. At inside corners and intersections with non-rated construction, make the fire-rated gypsum board continuous to maintain the rated enclosure.
- G. Identification: Do not remove stencilled messages identifying fire-rated partitions. If removal is unavoidable during cutting and patching, replace the message at a location as close as possible to the previously existing location. Intent is to leave messages at intervals not to exceed 25 feet on center, so that a message will be visible and can be read from any place where a person might gain access to the space above the ceiling.

3.06 SOUND ATTENUATION

- A. Where acoustical insulation is shown in the partition, construct the partition and install acoustical sealant and insulation as specified in this article.
- B. Do not install electrical boxes and similar penetrations back-to-back. Stagger them horizontally or vertically on opposite sides of the partition.
- C. Install sound attenuation blankets prior to gypsum board. Fit batt snugly to studs and around boxes and penetrations.
- D. Apply a continuous bead of sealant along top and bottom edge of gypsum board on both sides of the partition to seal the gap between the edge of the board and the structure above or the floor below. In double-layer work, seal the first layer of gypsum board.
- E. Seal construction at perimeters, control and expansion joints, openings and penetrations with a continuous bead of acoustical sealant to close off sound-flanking paths around or through construction. Apply a bead of sealant at both faces of partitions. Seal partitions above acoustical ceilings.
- F. Comply with ASTM C 919 and manufacturer's recommendations for location of edge trim.

3.07 SHAFTWALL SYSTEMS

- A. Cut and patch shaftwall systems so that finished system provides the same fire-resistance and structural performance as the existing installation.
- B. For installation of framing and core board, comply with shaftwall manufacturer's instructions. For installation of gypsum board on exposed face of shaftwall installation, install and finish in accordance with other articles in this Section pertaining to gypsum board installation and finishing.
- C. When installing shaft wall, take care not to damage sprayed-on fireproofing applied to structural elements. If fireproofing is damaged, patch to restore fire-rating of the assembly.
- D. At penetrations in shaft wall, maintain fire-resistance rating of shaft-wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices and similar items.
- E. Seal gypsum board shaft walls at perimeter of each section which abuts other work and at joints and penetrations within each section. Firestopping sealants are specified in Section 07840 for Firestopping. Where firestopping is not needed, seal perimeter, joints, and penetrations with

acoustical sealant, installed to withstand dislocation by the the air pressure differential between shaft and external spaces, in accordance with ASTM C 919.

3.08 INSTALLATION OF SPECIAL PANELS

- A. Where melamine-faced plywood and corrugated polycarbonate sheet are shown applied to steel stud framing, handle, cut, and install panels in accordance with panel manufacturer's recommendations and as shown on Drawings. Space fasteners as specified above for gypsum board panels, unless panel manufacturer recommends closer spacing of fasteners, or different distance from panel edges.

3.09 INSTALLATION OF FRG COLUMN COVERS

- A. Install column covers in accordance with manufacturer's recommendations.
- B. Joint Finish: Tape and finish joints as specified below for gypsum board.
- C. Surface Finishing: Fill and sand holes and pockmarks in accordance with manufacturer's recommendations to produce a smooth, even, unpitted surface.

3.10 FINISHING GYPSUM BOARD ASSEMBLIES

- A. Metal Trim: Trim outside corners, edges and control joints with metal trim of type scheduled below. Securely fasten metal trim to studs with screws. Space fasteners as recommend by trim manufacturer. Use fasteners which will be fully concealed by joint compound fill applied over flanges.
 - 1. Corner Beads: Install at external corners of drywall work.
 - 2. Edge Trim: Install at exposed panel edges and where gypsum board butts other materials. Install in single unjointed lengths wherever possible.
 - 3. Control joints: Install at control and expansion joints.
- B. General: Apply joint treatment at gypsum board joints (both directions); flanges of corner bead, edge trim, and control joints; penetrations; fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Mix and apply joint compounds according to manufacturer's instructions and use within recommended pot-life. Allow joint compound to dry between coats. Sand between coats.
- C. Prefill open joints, rounded or beveled edges, gaps wider than 1/16 inch (1.6 mm) between abutting drywall units, and damaged areas using setting-type joint compound.
- D. Apply joint tape over gypsum board joints except those which have metal trim, and fully embed tape in joint compound.
- E. Joint Finishing: Embed tape in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads, and accessories.
 - 1. Use the following joint compound combination:
 - a. Embedding and First Coat: Setting-type joint compound.
 - b. Fill (Second) Coat: Setting-type joint compound.
 - c. Finish (Third) Coat: Ready-mixed, drying-type, all-purpose or topping compound.

2. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration. (GA-214 "Level 4" finish.)
 3. Third coat may be omitted on concealed gypsum board surfaces above ceilings (GA-214 "Level 3" finish.)
- F. Finish glass-faced gypsum backing board forming base for ceramic tile to comply with ASTM C 840 and board manufacturer's directions for treatment of joints behind tile. Apply waterproof joint compound to joints and fastener heads to provide a smooth, level surface for tile installation.
- 3.11 MISCELLANEOUS WORK
- A. Spot grout hollow metal door frames. Apply spot grout at each jamb anchor clip just before inserting board into frame.
 - B. Access Doors: Install metal access doors into gypsum wall board partitions and ceilings in accordance with manufacturer's printed instructions.
- 3.12 CLEAN UP
- A. Keep work areas clean and free of debris by daily sweeping. At the completion of work in any area or on any floor, remove wallboard scraps and leave area broom clean.
 - B. Restore or replace work of other trades damaged or soiled by the work of this Section.
- 3.13 REPAIR AND TOUCH UP
- A. Protect gypsum board from damage during remainder of the construction period, including damage from water and impact.
 1. If gypsum board is wetted during construction, immediately remove and replace it. Once wet, gypsum board may not remain in place in the finished work.
 2. If gypsum board is damaged by impact during construction, repair to Architect's satisfaction before finishes are applied, or remove and replace with whole board.
 - B. After drywall has received prime coat of paint, inspect surfaces for defects and touch up where necessary.

END OF SECTION 09 29 00

SECTION 09 30 00
TILING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Procurement and Contracting Requirements and Division 01 General Requirements apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Ceramic tile.
2. Porcelain tile
3. Stone thresholds.
4. Waterproof membrane.
5. Crack isolation membrane.
6. Joint treatment of cementitious backing panels.
7. Metal edge strips.

B. Related Sections:

1. Section 02 41 19 "Selective Structure Demolition" for removing existing finishes.
2. Section 03 30 00 "Cast-in-Place Concrete" for monolithic slab finishes specified for tile substrates.
3. Section 07 92 00 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
4. Section 09 29 00 "Gypsum Board" for cementitious backer units.

1.03 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in "American National Standard Specifications for Installation of Ceramic Tile."
- C. Module Size: Actual tile size plus joint width indicated.
- D. Face Size: Actual tile size, excluding spacer lugs.

1.04 PERFORMANCE REQUIREMENTS

- A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:

1. Level Surfaces: Minimum 0.6.
2. Step Treads: Minimum 0.6.
3. Ramp Surfaces: Minimum 0.8.

1.05 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Sustainable Design:
 1. Complete “Sustainable Materials Attributes Submittal Form”, VOC Reporting Form and Concrete Tracking Form, as applicable which are attached to Section 01 81 13 “Sustainable Design Requirements”.
 2. Provide supporting documentation, as required in Section 01 81 13, from manufacturer for materials attributes data submitted.
- C. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- D. Samples: For each type of tile and grout indicated. Include Samples of accessories involving color selection.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- C. Product Certificates: For each type of product, signed by product manufacturer.
- D. Material Test Reports: For each tile-setting and -grouting product.

1.07 QUALITY ASSURANCE

- A. Source Limitations for Tile: Obtain tile of each type and color or finish from one source or producer.
 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, and grout component from one manufacturer and each aggregate from one source or producer.
- C. Source Limitations for Waterproofing and Crack Isolation Membranes: Provide waterproofing and crack isolation membranes manufactured by, or approved in writing by, setting materials manufacturer.
- D. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:

1. Stone thresholds.
2. Joint sealants.
3. Cementitious backer units.
4. Metal edge strips.

- E. Preinstallation Conference: Conduct conference at Project site.
1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.
- E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.09 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.01 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
1. Provide tile complying with Standard grade requirements unless otherwise indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCA installation methods specified in tile installation schedules, and other requirements specified.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

- E. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

2.02 PORCELAIN TILE PRODUCTS

- A. Tile Type PORC: Unglazed porcelain tile.
1. Products: Manufacturer, shape, and size as indicated on the Finish Schedule.
 2. Face: Plain with square edges, bullnose top edge of tile wainscot. Bullnose tile edges must be factory finished.
 3. Joint Width: 1/8 inches grout width to be used at wall tile, 3/16 inches grout width to be used at floor installations.
 4. Install with crack isolation membrane at floor applications.
 5. Install with waterproof membrane as indicated at wet areas.

2.03 CERAMIC TILE

- A. Tile Type CT, Glazed wall tile.
1. Products: Manufacturer, shape, and size as indicated on the Finish Schedule.
 - a. American Olean, Commercial Glazed Wall Tile, colors as selected by Architect from manufacturer's full range.
 2. Face: Plain with cushion edges.
 3. Tile Color and Pattern: As shown in the Finish Schedule.
 4. Joint Width: 1/8 inches grout width to be used at wall tile, 3/16 inches grout width floor installations.

2.04 TRIM UNITS

- A. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
- a. Base Cove: Cove, .
 - b. Base Cove External Corner: Cove, .
 - c. Wainscot Cap: Surface bullnose, .
 - d. External Corners: Surface bullnose,.
 - e. Internal Corners: Field-buttet square corners. For coved base and cap, use angle pieces designed to fit with stretcher shapes.

2.05 THRESHOLDS

- A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch or less above adjacent floor surface.

- B. Marble Thresholds: ASTM C 503, with a minimum abrasion resistance of 12 per ASTM C 1353 or ASTM C 241 and with honed finish.
 - 1. Description: Uniform, fine- to medium-grained white stone with gray veining.

2.06 WATERPROOF MEMBRANE

- A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and continuous fabric reinforcement.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Boiardi Products; a QEP company; Elastiment 344 Reinforced Waterproofing and Anti-Fracture/Crack Suppression Membrane.
 - b. Prospec Bonsal; B 6000 Waterproof Membrane with Glass Fabric.
 - c. Bostik, Inc.; Hydroment Blacktop 90210.
 - d. Custom Building Products; 9240 Waterproofing and Anti-Fracture Membrane.
 - e. Laticrete International, Inc.; Laticrete 9235 Waterproof Membrane.
 - f. MAPEI Corporation; Mapelastastic L (PRP M19) or Mapelastastic HPG with MAPEI Fiberglass Mesh.
 - g. Mer-Kote Products, Inc.; Hydro-Guard 2000.
 - h. Summitville Tiles, Inc.; S-9000.

2.07 CRACK ISOLATION MEMBRANE

- A. General: Manufacturer's standard product that complies with ANSI A118.12 for high performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and fabric reinforcement.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Boiardi Products; a QEP company; Elastiment 344 Reinforced Waterproofing and Anti-Fracture/Crack Suppression Membrane.
 - b. Prospec Bonsal; B 6000 Waterproof Membrane with Glass Fabric.
 - c. Bostik, Inc.; Hydroment Blacktop 90210.
 - d. Custom Building Products; 9240 Waterproofing and Anti-Fracture Membrane.
 - e. Laticrete International, Inc.; Laticrete Blue 92 Anti-Fracture Membrane or 9235 Waterproof Membrane.
 - f. MAPEI Corporation; Mapelastastic L (PRP M19) or Mapelastastic HPG with MAPEI Fiberglass Mesh.
 - g. Mer-Kote Products, Inc.; Hydro-Guard 2000.
 - h. Summitville Tiles, Inc.; S-9000.

2.08 SETTING MATERIALS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ardex Engineered Cements.

2. Boiardi Products; a QEP company.
3. Prospec Bonsal.
4. Custom Building Products.
5. Laticrete International, Inc.
6. MAPEI Corporation.

B. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.

1. Cleavage Membrane: Asphalt felt, ASTM D 226, Type I (No. 15); or polyethylene sheeting, ASTM D 4397, 4.0 mils thick.
2. Reinforcing Wire Fabric: Galvanized, welded wire fabric, 2 by 2 inches by 0.062-inch diameter; comply with ASTM A 185 and ASTM A 82 except for minimum wire size.
3. Latex Additive: Manufacturer's standard acrylic resin or styrene-butadiene-rubber water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate mortar bed.

C. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.

1. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

D. Medium-Bed, Latex-Portland Cement Mortar: Comply with requirements in ANSI A118.4. Provide product that is approved by manufacturer for application thickness of up to 5/8 inch.

1. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.

2.09 GROUT MATERIALS

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

1. Ardex Engineered Cements.
2. Boiardi Products; a QEP company.
3. Prospec Bonsal.
4. Custom Building Products.
5. Laticrete International, Inc.
6. MAPEI Corporation.

B. Medium-Bed Tile Setting Mortar, Basis-of-Design: Laticrete International, Inc.; 3701 or comparable product by one of the listed manufacturers.

C. Polymer-Modified Tile Grout: ANSI A118.7.

1. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersible form, prepackaged with other dry ingredients.

D. Water-Cleanable Epoxy Grout: ANSI A118.3.

1. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 deg F and 212 deg F, respectively, and certified by manufacturer for intended use.

2.10 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Provide the following for the conditions indicated
 - 1. Flooring Transitions: Schluter-SCHIENE L-shape profile, height to match tile and setting-thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless-steel, ASTM A 666, 300 Series exposed-edge material.
 - 2. Flooring Transition to Concrete: Schluter-RENO-RAMP-shape profile, height to match tile and setting-bed thickness, designed specifically for flooring applications; anodized aluminum, ASTM A 666, 300 Series exposed-edge material.
 - 3. Outside Corners of Wall Installations: Schluter-ECK-E shape profile, height to match tile and setting-bed thickness, designed specifically for wall applications; backfill to top edge per manufacturer's recommendation; stainless-steel, ASTM A 666, 300 Series exposed-edge material.
 - 4. Exposed Vertical Edges of Wall Installations: Schluter-JOLLY shape profile, height to match tile and setting-bed thickness, designed specifically for wall applications; backfill to top edge per manufacturer's recommendation; stainless-steel, ASTM A 666, 300 Series exposed-edge material.
- C. Temporary Protective Coating: Either product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.
 - 1. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F per ASTM D 87.
 - 2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.
- D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- E. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints and that does not change color or appearance of grout.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ardex Engineered Cements.
 - b. Boiardi Products; a QEP company.
 - c. Prospec Bonsal.
 - d. Custom Building Products.
 - e. Laticrete International, Inc.
 - f. MAPEI Corporation.

2.11 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 - 1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors installed with thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 - 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.
- C. Field-Applied Temporary Protective Coating: For use in areas with epoxy grout to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.03 WATERPROOFING INSTALLATION

- A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.

- B. Do not install tile or setting materials over waterproofing until waterproofing has cured and been tested to determine that it is watertight.
- C. When installing over a mortar bed, allow bed to cure thoroughly before installing waterproofing membrane.
- D. Bonding Sheet to Substrate: Use same thin-set latex portland cement mortar which will be used for setting the tile. Spread bond coat with a trowel; do not spread more mortar than can be covered before the mortar sets. Unroll sheet into the bond coat before the bond coat begins to form a "skin." Use a roller to embed the membrane into the bond coat. Work from center to edges of sheet in overlapping passes, and from area first laid to area laid last, removing all air pockets, and ensuring 100 percent coverage with full penetration of bond coat into the fabric. Lift sheet and inspect for full contact.
- E. Seaming: Lap sheets at least 2 inches edges and ends. Clean and roughen bonding area. Apply seam solvent and roll seam.
- F. Upturns and Corners: Turn membrane up at vertical surfaces at least 3 inches above the anticipated "waterline" to form a basin for containment of water. Bond to wall surface as specified for floors. Form watertight corners by using preformed corners, or by folding, or by cutting and sealing.
- G. Drains: Extend membrane into drain. Remove strainer and clamping ring. Fit and cut sheet before spreading bond coat in drain area. Punch or notch openings for clamping ring bolts, but do not cut outside the clamping ring. Apply heavy beads of sealant between drain body and membrane (under membrane), and between membrane and clamp (above membrane), under the clamping ring area. Reinstall clamping ring, firmly tighten bolts, and replace strainer.
- H. Set tile immediately following installation of sheet while bond coat is still plastic, or after bond coat has fully cured. Comply with specification for tile thin-set over waterproofing membrane.
- I. Field Testing: Inspect the waterproofing for continuity. It should be of uniform thickness and without gaps or pinholes. After seams have cured, flood test to confirm watertightness. Patch or repair as necessary until installation is watertight.

3.04 WATERPROOFING INSTALLATION AT WALL BASE

- A. Application: Install waterproofing membrane at base of walls in each restroom.
- B. Install in compliance with waterproofing manufacturer's instructions to produce a waterproof membrane of uniform thickness bonded securely to substrate.
- C. Fill gaps at base of gypsum board walls as recommended by the waterproofing membrane manufacturer.
- D. Flash Coves: Where floors meet walls, flash for a distance of at least 4 inches up the walls by embedding reinforcing fabric between two layers of liquid membrane.
- E. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.05 CRACK ISOLATION MEMBRANE INSTALLATION

- A. Where crack isolation membrane is scheduled, install crack isolation membrane on surface under tile at locations described below to comply with ANSI A108.17, TCA F125, and manufacturer's written instructions to produce membrane of uniform thickness and bonded securely to substrate.
 - 1. Over control and contraction joints in concrete floors, where control joint/sealant joint in tile is offset from the joint in the subfloor.
 - 2. Other locations indicated on the Drawings.
- B. Do not install tile or setting materials over crack isolation membrane until membrane has cured.

3.06 TILE INSTALLATION

- A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
 - 1. Backbutter tiles 12 by 12 inches or larger, whether or not recommended by the tile setting materials manufacturer.
 - 2. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:
 - a. Tile floors in wet areas.
 - b. Tile floors composed of tiles 8 by 8 inches or larger.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
 - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
 - 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 - 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- E. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

- F. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 - 1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
 - 2. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 "Joint Sealants."
- G. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
 - 1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thin set).
 - 2. Do not extend crack isolation membrane under thresholds set in latex-portland cement mortar.
- H. Metal Edge Strips: Install at locations indicated.

3.07 GROUTING

- A. Grout Release Coating:
 - 1. Apply to face of quarry tile before grouting.
 - 2. Apply to faces of other types of tile if recommended by the tile manufacturer based on type of tile, tile color and grout color.
 - 3. After grouting, remove excess grout from face of tile and remove grout release.
- B. Grout tile in accordance with the applicable ANSI A108 Series standard; mixing and applying grout in accordance with grout manufacturer's instructions.
 - 1. ANSI A108.10 for polymer modified sanded tile grout and polymer modified unsanded tile grout.
- C. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.08 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove epoxy and latex-portland cement grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
 - 3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.

- B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.09 INTERIOR TILE INSTALLATION SCHEDULE

- A. Interior Floor Installations, Concrete Subfloor:
 - 1. Tile Installation F113: Thin-set mortar; TCA F113.
 - a. Tile Type: Tiled areas with largest floor tile 12 inches or less in both dimensions.
 - b. Mortar: Latex-portland cement mortar.
 - c. Grout: Polymer-modified sanded grout.
 - 2. Tile Installation F125: Thin-set mortar on partial coverage crack isolation membrane; TCA F125.
 - a. Tile Type: Tiled areas with largest floor tile having length or width of 12 inches or more but less than 24 inches.
 - b. Mortar: Medium-bed latex-portland cement mortar.
 - c. Grout: Polymer-modified sanded grout.
 - 3. Tile Installation F125A: Thin-set mortar on full coverage crack isolation membrane; TCA F125A.
 - a. Tile Type: Tiled areas with largest floor tile having length or width of more than 24 inches.
 - b. Mortar: Medium-bed, latex-portland cement mortar.
 - c. Grout: Polymer-modified sanded grout.
 - 4. Tile Installation F122: Thin-set mortar on full coverage crack isolation membrane; TCA F122.
 - a. Tile Type: Floor tile in shower rooms outside shower stalls.
 - b. Mortar: Medium-bed, latex-portland cement mortar.
 - c. Grout: Polymer-modified sanded grout.
- B. Interior Wall Installations, Metal Studs or Furring:
 - 1. Tile Installation W243: Thin-set mortar on gypsum board and GFRP; TCA W243.
 - a. Tile Type: Wall tile in dry locations
 - b. Mortar: Latex-portland cement mortar.
 - c. Grout: Polymer-modified unsanded grout.
 - 2. Tile Installation W244C: Thin-set mortar on cementitious backer units over waterproof membrane; TCA W244.
 - a. Tile Type: Wall tile in wet locations, including showers.
 - b. Waterproof Membrane: Bonded, on face of backer unit.
 - c. Mortar: Latex-portland cement mortar.
 - 3. Tile Installation W245: Thin-set mortar on water-resistant gypsum backer board; TCA W245.
 - a. Tile Type: Wall tile on walls with plumbing fixtures.
 - b. Mortar: Latex-portland cement mortar.

- c. Grout: Polymer-modified unsanded grout.

END OF SECTION 09 30 00

SECTION 09 51 00
ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The general provisions of the Contract, including General and Supplementary Conditions and Division 1 - General Requirements, apply to work specified in this Section.

1.02 SUMMARY

- A. This Section includes acoustical panels and exposed suspension systems for ceilings.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
 - 1. Acoustical Panel: Set of 6-inch-square Samples of each type, color, pattern, and texture.
 - 2. Exposed Suspension System Members, Moldings, and Trim: Set of 12-inch- long Samples of each type, finish, and color.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each acoustical panel ceiling.
- D. Maintenance Data: For finishes to include in maintenance manuals.

1.04 QUALITY ASSURANCE

- A. Source Limitations: Obtain panels and grid through one source from a single manufacturer.
- B. Surface-Burning Characteristics: Provide acoustical panels complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:
- C. Seismic Standard: Provide acoustical panel ceilings designed and installed to withstand the effects of earthquake motions; comply with ASTM E 580, "Standard for Ceiling Suspension Systems Requiring Seismic Restraint."
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Section 01310, "Project Management and Coordination."

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or otherwise damaging units.

1.06 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 - 1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

1.07 COORDINATION

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

1.08 WARRANTY

- A. Dimensional Stability: Furnish manufacturer's written warranty, agreeing to replace panels which visibly sag or warp, under ambient conditions of temperature and relative humidity up to 104°F and 90% R.H, within 10 years from the date of Substantial Completion
- B. The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

1.09 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.
 - 1. Acoustical Ceiling Panels: Full-size panels equal to 2.0 percent of quantity installed.
 - 2. Suspension System Components: Quantity of each exposed component equal to 2.0 percent of quantity installed.

PART 2 - PRODUCTS

2.01 ACOUSTICAL PANELS

2.02 Armstrong Cortega 704 24" x 24" x 5/8" mineral base panels with tegular edge

2.03 SUSPENSION SYSTEM AND TRIM

- A. Armstrong Prelude ML, 15/16" suspension system.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. With Installer present, examine substrates, areas, and conditions, including structural framing, to which acoustical panel ceilings attach or abut, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.03 INSTALLATION, GENERAL

- A. General: Install acoustical panel ceilings to comply with ASTM C 636 and seismic requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
 - 4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 - 5. Do not attach hangers to permanent metal forms, steel deck tabs or steel roof deck. Attach hangers only to structural members, or to power-actuated fasteners that extend through steel deck into the concrete.
 - 6. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.

- C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
 - 1. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
 - 2. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- E. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
 - 1. Arrange directionally patterned acoustical panels with pattern running in one direction parallel to long axis of space, unless otherwise shown on the Drawings.
 - 2. Install square-edge panels with edges fully hidden from view by flanges of suspension system runners and moldings.
 - 3. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

3.04 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 00

SECTION 09 90 00
PAINTING

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

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

1.02 SUMMARY

- A. Work Included: Furnish painting equipment, labor and materials; prepare surfaces, and apply prime and finish coats.

1. Paint all new work under this Contract according to the finish schedule at the end of this Section.
2. Repaint existing painted surfaces which are disturbed by work under this contract, including but not limited to areas disturbed by cutting and patching.

- B. Definitions: As used in this section,

1. "Paint," includes fillers, primers, intermediate and top coats.
2. "Exposed" means "exposed to view" and includes areas visible through or behind built-in fixtures.
3. "Semi-Exposed" means "partly exposed to view" or "partly obscured" and includes areas visible through grilles, perforated or louvered covers, air intake and exhaust registers and the like, and includes the interior of ductwork which is so visible.

- C. Related Work Specified in Other Sections:

1. Cutting and patching: Section 01 73 29.
2. Room Finish Schedule: Section 09 00 00
3. Shop-priming metal fabrications: Section 05 50 00.
4. Shop-finishing of architectural woodwork: Section 06 40 00.
5. Shop priming of steel door and sidelight frames: Section 08 11 13.
6. Shop-finishing of wood doors: Section 08 14 00.
7. Stencils for pipe and conduit identification: Division 23 and 26 sections.
8. Temporary lighting and illumination levels during painting: Section 01 50 00.

1.03 SUBMITTALS

- A. Product data: Manufacturer's technical information including label analysis and instructions for handling, storage, and application of each material proposed for use. List each material and cross-reference the specific coating, finish system, and application. Identify each material by the manufacturer's catalog number and general classification.

1. Include certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).
- B. Samples for Verification: Of each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.
1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
 2. Provide a list of materials and applications for each coat of each sample. Attach to each sample a which clearly identifies each sample for location and application, and lists the materials applied for each coat.
 3. Submit Samples on the following substrates for the Architect's review of color and texture only:
 - a. Concrete: Two 4-inch-square samples for each color and finish.
 - b. Metal: Two 4-inch-square samples of flat metal and two 8-inch-long samples of solid metal for each color and finish.
 - c. Gypsum Board: Two 12 inch square samples of each color and material on hardboard.
- C. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.04 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to those indicated for the Project that have resulted in a construction record of successful in-service performance.
- B. Source Limitations: For each type of paint system, obtain block fillers, primers, and undercoat materials from the same manufacturer as the finish coats. To the greatest extent possible, furnish all paint materials for the project from a single manufacturer.
- C. Field Samples: On actual surfaces at the Project, duplicate painted finishes of the prepared samples. On at least 300 sq. ft. of surface, where directed, provide full-coat finish samples until required sheen, color, and texture is obtained. Simulate finished lighting conditions for review of in-place work. Architect will approve sample panels or direct changes as desired. Painters shall be present and prepared to change sample panels to desired shade as directed.
1. Final acceptance of colors will be from job-applied samples.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the job site in the manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:
1. Product name or title of material.
 2. Product description (generic classification or binder type).

3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.

- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Protect paint materials from freezing.
- C. Keep containers clean and keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.06 SITE CONDITIONS

- A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 deg F (10 deg C) and 90 deg F (32 deg C).
- B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 deg F (7 deg C) and 95 deg F (35 deg C).
- C. Do not apply paint when the relative humidity inside the building exceeds 85 percent; or at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
- D. Do not begin priming or painting unless adequate general illumination is provided as specified in Section 01500.

1.07 SEQUENCING, SCHEDULING AND COORDINATION WITH OTHER TRADES

- A. The trades installing surfaces and items which are to be painted shall provide smooth, sound, fully cured surfaces suitable for painting, except to the extent specified in this section. Painting work is not intended to include more than minor spackling, caulking of gaps at changes of materials, light hand sanding of millwork and carpentry items.
- B. Allow plaster to dry thoroughly, at least 30 days, before painting. Test plaster surfaces with a moisture meter to determine whether the moisture content satisfies the recommendation of the respective paint manufacturer, and do not allow painting to proceed until it does.
- C. Allow concrete and concrete unit masonry to cure thoroughly, unless paint manufacturers specifications explicitly state otherwise.
- D. Schedule installation of finish hardware, wall plates, and similar applied items which are not being painted after painting is completed, or, if necessary to maintain the schedule and acceptable to Architect, until at least the first top-coat has been applied.
- E. After prime coat has been applied to gypsum board, require drywall trade to return to the job to repair imperfections in their work that became visible after the prime coat was applied. Make flush with adjoining surface, and spot prime spackled areas.

1.08 EXTRA MATERIALS

- A. Furnish extra paint materials from the same production run as the materials applied in the quantities described below. Package paint materials in unopened, factory-sealed containers for storage and identify with labels describing contents. Deliver extra materials to the Owner.
 - 1. Quantity: Furnish the Owner with an additional 5 percent, but not less than 1 gallon or 1 case, as appropriate, of each material and color applied.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Furnish complying products by one of the following manufacturers:
 - 1. Benjamin Moore and Co. (Moore).
 - 2. PPG Industries, Pittsburgh Paints (PPG)
 - 3. The Sherwin-Williams Company (S-W).
 - 4. ICI Paint Stores, Inc., Dulux Paints (ICI)

2.02 PAINT MATERIALS, GENERAL

- A. Material Compatibility: Provide primers, intermediate and finish coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by the manufacturer based on testing and field experience.
- B. Material Quality: Provide the manufacturer's best-quality professional paint materials.
- C. VOC Content: Furnish paint materials which comply with limits on volatile organic compounds (VOC) specified in Section 01600, "Product Requirements," or with applicable air quality regulations, whichever is the more stringent limitation. Naming of a paint in this specification which does not comply with the VOC limits, does not supersede the VOC content requirement; advise Architect of the discrepancy and submit a VOC-compliant product of similar type with equal or better performance.
- D. Performance: Provide paints which are washable and which will withstand scrubbing required to remove pencil marks, ink, ordinary soil, and similar stains, and which will show no discoloration, loss of gloss, staining, or other damage when subject to ordinary wear and maintenance procedures.
- E. Proprietary Names: Products named in Part 2 establish chemical composition, sheen and quality of product required for each application. Comparable products by one of the other named manufacturers will be acceptable.
- F. Color and Sheen: Architect will select colors and specify colors by reference to one manufacturer's color names. Match the selected color in the brand of materials proposed and submit samples as specified above.
 - 1. Architect may select more than one color in each room or space.
 - 2. Colors may include deep tones or premium colors for painting up to 10% of the surface area on the project.

2.03 INTERIOR PAINT SYSTEM

A. Concrete Floors, 100% Solids Epoxy:

1. Primer: Thnemec Series 201 Epoxoprime; 6 to 8 mils dft.
2. Top Coats: Tnemenc Series 280/281 Tneme Glaze, 2 coats at 6.0 to 8.0 mils d.f.t. per coat.

B. Concrete Walls, Columns and Ceilings, Acrylic Epoxy: Self priming; 2 coats.

1. Primer: Same as top coat.
2. Top Coat: Moore: Moore's SuperSpec Acrylic Epoxy Coating #256.
ICI: Devoe Coatings Tru-Glaze Acrylic Epoxy #4418
PPG: Aquapon Waterborne Epoxy 98-1/98-98
Tnemec: Series 113/114 Tneme Tufcoat

C. Concrete Walls and Ceilings, Latex Paint:

1. Primer: Latex-based primer.
Moore: Moore's SuperSpec Latex Enamel Undercoater and Primer Sealer #253
PPG: Speedhide Int/Ext Acrylic Latex Alkali Resistant Primer 6-603
S-W: PrepRite 200 Interior Latex Wall Primer B28W200.
2. Top Coats: Latex Paint, low-odor, low gloss:
Moore: Moore's SuperSpec Latex Eggshell Enamel #274
PPG: Speedhide Latex Eggshell Enamel 6-411 Series
S-W: ProMar 200 Interior Latex Eg-Shel Enamel B20W200.

D. Steel, Acrylic Epoxy Coating: Water-based epoxy over water-based rust-inhibitive primer.

1. Primer: Moore: Moore's Acrylic Metal Primer MO4
ICI: Devoe Coatings Devflex 4020
PPG: Porter Coatings DTM Acrylic primer/Finish #215
Tnemec: Series 18 Enviro-Prime
2. Top Coat: Moore: Moore's SuperSpec Acrylic Epoxy Coating #256.
ICI: Devoe Coatings Tru-Glaze Acrylic Epoxy #4418
PPG: Aquapon Waterborne Epoxy 98-1/98-98
Tnemec: Series 113/114 H.B. Tneme-Tufcoat

E. Steel, Latex Paint, Semigloss: Latex enamel over water-based primer.

1. Primer: VOC compliant, rust-inhibiting primer; product recommended by topcoat manufacturer:
Moore: IronClad Latex Low Lustre Enamel #363.
ICI: Waterborne metal primer 4020
PPG: Pitt-Tech 100% acrylic primer 90-712

2. Top Coats: Latex Enamel, semigloss
 Moore: SuperSpec Latex Semi-Gloss Enamel 276-01
 ICI: Dulux Professional S.G. Wall and Trim Enamel 1406
 PPG: Speedhide Interior Semi-Gloss Acrylic Latex 6-500
 S-W: ProMar 200 Interior Latex Gloss B21W252
- F. Galvanized Steel, Latex Paint, Semi-Gloss: Latex paint over galvanized metal primer.
1. Primer: VOC compliant primer for galvanized metal; product recommended by topcoat manufacturer.
 ICI: Aquacrylic Gripper 3210.
 PPG: Pitt-Tech 100% acrylic primer 90-712
2. Top Coats: Latex Enamel, semigloss
 Moore: SuperSpec Latex Semi-Gloss Enamel 276-01
 ICI: Dulux Professional S.G. Wall and Trim Enamel 1406
 PPG: Speedhide Interior Semi-Gloss Acrylic Latex 6-500
 S-W: ProMar 200 Interior Latex Gloss B21W252
- H. Gypsum Board, Acrylic Epoxy, Gloss finish:
1. Primer: Moore: Moorcraft Latex Undercoater & Primer Sealer 253-00 or Regal First Coat Latex Primer/Undercoater 216
 ICI: Prep-N-Prime PVA Int. Wall Primer Sealer 1030-1200
 PPG: Speedhide Int. Latex Primer Sealer 133
 Tnemec: Series 51-792 PVA Sealer or Series 151 Elasto-Grip.
2. Top Coat: Moore: Moore's SuperSpec Acrylic Epoxy Coating #256.
 ICI: Devoe Coatings Tru-Glaze Acrylic Epoxy #4418
 PPG: Aquapon Waterborne Epoxy 98-1/98-98
 Tnemec: Series 113/114 H.B. Tneme-Tufcoat
- I. Gypsum Board, Latex Paint, Low Sheen:
1. Primer: Vinyl acrylic; product consistent with top coats specified below:
 Moore: SuperSpec Latex Enamel Undercoater and Primer 253
 PPG: Speedhide 6-2 Latex Primer-Sealer
 S-W: PrepRite 200 Latex Primer
2. Top Coats: Latex-Based Paint, Eggshell sheen
 Moore: SuperSpec Latex Eggshell Enamel 274
 PPG: Speedhide Eggshell Latex Enamel 6-411
 S-W: Promar 200 Interior Latex Eg-Shel B20W200 Series
- J. Gypsum Board, Latex Paint, Flat:
1. Primer: Vinyl acrylic; product consistent with top coats specified below:
 Moore: SuperSpec Latex Enamel Undercoater and Primer 253
 PPG: Speedhide 6-2 Latex Primer-Sealer
 S-W: PrepRite 200 Latex Primer
2. Top Coats: Vinyl acrylic or 100% acrylic; flat sheen.
 Moore: SuperSpec Latex Flat 6-70 Series

PPG: Speedhide Eggshell Latex Enamel 6-411
S-W: Promar 200 Interior Latex Flat B30W200 Series

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions under which painting will be performed for compliance with paint application requirements. Surfaces receiving paint must be thoroughly dry before paint is applied.
 - 1. Gypsum Board: Sealing of gaps between gypsum board and abutting work such as hollow metal doors and frames, aluminum windows, masonry, and similar changes of materials with paintable sealant to fill gaps in preparation for painting is specified in Section 07920. Confirm that this work has been done.
 - 2. Do not begin to apply paint until unsatisfactory conditions have been corrected. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 - 1. Notify the Architect of anticipated problems in using the materials specified over substrates primed by others.

3.02 PREPARATION

- A. Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted, or provide surface-applied protection prior to surface preparation and painting. Remove these items, if necessary, to completely paint the items and adjacent surfaces. Following completion of painting operations in each space or area, have items reinstalled by workers skilled in the trades involved.
- B. Prepare interior drywall surfaces to be painted by sealing cracks and gaps at perimeter of drywall, around hollow metal frames and at similar locations to seal out dust and provide a smooth surface for finish painting. Use acrylic latex sealant and apply in accordance with the manufacturer's recommendations. Tool beads to insure full, firm contact with both faces of the joint, strike off excess sealant and finish to a smooth, wrinkle-free, slightly concave surface.
- C. Cleaning: Before applying paint or other surface treatments, clean the substrates to remove substances that could impair the bond of the various coatings. Remove oil and grease prior to cleaning. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- D. Surface Preparation, General: Clean and prepare surfaces to be painted according to the manufacturer's instructions for each particular substrate condition and as specified. Provide barrier coats over incompatible primers or remove and reprime. Notify Architect in writing

about anticipated problems using the specified finish-coat material with substrates primed by others.

- E. Concrete: Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen, as required, to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
 - 1. Use abrasive blast-cleaning methods if recommended by the paint manufacturer.
 - 2. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's printed directions.
- F. Ferrous Metals, Shop Primed: Remove oil, grease, dirt, and other foreign substances. Use solvent or mechanical cleaning methods that comply with primer manufacturer's recommendations.
 - 1. Touch-up of bare areas and shop-applied prime coats that have been damaged during installation is the responsibility of the fabricator.
- G. Ferrous Metals, Unprimed: Remove oil, grease, dirt, loose mill scale, and other foreign substances. Use mechanical cleaning methods and pre-treatment that comply with recommendations of the primer manufacturer for type of exposure and condition of substrate, and with Steel Structures Painting Council (SSPC). As a minimum, prepare unprimed surfaces according to requirements of SSPC-SP 3, Power-Tool Cleaning.
- H. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so that the surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
 - 1. Touch-up of damaged galvanizing is responsibility of the fabricator.
- I. Previously Painted Surfaces:
 - 1. Remove loose paint, rust and corrosion.
 - 2. Spackle, fill and sand, as appropriate, to make surface smooth and even for application of new paint.
 - 3. Touch-up bare surfaces with primer.
 - 4. Sand lightly if necessary to clean the surface or promote adhesion.
 - 5. Test specified paint system on the surface to verify compatibility and adhesion. Apply barrier coat if old coating is not compatible with scheduled top-coat material, or remove existing finish entirely and reprime as required.

3.03 MIXING AND TINTING

- A. Mix and prepare paint materials according to manufacturer's directions. Keep containers used in mixing and applying paint clean and uncontaminated with foreign material. Stir paint before application to produce a mixture of uniform density and pigment; and stir again as necessary during application to maintain uniformity.

1. Do not stir surface film into material. Remove film and, if necessary, strain material before using.
2. If thinners are used, use only thinners approved by the paint manufacturer and only within recommended limits.

- B. Tinting: Tint each undercoat a lighter shade to facilitate identification of each coat where multiple coats of the same material are applied. Tint undercoats same color as the finish coat, but with sufficient difference in shade to distinguish each separate coat.

3.04 APPLICATION

- A. Apply paints according to paint manufacturer's printed instructions, including recommendations for application rate for best performance, drying time between coats, and compatibility of different coating materials. Comply with these specifications where these are more stringent than manufacturer's instructions.
- B. Match approved samples for color, texture, and coverage. Remove, refinish, or recoat work not complying with specified requirements.
- C. Apply paint by brush or roller, unless the Painting Schedule in these specifications of manufacturer's directions specifically require spray application. Select brush or roller material best suited for the type of paint being applied.
- D. Apply the number of coats specified for the paint system. Comply with paint manufacturer's recommendations for optimum coverage. Allow each coat to dry before applying the succeeding coat. Sand between coats with fine sandpaper or rub surfaces with pumice stone where required to produce an even, smooth surface.
- E. Apply additional coats when undercoats, stains, or other conditions show through the final coat of paint, until the paint film is of uniform finish, color and appearance.
- F. Paint heating equipment and pipes only when cold. Do not turn heat on until paint has dried.
- G. Prime Coats: Before application of finish coats, apply a prime coat or sealer (as scheduled) to material which is required to be field painted.
1. Touch up or recoat with primer where there is evidence of suction spots in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.
- H. Top Coat: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Apply the specified number of top coats. Apply additional top coats if surface shows skips or holidays, or if additional hiding is required over an existing finish.
- I. Labels: Do not paint over Underwriters Laboratories, Factory Mutual or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

3.05 CLEANING

- A. Cleanup: At the end of each work day, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

- B. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.06 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.
- B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
- C. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.07 PAINTING SCOPE, GENERAL

- A. The schedule at the end of this Section identifies the principal items and surfaces to be painted and the paint systems to be applied to them. This schedule is not exhaustive; paint all exposed and semi-exposed surfaces not specifically scheduled to receive another finish and not specifically excluded from painting. Paint unscheduled surfaces with the paint system for the most similar substrate listed, or confer with the Architect to decide upon the actual paint materials.
 1. Paint all new work under this Contract according to this finish schedule.
 2. Repaint existing painted surfaces which are disturbed by work under this contract, including but not limited to areas disturbed by cutting and patching. Prepare surfaces as specified under surface preparation, and apply 2 top coats.
 3. Painting includes surface preparation.
 4. Painting includes priming, except where system explicitly indicates "self priming" topcoat or otherwise excludes priming. Apply one coat of field-applied primer on steel door frames (shop primer is only for temporary protection during shipping and installation).
 5. Paint piping, ductwork, conduit and hangers where noted on the room finish schedule; at other locations these items need not be painted.
 6. Paint access panels and electric load center panel covers to match the surrounding surfaces. Panels mounted on unpainted surfaces do not have to be painted.
 7. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces.
 8. Top coats may be omitted on wall surfaces which will be covered with permanently-fixed casework or equipment.

3.08 INTERIOR PAINT SCHEDULE

<u>Surface</u>	<u>Paint System</u>
Concrete walls and columns:	Latex paint; eggshell finish.
Exposed Structural Steel:	Waterborne epoxy paint; 2 coats over primer.
Exposed Steel Deck:	Waterborne epoxy paint; 2 coats over primer.
Steel Door and Window Frames:	Interior acrylic enamel, semigloss; 2 coats over rust-inhibitive primer. Apply by spray.
Access Panels:	Paint to match surrounding surfaces. Panels located in mechanical rooms do not have to be painted.
Gypsum Board Walls 4th floor:	Water-borne epoxy paint, gloss finish.
Gypsum Board Ceilings:	Latex paint, flat; 2 top coats over 1 coat of PVA primer.
Piping and pipe hangers:	Waterborne epoxy paint; 2 coats over primer.
Ductwork and duct hangers:	Waterborne epoxy paint; 2 coats over primer.
Conduit:	Waterborne epoxy paint; 2 coats over primer.
Electric load center panel covers:	Paint to match surrounding surfaces. Paint sides, top, and bottom of exposed panel tubs. Panels located in mechanical rooms do not have to be painted.

END OF SECTION 09 90 00

SECTION 10 21 13
PLASTIC TOILET COMPARTMENTS

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

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

1.02 SUMMARY

- A. This Section includes toilet compartments and screens fabricated from plastic panels, floor supported and overhead braced.
- B. Related Work Specified in Other Sections:
 - 1. Toilet accessories: Refer to schedule on drawings.

1.03 DEFINITION

- A. "Accessible": Accessible to and individual in a wheelchair, and conforming to the Americans with Disabilities Act (ADA) "Architectural Guidelines," ANSI A117.1.
 - 1. Where stalls are shown as oversize (5' x 5' or larger), provide accessible hardware whether or not units are called out as "accessible" on the Drawings.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's illustrated product data, including specifications for materials and fabrication, installation instructions, and details of anchors, hardware, fastenings, and accessories.
- B. Shop drawings for fabrication and erection of toilet compartment assemblies not fully described by product drawings. Include plans, elevations, sections, details, and attachment to other work. Show locations of reinforcement and cutouts for compartment-mounted toilet accessories.
- C. Samples: For color selection submit sections of actual units showing full range of colors, textures, and patterns available. For verification after color selection has been made, submit 6-inch-square samples of each color.

1.05 QUALITY ASSURANCE

- A. Field Measurements: Verify dimensions in areas of installation by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating units without field measurements. Coordinate supports, adjacent construction, and fixture locations to ensure actual dimensions correspond to established dimensions.

- B. Coordination: Furnish inserts and anchors which must be built into other work for installation of toilet compartments and related items. Coordinate delivery with other work to avoid delay.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers, subject to compliance with product requirements:
 - 1. Scranton Products
 - 2. Bradley
 - 3. Global Partitions

2.02 COMPONENTS

- A. General: Provide materials that have been selected for surface flatness and smoothness. Exposed surfaces that exhibit pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections on finished units are unacceptable.
- B. Panels: High density polyethylene resin (HDPE) with homogenous color throughout, incorporating at least 20% recycled plastic. Provide material not less than 1 inch (25 mm) thick, with seamless construction and eased edges.
 - 1. Color: Furnish color selected by the Architect from manufacturer's full range.
- C. Pilaster Shoes and Sleeves (Caps): ASTM A 666, Type 302 or 304 stainless steel, not less than 0.0312 inch (0.8 mm) thick and 3 inches (75 mm) high, finished to match hardware.
- D. Full-Height (Continuous) Brackets: For attaching panels and screens to walls and pilasters, furnish full-height aluminum brackets.
- E. Overhead Bracing: Continuous extruded aluminum, ant grip profile, with clear anodized finish.
- F. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum strip in manufacturer's standard finish.
- G. Anchorages and Fasteners:
 - 1. Exposed: Stainless steel, finished to match hardware, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications.
 - 2. Concealed anchors: Hot-dip galvanized, cadmium-plated, or other rust-resistant protective-coated steel.
- H. Door Hardware: Aluminum hardware of the following types:
 - 1. Hinges: 8" high aluminum hinges, self-closing, adjustable to hold door open at any angle up to 90 degrees.
 - 2. Latch and Keeper: Manufacturer's standard surface-mounted latch unit with combination rubber-faced door strike and keeper designed for emergency access. Provide units that comply with ANSI A117.1 and with MAAB at compartments indicated to be "accessible."

3. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.
4. Door Bumper: Manufacturer's standard rubber-tipped bumpers.
5. Door Pull: Manufacturer's standard unit that complies with accessibility requirements of authorities having jurisdiction.

2.03 FABRICATION OF TOILET PARTITIONS

- A. General: Furnish standard doors, panels, screens, and pilasters fabricated for compartment system. Furnish units with cutouts and drilled holes to receive partition-mounted hardware, accessories, and grab bars, as indicated.
- B. Solid-Plastic, Polymer-Resin Compartments and Screens: Provide aluminum heat-sink strips at exposed bottom edges of HDPE units to prevent burning.
- C. Overhead-Braced-and-Floor-Anchored Compartments: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, fasteners, and anchors at pilasters to suit floor conditions. Make provisions for setting and securing continuous head rail at top of each pilaster. Provide shoes at pilasters to conceal supports and leveling mechanism.
 1. Headrail: Extruded aluminum with anti-grip configuration.
- D. Floor-Anchored Screens: Provide pilasters and panels of same construction and finish as toilet compartments. Provide manufacturer's standard corrosion-resistant anchoring assemblies complete with threaded rods, lock washers, and leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.
- E. Doors: Unless otherwise indicated, provide 24-inch-wide in-swinging doors for standard toilet compartments and 36-inch-wide out-swinging doors with a minimum 32-inch-wide clear opening for compartments indicated to be "accessible" or wheelchair accessible.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, plumb, and level. Provide clearances of not more than 1/2 inch between pilasters and panels and not more than 1 inch between panels and walls. Secure units in position with manufacturer's recommended anchoring devices.
 1. Secure panels to walls and pilasters with continuous brackets. Locate wall brackets so holes for wall anchors occur in masonry or tile joints. Align brackets at pilasters with brackets at walls.
- B. Overhead-Braced-and-Floor-Anchored Compartments: Secure pilasters to floor and level, plumb, and tighten. Secure continuous head rail to each pilaster with not less than 2 fasteners. Hang doors and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

- C. Screens: Attach with anchoring devices according to manufacturer's written instructions and to suit supporting structure. Set units level and plumb and to resist lateral impact.

3.02 ADJUST AND CLEAN

- A. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return to fully closed position.
- B. Clean exposed surfaces of partition systems using materials and methods recommended by manufacturer.
- C. Protect toilet partitions from damage and deterioration until the time of Substantial Completion.

END OF SECTION 10170

SECTION 12 36 61
SIMULATED STONE COUNTERTOPS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Procurement and Contracting Requirements and Division 01 General Requirements apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Solid-surface-material countertops, integral sinks, and backsplashes.
- B. Related Sections:
 - 1. Section 06 10 53 "Miscellaneous Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view.
 - 2. Section 06 46 00 "Wood Trim" for painted or transparent finished wood trim.
 - 3. Section 12 32 00 "Manufactured Wood Casework."
 - 4. Division 22 Plumbing for nonintegral sinks and plumbing fittings.

1.03 ACTION SUBMITTALS

- A. Product Data: For countertop materials and sinks.
- B. Sustainable Design:
 - 1. Complete "Sustainable Materials Attributes Submittal Form", VOC Reporting Form and Concrete Tracking Form, as applicable which are attached to Section 01 81 13 "Sustainable Design Requirements". Applicable attributes may include recycled content, and regional, reused, rapidly renewable, or low-emitting materials.
 - 2. Provide supporting documentation from manufacturer for materials attributes data submitted; for Low-Emitting Materials and FSC-Certified Wood products include certificates as specified in Section 01 81 13.
- C. Shop Drawings: For countertops. Show materials, seam locations, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
- D. Samples for Initial Selection: For each type of material exposed to view.
- E. Samples for Verification: For the following products:
 - 1. Countertop material, 6 inches square.
 - 2. Wood trim, 8 inches long.

1.04 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For simulated stone countertops to include in maintenance manuals. Include product data for cleaning products used or recommended by Installer, and names, addresses, and telephone numbers of local sources for products.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Fabricator of products.

1.06 FIELD CONDITIONS

- A. Field Measurements: Where countertops are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Established Dimensions: Where countertops are indicated to fit to other construction, establish dimensions for areas where countertops are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.01 SOLID-SURFACE-MATERIAL COUNTERTOPS

- A. Configuration: Provide countertops with the following backsplash style:
 - 1. Backsplash: Straight, slightly eased at corner.
 - 2. Endsplash: Matching backsplash.
- B. Countertops: 1/2-inch- thick, solid surface material with front edge built up with same material.
- C. Backsplashes: 1/2-inch- thick, solid surface material.
- D. Fabrication: Fabricate tops in one piece with shop-applied edges and backsplashes unless otherwise indicated. Comply with solid-surface-material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
 - 1. Install integral sink bowls in countertops in the shop.
- E. Grommets: Provide grommets for wire management at 5 ft o.c. unless otherwise indicated.

2.02 COUNTERTOP MATERIALS

- A. Adhesives: Adhesives shall not contain urea formaldehyde.

- B. Solid Surface Material: Homogeneous solid sheets of filled plastic resin complying with ANSI SS1.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Avonite Surfaces.
 - b. E. I. du Pont de Nemours and Company.(Corian)
 - c. Formica Corporation.
 - d. Meganite Inc.
 - e. Samsung Chemical USA, Inc.
 - f. Swan Corporation (The).
 - g. Wilsonart International.
 2. Type: Provide Standard Type unless Special Purpose Type is indicated.
 3. Integral Sink Bowls: Comply with ISSFA-2 and ANSI Z124.3, Type 5 or Type 6, without a precoated finish.
 4. Colors and Patterns: As selected by Architect from manufacturer's full range.

2.03 COUNTERTOP SUPPORTS

- A. Countertop Support Brackets: Boomerang shaped bracket fabricated from 1/8 inch thick steel plate, designed so that either leg can be fastened to the wall, with wall flange pre-punched for fasteners, and corner notched to provide clearance for wall cleat and wire run.
1. Product: A & M Hardware, Inc., Manheim, PA; Work Station Brackets.
 2. Finish: Powder coat finish in color selected by the Architect.

2.04 ACCESSORIES

- A. Grommets for Cable Passage through Countertops: 2-inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage.
1. Product: Subject to compliance with requirements, provide by Doug Mockett & Company, Inc.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install countertops level to a tolerance of 1/8 inch in 8 feet.
- B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Pre-drill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
1. Seal edges of cutouts in particleboard subtops by saturating with varnish.
- C. Install backsplashes and end splashes by adhering to countertops with adhesive recommended by the simulated stone manufacturer. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Leave 1/16-inch gap between splashes and wall for filling with sealant. Use temporary shims to ensure uniform spacing.

- D. Apply sealant to joints and gaps specified for filling with sealant; comply with Section 07 92 00 "Joint Sealants." Remove temporary shims before applying sealant.

END OF SECTION 12 36 61

SECTION 21 05 00
COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Procurement and Contracting Requirements and Division 01 General Requirements apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Piping materials and installation instructions common to most piping systems.
 - 2. Sleeves.
 - 3. Escutcheons.
 - 4. Painting and finishing.
 - 5. Supports and anchorages.

1.03 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.04 SUBMITTALS

- A. Product Data: For the following:
 - 1. Mechanical sleeve seals.
 - 2. Escutcheons.
 - 3. Sleeves.

1.05 QUALITY ASSURANCE

- A. Electrical Characteristics for Fire-Suppression 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.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

1.07 COORDINATION

- A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for fire-suppression installations.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- C. Coordinate requirements for access panels and doors for fire-suppression items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

PART 2 - PRODUCTS

2.01 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 21 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.02 JOINING MATERIALS

- A. Refer to individual Division 21 piping Sections for special joining materials not listed below.
- B. 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.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. 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.

- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- E. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.03 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

2.04 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: With set screw.
 - 1. Finish: Polished chrome-plated
- D. One-Piece, Floor-Plate Type: Cast-iron floor plate.

PART 3 - EXECUTION

3.01 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 21 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

- C. Install piping in concealed locations, 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.
- F. Install piping to permit valve servicing.
- G. Install piping at a slope that will permit full drainage.
- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.
- K. Select system components with pressure rating equal to or greater than system operating pressure.
- L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
 - c. Insulated Piping: One-piece, stamped-steel type with spring clips.
 - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
 - e. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type and set screw.
 - f. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished chrome-plated finish.
 - g. Bare Piping in Equipment Rooms: One-piece, cast-brass type.
 - h. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.
- M. Sleeves are not required for core-drilled holes.
- N. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring.
 - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.

3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. Steel Pipe Sleeves: For pipes smaller than NPS 6.
 - b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.
 - c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for flashing.
 - 1) Seal space outside of sleeve fittings with grout.
 4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.
- O. Verify final equipment locations for roughing-in.
- P. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.02 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 21 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- E. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- F. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.03 PAINTING

- A. Painting of fire-suppression systems, equipment, and components is specified in Division 09 Sections "Interior Painting" and "Exterior Painting."

- B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.04 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Refer to Division 05 Section "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor fire-suppression materials and equipment.
- C. Field Welding: Comply with AWS D1.1.

END OF SECTION 21 05 00

SECTION 21 05 48
VIBRATION AND SEISMIC CONTROLS FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Contracting Requirements and Division 01 General Requirements apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Restraining braces.

1.03 DEFINITIONS

- A. IBC: International Building Code.
- B. ICC-ES: ICC-Evaluation Service.
- C. OSHPD: Office of Statewide Health Planning and Development for the State of California.

1.04 PERFORMANCE REQUIREMENTS

- A. Refer to structural engineering drawings for performance criteria.

1.05 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.
 - a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an agency acceptable to authorities having jurisdiction.
 - b. Annotate to indicate application of each product submitted and compliance with requirements.
- B. Provide supporting documentation, as required in Section 01 81 13, from manufacturer for materials attributes data submitted.
- C. Delegated-Design Submittal: For vibration isolation and 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 vibration isolators, seismic restraints, and for designing vibration isolation bases.
2. Seismic-Restraint Details:
 - a. Design Analysis: To support selection and arrangement of seismic 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. Indicate association with vibration isolation devices.
 - c. Preapproval and Evaluation Documentation: By an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

D. Qualification Data: For professional engineer.

1.06 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 and NFPA 13 unless requirements in this Section are more stringent.
- 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

2.01 SEISMIC-RESTRAINT DEVICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. California Dynamics Corporation.
 2. Hilti, Inc.
 3. Kinetics Noise Control.
 4. Unistrut; Tyco International, Ltd.
- B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to authorities having jurisdiction.

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.
- C. Channel Support System: MFMA-3, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.
- D. Hanger Rod Stiffener: Reinforcing steel angle clamped to hanger rod.
- E. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.
- F. 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 used.
- G. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.
- H. 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.
- I. 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.
 1. Low-Emitting Materials: Adhesive shall have a VOC content of 30 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.02 FACTORY FINISHES

- A. Finish: Manufacturer's standard prime-coat finish ready for field painting.
- B. 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

3.01 EXAMINATION

- A. Examine areas and equipment to receive vibration isolation and 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.

3.02 APPLICATIONS

- A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction.
- 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.

3.03 SEISMIC-RESTRAINT DEVICE INSTALLATION

- A. Equipment Restraints:
 - 1. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.
- B. Piping Restraints:
 - 1. Comply with requirements in MSS SP-127 and NFPA 13.
 - 2. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
 - 3. Brace a change of direction longer than 12 feet.
- C. Install cables so they do not bend across edges of adjacent equipment or building structure.
- D. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.
- E. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolts and mounting hole in concrete base.
- F. 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.

- G. 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.
- H. Drilled-in Anchors:
1. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.
 2. 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.
 3. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 4. 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.
 5. 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.
 6. Set anchors to manufacturer's recommended torque, using a torque wrench.

3.04 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

- A. Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment. Comply with requirements in other Division 21 Sections for piping flexible connections.

END OF SECTION 21 05 48

SECTION 21 13 13
WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Procurement and Contracting Requirements and Division 01 General Requirements apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Pipes, fittings, and specialties.
- B. Related Sections:
 - 1. 21 05 00 "Common Work Results".
 - 2. 21 05 48 "Vibration and Seismic Controls".

1.03 DEFINITIONS

- A. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 300 psig maximum.

1.04 SYSTEM DESCRIPTIONS

- A. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply through alarm valve. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device. Hose connections are included.

1.05 PERFORMANCE REQUIREMENTS

- A. Standard-Pressure Piping System Component: Listed for 300-psig minimum working pressure.
- B. Delegated Design: Design sprinkler system(s), including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated. A new hydrant flow test shall be performed by the Fire protection Contractor as part of the contract, who will pay for all associated fees/permits. Test results shall include:
 - 1. Location of Flow & Pressure:
 - Date:
 - Flow(gpm):
 - Static pressure (psi):
 - Residual pressure at flow rate (psi):

- C. Sprinkler system design shall be approved by authorities having jurisdiction. The contractor shall confirm the Sprinkler Occupancy Hazard Classifications, Sprinkler Densities and Sprinkler Spacing with authority having jurisdiction and the Owner' insurance underwriter prior to submitting his Bid, to confirm that the classifications listed are still applicable or if more stringent requirements are to be used for the Project.
1. Margin of Safety for Available Water Flow and Pressure: 10 psi, including losses through water-service piping, valves, and backflow preventers.
 2. Sprinkler Occupancy Hazard Classifications:
 - a. Building Service Areas: Ordinary Hazard, Group 1.
 - b. Electrical Equipment Rooms: Ordinary Hazard, Group 2.
 - c. General Storage Areas: Ordinary Hazard, Group 1.
 - d. Apartments: Light Hazard.
 - e. Mechanical Equipment Rooms: Ordinary Hazard, Group 2.
 - f. Office, Fitness Center, Lobbies/Corridor and Public Areas: Light Hazard.
 - g. Restaurant/retail space: Ordinary Hazard, Group 1.
 3. Minimum Density for Automatic-Sprinkler Piping Design:
 - a. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. area.
 - b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. area.
 - c. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm over 1500-sq. ft. area.
 4. Maximum Protection Area per Sprinkler:
 - a. Office & Classroom Spaces: 225 sq. ft.
 - b. Storage Areas: 130 sq. ft.
 - c. Mechanical Equipment Rooms: 130 sq. ft.
 - d. Electrical Equipment Rooms: 130 sq. ft.
 - e. Other Areas: According to NFPA 13 recommendations unless otherwise indicated.
 5. Total Combined Hose-Stream Demand Requirement: According to NFPA 13 unless otherwise indicated:
 - a. Light-Hazard Occupancies: 100 gpm
 - b. Ordinary-Hazard Group 1 Occupancies: 250 gpm
 - c. Ordinary-Hazard Group 2 Occupancies: 250 gpm
- D. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.

1.06 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For wet-pipe sprinkler systems. Include plans, elevations, sections, details, and attachments to other work.
 1. Wiring Diagrams: For power, signal, and control wiring.

- C. Delegated-Design Submittal: For sprinkler systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Coordination Drawings: Sprinkler systems, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Domestic water piping.
 - 2. HVAC ductwork and hydronic piping.
 - 3. Building structural components, including beam penetrations.
 - 4. Items penetrating finished ceiling include the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
- E. Qualification Data: For qualified Installer.
- F. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations.
- G. Fire-hydrant flow test report.
- H. 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."
- I. Field quality-control reports.
- J. Operation and Maintenance Data: For sprinkler specialties to include in emergency, operation, and maintenance manuals.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.
 - a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer.
- 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. NFPA Standards: Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:
 - 1. NFPA 13, "Installation of Sprinkler Systems."

1.08 COORDINATION

- A. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

1.09 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. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

PART 2 - PRODUCTS

2.01 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.

2.02 STEEL PIPE AND FITTINGS

- A. Standard Weight, Black-Steel Pipe for sizes 2" and smaller: ASTM A 53/A 53M. Pipe ends may be factory or field formed to match joining method.
- B. Schedule 10, Black-Steel Pipe for sizes 2 1/2" and larger: ASTM A 135 or ASTM A 795/A 795M, Schedule 10, rated for 300 psi.
- C. Malleable- or Ductile-Iron Unions: UL 860.
- D. Grooved-Joint, Steel-Pipe Appurtenances:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anvil International, Inc.
 - b. Tyco Fire & Building Products LP.
 - c. Victaulic Company.
 - 2. Pressure Rating: 300 psig minimum.
 - 3. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

2.03 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick.

1. Class 125, Cast-Iron Flanges and Class 150, Bronze Flat-Face Flanges: Full-face gaskets.
2. Class 250, Cast-Iron Flanges and Class 300, Steel Raised-Face Flanges: Ring-type gaskets.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

2.04 SPRINKLER SPECIALTY PIPE FITTINGS

2.05 SPRINKLERS

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

1. Reliable Automatic Sprinkler Co., Inc.
2. Tyco Fire & Building Products LP.
3. Viking Corporation.

B. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating for Automatic Sprinklers: 300 psig minimum.

C. Automatic Sprinklers with Heat-Responsive Element:

1. Early-Suppression, Fast-Response Applications: UL 1767.
2. Nonresidential Applications: UL 199.
3. Characteristics: Nominal 1/2-inch orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.

D. Sprinkler Finishes:

1. Chrome plated.
2. Bronze.
3. Black. (Auditorium, Drama, TV studio)

E. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.

1. Ceiling Mounting: Chrome-plated steel, one piece, flat or black.
2. Sidewall Mounting: Chrome-plated steel, one piece, flat.

F. Sprinkler Guards:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Reliable Automatic Sprinkler Co., Inc.
 - b. Tyco Fire & Building Products LP.

- c. Viking Corporation.
2. Standard: UL 199.
3. Type: Wire cage with fastening device for attaching to sprinkler.

2.06 SLEEVES

- A. Cast-Iron Wall Pipe Sleeves: Cast or fabricated of cast iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- C. Molded-PE Sleeves: Reusable, PE, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.
- D. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, standard weight, zinc coated, plain ends.
- E. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 1. Underdeck Clamp: Clamping ring with set-screws.

2.15 SPARE HEADS AND CABINETS

- A. Provide where directed by the Designer, a metal cabinet in the building containing spare sprinkler heads and wrenches.
- B. Cabinet shall have shelves for storing the spare sprinkler heads in an orderly manner. The shelf spaces shall be subdivided to segregate the sprinkler heads of each type and clearly identify them with approved markings. Cabinet shall have proper arrangements for hanging the wrenches. Wrenches shall be located so as to be readily accessible.
- C. Cabinet shall be dust tight and red in color, enameled finish. The outside of the cabinet door shall have painted on it in legible and clear lettering "Automatic Sprinklers - Reserve Supply", suitable standard instructions pertaining to the sprinkler systems and any other necessary information shall be fastened onto the inside of the cabinet door.
- D. The cabinet size and number of each type spare sprinkler head shall conform to the National Fire Protection Association Pamphlet No. 13.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.
- B. Report test results promptly and in writing.

3.02 PIPING INSTALLATION

- A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
 - 1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
- B. Piping Standard: Comply with requirements for installation of sprinkler piping in NFPA 13.
- C. Install seismic restraints on piping. Comply with requirements for seismic-restraint device materials and installation in NFPA 13.
- D. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- E. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- F. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- G. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.
- H. Install sprinkler piping with drains for complete system drainage.

- I. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
- J. Install automatic (ball drip) drain valve at each check valve for fire-department connection, to drain piping between fire-department connection and check valve. Install drain piping to and spill over floor drain or to outside building.
- K. Install alarm devices in piping systems.
- L. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.
- M. Fill sprinkler system piping with water.
- N. Install pipe insulation on sprinkler piping in areas subject to freezing.

3.03 JOINT CONSTRUCTION

- A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.
- B. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.
- G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- H. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.
- I. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.

- J. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.04 INSTALLATION OF COVER SYSTEM FOR SPRINKLER PIPING

- A. Install cover system, brackets, and cover components for sprinkler piping according to manufacturer's "Installation Manual" and with NFPA 13 for supports.

3.05 VALVE AND SPECIALTIES INSTALLATION

- A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.
- B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.
- C. Install double check valve assembly in the water-supply connection.
- D. Specialty Valves:
 - 1. General Requirements: Install in vertical position for proper direction of flow, in main supply to system.
 - 2. Alarm Valves: Include bypass check valve and retarding chamber drain-line connection.

3.06 SPRINKLER INSTALLATION

- A. Install sprinklers in suspended ceilings in center of narrow dimension of acoustical ceiling panels.

3.07 ESCUTCHEON INSTALLATION

- A. Install escutcheons for penetrations of walls, ceilings, and floors.
- B. Escutcheons for New Piping:
 - 1. Piping with Fitting or Sleeve Protruding from Wall: One piece, deep pattern.
 - 2. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish.
 - 3. Bare Piping at Ceiling Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish.
 - 4. Bare Piping in Unfinished Service Spaces: One piece, stamped steel with set-screw or spring clips.
 - 5. Bare Piping in Equipment Rooms: One piece, stamped steel with set-screw or spring clips.
 - 6. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece floor plate.

3.08 SLEEVE INSTALLATION

- A. General Requirements: Install sleeves for pipes and tubes passing through penetrations in floors, partitions, roofs, and walls.
- B. Sleeves are not required for core-drilled holes.
- C. Permanent sleeves are not required for holes formed by removable PE sleeves.
- D. Cut sleeves to length for mounting flush with both surfaces unless otherwise indicated.
- E. Install sleeves in new partitions, slabs, and walls as they are built.
- F. For interior wall penetrations, seal annular space between sleeve and pipe or pipe insulation using joint sealants appropriate for size, depth, and location of joint. Comply with requirements for joint sealants in Division 07 Section "Joint Sealants."
- G. For exterior wall penetrations above grade, seal annular space between sleeve and pipe using joint sealants appropriate for size, depth, and location of joint. Comply with requirements for joint sealants in Division 07 Section "Joint Sealants."
- H. For exterior wall penetrations below grade, seal annular space between sleeve and pipe using sleeve seals.
- I. Seal space outside of sleeves in concrete slabs and walls with grout.
- J. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation unless otherwise indicated.
- K. Install sleeve materials according to the following applications:
 - 1. Sleeves for Piping Passing through Gypsum-Board Partitions:
 - a. Galvanized-steel-pipe sleeves for pipes smaller than NPS 6.
 - b. Galvanized-steel-sheet sleeves for pipes NPS 6 and larger.
 - c. Exception: Sleeves are not required for water-supply tubes and waste pipes for individual plumbing fixtures if escutcheons will cover openings.
 - 2. Sleeves for Piping Passing through Interior Concrete Walls:
 - a. Galvanized-steel-pipe sleeves for pipes smaller than NPS 6.
 - b. Galvanized-steel-sheet sleeves for pipes NPS 6 and larger.
- L. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestop materials and installations in Division 07 Section "Penetration Firestopping."

3.09 IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.

- B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.10 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
 - 4. Energize circuits to electrical equipment and devices.
 - 5. Coordinate with fire-alarm tests. Operate as required.
- C. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.11 CLEANING

- A. Clean dirt and debris from sprinklers.
- B. Remove and replace sprinklers with paint other than factory finish.

3.12 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain specialty valves.

3.13 PIPING SCHEDULE

- A. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.
- B. Standard-pressure, wet-pipe sprinkler system, NPS 2 and smaller shall be one of the following:
 - 1. Standard-weight, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
- C. Standard-pressure, wet-pipe sprinkler system, NPS 2-1/2 and larger, shall be one of the following:
 - 1. Schedule 10, black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

3.14 SPRINKLER SCHEDULE

- A. Use sprinkler types in subparagraphs below for the following applications:
1. Rooms without Ceilings: Upright sprinklers
 2. Rooms with Suspended Ceilings: Pendent, recessed, flush, or concealed sprinklers as indicated.
 3. Wall Mounting: Sidewall sprinklers.
- B. Provide sprinkler types in subparagraphs below with finishes indicated.
1. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.
 2. Flush Sprinklers: Bright chrome, with painted white escutcheon.
 3. Recessed Sprinklers: Bright chrome, with bright chrome escutcheon and black at auditorium, drama, & TV studio..
 4. Upright, Pendent and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes. Provide wire cages in mechanical and storage rooms.

END OF SECTION 21 13 13

SECTION 22 03 00
PLUMBING SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Procurement and Contracting Requirements and Division 01 General Requirements apply to this Section.
- B. Refer to architectural demolition drawings for the area and scope of work.

1.02 SUMMARY

- A. Section Includes: Selective demolition of plumbing services and equipment, including:
 - 1. All work shown on architectural demolition drawings, phasing drawings and phasing specifications.
- B. Related Sections:
 - 1. Division 01 Section "Construction Waste Management and Disposal" for sorting disposal of demolition waste.

1.03 SUBMITTALS

- A. Selective demolition plan and schedule.
- B. Qualification Data: For qualified plumbing subcontractor, and for Hazardous Waste Hauler.

1.04 QUALITY ASSURANCE

- A. Selective Demolition Subcontractor Qualifications: An employer of workers trained and approved by manufacturer.
- B. Hazardous Material Disposal:
- C. Referenced Standards: Execute the work in accordance with applicable provisions of Federal, State, local government laws, ordinances, reference codes. Governing laws, ordinances, codes, and standards constitute minimum requirements.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Demolition drawings are based on casual field observation and existing record documents. Verify that field measurements and piping arrangements are as shown on Drawings. Verify that abandoned piping and equipment (if any) serve only abandoned facilities.
- B. Report discrepancies to Architect before disturbing existing installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Disconnection: Disconnect all sanitary, storm, gas and water service provided for the building before starting work.
- B. Notification: Notify the Owner at least 24 hours in advance of shutting down the plumbing services.

3.03 CLEANING AND REPAIR

- A. Clean and repair existing materials and equipment which remain or are to be reused.
- B. Repair adjacent construction and finishes damaged during demolition and rearrangement work.

END OF SECTION 22 03 00

SECTION 22 05 00
COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Contracting Requirements and Division 01 General Requirements apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Piping materials and installation instructions common to most piping systems.
 - 2. Sleeves.
 - 3. Escutcheons.
 - 4. Plumbing demolition.
 - 5. Equipment installation requirements common to equipment sections.
 - 6. Painting and finishing.
 - 7. Supports and anchorages.

1.03 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- F. The following are industry abbreviations for plastic materials:
 - 1. ABS: Acrylonitrile-butadiene-styrene plastic.
 - 2. CPVC: Chlorinated polyvinyl chloride plastic.
 - 3. PE: Polyethylene plastic.
 - 4. PVC: Polyvinyl chloride plastic.
- G. The following are industry abbreviations for rubber materials:
 - 1. EPDM: Ethylene-propylene-diene terpolymer rubber.
 - 2. NBR: Acrylonitrile-butadiene rubber.

1.04 SUBMITTALS

- A. Product Data: For the following:
 - 1. Transition fittings.
 - 2. Dielectric fittings.
 - 3. Mechanical sleeve seals.
 - 4. Escutcheons.

- B. Welding certificates.

1.05 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
 - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. Electrical Characteristics for Plumbing 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.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.07 COORDINATION

- A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for plumbing installations.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- C. Coordinate requirements for access panels and doors for plumbing items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.02 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.03 JOINING MATERIALS

- A. Refer to individual Division 22 piping Sections for special joining materials not listed below.
- B. 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.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. 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.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, 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:
 - 1. ABS Piping: ASTM D 2235.
 - 2. CPVC Piping: ASTM F 493.
 - 3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
 - 4. PVC to ABS Piping Transition: ASTM D 3138.

- I. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.

2.04 SLEEVES

- A. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- B. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - 1. Underdeck Clamp: Clamping ring with set screws.

2.05 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: With set screw.
 - 1. Finish: Polished chrome-plated
- D. One-Piece, Stamped-Steel Type: With set screw or spring clips and chrome-plated finish.
- E. One-Piece, Floor-Plate Type: Cast-iron floor plate.

PART 3 - EXECUTION

3.01 PLUMBING DEMOLITION

- 1. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - 2. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - 3. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
- B. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.02 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.

- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping in concealed locations, 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.
- F. Install piping to permit valve servicing.
- G. Install piping at indicated slopes.
- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.
- K. Select system components with pressure rating equal to or greater than system operating pressure.
- L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
 - 1. New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
 - c. Insulated Piping: One-piece, stamped-steel type with spring clips.
 - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
 - e. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece cast-brass type with polished chrome-plated finish.
 - f. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with rough-brass finish.
 - g. Bare Piping in Equipment Rooms: One-piece, cast-brass type.
 - h. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.
- M. Sleeves are not required for core-drilled holes.
 - 1. Exception: Provide and extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
- N. Permanent sleeves are not required for holes formed by removable PE sleeves.

- O. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 - 3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. Steel Pipe Sleeves: For pipes smaller than NPS 6.
 - b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.
 - c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for flashing.
 - 1) Seal space outside of sleeve fittings with grout.
 - 4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.
- P. Verify final equipment locations for roughing-in.
- Q. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.03 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel 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.
- F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

- G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- I. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
 - 1. Plain-End Pipe and Fittings: Use butt fusion.
 - 2. Plain-End Pipe and Socket Fittings: Use socket fusion.
- J. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

3.04 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
 - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
 - 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
 - 3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
 - 4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.05 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install plumbing 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.
- D. Install equipment to allow right of way for piping installed at required slope.

3.06 PAINTING

- A. Painting of plumbing systems, equipment, and components is specified in Division 09 Sections "Interior Painting" and "Exterior Painting."
- B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.07 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Refer to Division 05 Section "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing materials and equipment.
- C. Field Welding: Comply with AWS D1.1.

END OF SECTION 22 05 00

SECTION 22 05 23
GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Contracting Requirements and Division 01 General Requirements apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Bronze ball valves.
 - 2. Iron ball valves.
 - 3. Iron, single-flange butterfly valves.
- B. Related Sections:
 - 1. Division 22 plumbing piping Sections for specialty valves applicable to those Sections only.
 - 2. Division 22 Section "Identification for Plumbing Piping and Equipment" for valve tags and schedules.
 - 3. Division 33 water distribution piping Sections for general-duty and specialty valves for site construction piping.

1.03 DEFINITIONS

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene copolymer rubber.
- C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- D. OS&Y: Outside screw and yoke.
- E. RS: Rising stem.
- F. SWP: Steam working pressure.

1.04 SUBMITTALS

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

1.05 QUALITY ASSURANCE

- A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
- B. ASME Compliance:

1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
2. ASME B31.1 for power piping valves.
3. ASME B31.9 for building services piping valves.

C. NSF Compliance: NSF 61 for valve materials for potable-water service.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.
3. Set angle, gate, and globe valves closed to prevent rattling.
4. Set ball and plug valves open to minimize exposure of functional surfaces.
5. Set butterfly valves closed or slightly open.
6. Block check valves in either closed or open position.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS FOR VALVES

A. Refer to valve schedule articles for applications of valves.

B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

C. Valve Sizes: Same as upstream piping unless otherwise indicated.

D. Valves in Insulated Piping: With 2-inch stem extensions and the following features:

1. Gate Valves: With rising stem.
2. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
3. Butterfly Valves: With extended neck.

E. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1 for iron valves.
2. Grooved: With grooves according to AWWA C606.
3. Solder Joint: With sockets according to ASME B16.18.
4. Threaded: With threads according to ASME B1.20.1.

F. Valve Bypass and Drain Connections: MSS SP-45.

2.02 BRONZE BALL VALVES

- A. Three-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Conbraco Industries, Inc.; Apollo Valves.
 - b. Hammond Valve.
 - c. Milwaukee Valve Company.
 - d. NIBCO INC.
 2. Description:
 - a. Standard: MSS SP-110.
 - b. SWP Rating: 150 psig.
 - c. CWP Rating: 600 psig.
 - d. Body Design: Three piece.
 - e. Body Material: Bronze.
 - f. Ends: Threaded. (or solder for domestic water service, 2" and smaller)
 - g. Seats: PTFE or TFE.
 - h. Stem: Stainless steel.
 - i. Ball: Stainless steel, vented.
 - j. Port: Full.
 - k.

2.03 IRON BALL VALVES

- A. Class 125, Iron Ball Valves:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Valve, Inc.
 - b. Conbraco Industries, Inc.; Apollo Valves.
 - c. Kitz Corporation.
 - d. Sure Flow Equipment Inc.
 - e. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 2. Description:
 - a. Standard: MSS SP-72.
 - b. CWP Rating: 200 psig
 - c. Body Design: Split body.
 - d. Body Material: ASTM A 126, gray iron.
 - e. Ends: Flanged.
 - f. Seats: PTFE or TFE.
 - g. Stem: Stainless steel.
 - h. Ball: Stainless steel.
 - i. Port: Full.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- E. Do not attempt to repair defective valves; replace with new valves.

3.02 VALVE INSTALLATION

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement.

3.03 ADJUSTING

- A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.04 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

- A. If valve applications are not indicated, use the following:
 - 1. Shutoff Service: Ball, butterfly valves.
 - 2. Butterfly Valve Dead-End Service: Single-flange (lug) type.
 - 3. Throttling Service: Ball valves or butterfly valves.
 - 4. Balancing Valves: Circuit balancing type
 - 5. Pump-Discharge Check Valves:
 - a. NPS 2 and Smaller: Bronze swing check valves with bronze disc.
 - b. NPS 2-1/2 and Larger for Domestic Water: Iron swing check valves with lever and weight or with spring or iron, center-guided, metal seat check valves.
 - c. NPS 2-1/2 and Larger for Sanitary Waste and Storm Drainage: Iron swing check valves with lever and weight or spring.

- B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.
- C. Select valves, except wafer types, with the following end connections:
 - 1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
 - 2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
 - 3. For Copper Tubing, NPS 5 and Larger: Flanged ends.
 - 4. For Steel Piping, NPS 2 and Smaller: Threaded ends.
 - 5. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
 - 6. For Steel Piping, NPS 5 and Larger: Flanged ends.
 - 7. For Grooved-End Copper Tubing and Steel Piping: Valve ends may be grooved.

3.05 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE

- A. Pipe NPS 2 and Smaller:
 - 1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
 - 2. Ball Valves: Three piece, full port, bronze with bronze trim.
- B. Pipe NPS 2-1/2 and Larger:
 - 1. Iron Ball Valves: Class 150.

END OF SECTION 22 05 23

SECTION 22 05 29
HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Contracting Requirements and Division 01 General Requirements apply to this Section.

1.02 SUMMARY

- A. This Section includes the following hangers and supports for plumbing system piping and equipment:
 - 1. Steel pipe hangers and supports.
 - 2. Trapeze pipe hangers.
 - 3. Metal framing systems.
 - 4. Thermal-hanger shield inserts.
 - 5. Fastener systems.
 - 6. Pipe stands.
 - 7. Pipe positioning systems.
 - 8. Equipment supports.
- B. Related Sections include the following:
 - 1. Division 05 Section "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
 - 2. Division 21 Section "Water-Based Fire-Suppression Systems" for pipe hangers for fire-suppression piping.
 - 3. Division 22 Section "Expansion Fittings and Loops for Plumbing Piping" for pipe guides and anchors.
 - 4. Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment" for vibration isolation devices.

1.03 DEFINITIONS

- A. MSS: Manufacturers Standardization Society for The Valve and Fittings Industry Inc.
- B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.04 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

- C. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.05 SUBMITTALS

- A. Product Data: For the following:
 1. Steel pipe hangers and supports.
 2. Trapeze pipe hangers.
 3. Metal framing systems.
 4. Thermal-hanger shield inserts.
 5. Fastener systems.
 6. Pipe stands.
 7. Pipe positioning systems.
 8. Equipment supports.

- B. Welding certificates.

1.06 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel." AWS D1.4, "Structural Welding Code--Reinforcing Steel."

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.02 STEEL PIPE HANGERS AND SUPPORTS

- A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.

- B. Manufacturers:
 1. B-Line Systems, Inc.; a division of Cooper Industries.
 2. Globe Pipe Hanger Products, Inc.
 3. Grinnell Corp.
 4. National Pipe Hanger Corporation.
 5. PHD Manufacturing, Inc.
 6. PHS Industries, Inc.
 7. Piping Technology & Products, Inc.
 8. Tolco Inc.

- C. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.

- D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

- E. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.03 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

2.04 METAL FRAMING SYSTEMS

- A. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components.

- B. Manufacturers:

1. B-Line Systems, Inc.; a division of Cooper Industries.
2. ERICO/Michigan Hanger Co.; ERISTRUT Div.
3. GS Metals Corp.
4. Power-Strut Div.; Tyco International, Ltd.
5. Thomas & Betts Corporation.
6. Tolco Inc.
7. Unistrut Corp.; Tyco International, Ltd.

- C. Coatings: Manufacturer's standard finish unless bare metal surfaces are indicated.

- D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

2.05 THERMAL-HANGER SHIELD INSERTS

- A. Description: 100-psig minimum, compressive-strength insulation insert encased in sheet metal shield.

- B. Manufacturers:

1. Carpenter & Paterson, Inc.
2. ERICO/Michigan Hanger Co.
3. PHS Industries, Inc.
4. Pipe Shields, Inc.
5. Rilco Manufacturing Company, Inc.
6. Value Engineered Products, Inc.

- C. Insulation-Insert Material for Cold Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass with vapor barrier.

- D. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass.

- E. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

- F. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

- G. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.06 FASTENER SYSTEMS

- A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
 - 1. Manufacturers:
 - a. Hilti, Inc.
 - b. ITW Ramset/Red Head.
 - c. Masterset Fastening Systems, Inc.
 - d. MKT Fastening, LLC.
 - e. Powers Fasteners.
- B. Mechanical-Expansion Anchors: Insert-wedge-type zinc-coated steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
 - 1. Manufacturers:
 - a. B-Line Systems, Inc.; a division of Cooper Industries.
 - b. Empire Industries, Inc.
 - c. Hilti, Inc.
 - d. ITW Ramset/Red Head.
 - e. MKT Fastening, LLC.
 - f. Powers Fasteners.

2.07 PIPE STAND FABRICATION

- A. Pipe Stands, General: Shop or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.
- B. Compact Pipe Stand: One-piece plastic unit with integral-rod-roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.
 - 1. Manufacturers:
 - a. ERICO/Michigan Hanger Co.
 - b. MIRO Industries.
- C. Low-Type, Single-Pipe Stand: One-piece plastic base unit with plastic roller, for roof installation without membrane penetration.
 - 1. Manufacturers:
 - a. MIRO Industries.
- D. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe support made from structural-steel shape, continuous-thread rods, and rollers for mounting on permanent stationary roof curb.
 - a.

2.08 PIPE POSITIONING SYSTEMS

- A. Description: IAPMO PS 42, system of metal brackets, clips, and straps for positioning piping in pipe spaces for plumbing fixtures for commercial applications.

- B. Manufacturers:
 - 1. C & S Mfg. Corp.
 - 2. HOLDRITE Corp.; Hubbard Enterprises.
 - 3. Samco Stamping, Inc.

2.09 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

PART 3 - EXECUTION

3.01 HANGER AND SUPPORT APPLICATIONS

- A. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use padded hangers for piping that is subject to scratching.
- F. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.
 - 2. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes, NPS 3/4 to NPS 24, requiring clamp flexibility and up to 4 inches of insulation.
 - 3. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes, NPS 1/2 to NPS 24, if little or no insulation is required.
 - 4. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
 - 5. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated stationary pipes, NPS 3/4 to NPS 8.
 - 6. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8 .
 - 7. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
 - 8. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 2.
 - 9. Split Pipe-Ring with or without Turnbuckle-Adjustment Hangers (MSS Type 11): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 8.
 - 10. Extension Hinged or 2-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 3.

11. U-Bolts (MSS Type 24): For support of heavy pipes, NPS 1/2 to NPS 30.
 12. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
 13. Pipe Saddle Supports (MSS Type 36): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange.
 14. Pipe Stanchion Saddles (MSS Type 37): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange and with U-bolt to retain pipe.
 15. Adjustable, Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes, NPS 2-1/2 to NPS 36, if vertical adjustment is required, with steel pipe base stanchion support and cast-iron floor flange.
- G. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.
 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.
- H. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
 3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
 4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
 5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.
- I. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction to attach to top flange of structural shape.
 3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
 6. C-Clamps (MSS Type 23): For structural shapes.
 7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
 8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
 9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
 10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
 11. Malleable Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.

12. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:
 - a. Light (MSS Type 31): 750 lb.
 - b. Medium (MSS Type 32): 1500 lb.
 - c. Heavy (MSS Type 33): 3000 lb.
 13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
 14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
 15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.
- J. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
 3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- K. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
 2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
 3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41 roll hanger with springs.
 4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
 5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from hanger.
 6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from base support.
 7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from trapeze support.
 8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
 - a. Horizontal (MSS Type 54): Mounted horizontally.
 - b. Vertical (MSS Type 55): Mounted vertically.
 - c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.
- L. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.
- M. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.

- N. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.
- O. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

3.02 HANGER AND SUPPORT INSTALLATION

- A. Steel Pipe Hanger 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. Trapeze Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated trapeze pipe hangers.
 - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
 - 2. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.
- C. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- D. Fastener System Installation:
 - 1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
 - 2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- E. Pipe Positioning System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture. Refer to Division 22 Section "Plumbing Fixtures" for plumbing fixtures.
- F. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- G. 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.
- H. Install lateral bracing with pipe hangers and supports to prevent swaying.
- I. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

- J. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- K. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9 (for building services piping) are not exceeded.
- L. Insulated Piping: Comply with the following:
 - 1. Attach clamps and spacers to piping.
 - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Do not exceed pipe stress limits according to ASME B31.9 for building services piping.
 - 2. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
 - 3. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
 - b. NPS 4: 12 inches long and 0.06 inch thick.
 - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
 - d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
 - e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
 - 4. Pipes NPS 8 and Larger: Include wood inserts.
 - 5. Insert Material: Length at least as long as protective shield.

3.03 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers.
- B. Fit exposed connections together to form hairline joints.

3.04 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.05 PAINTING

- A. Touch Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09 painting Sections.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 22 05 29

SECTION 22 05 48
VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Contracting Requirements and Division 01 General Requirements apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Pipe riser resilient supports.
 - 2. Resilient pipe guides.
 - 3. Seismic snubbers.
 - 4. Restraining braces and cables.

1.03 DEFINITIONS

- A. IBC: International Building Code.
- B. ICC-ES: ICC-Evaluation Service.

1.04 PERFORMANCE REQUIREMENTS

- A. Refer to structural engineering and architectural drawings for performance criteria.

1.05 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 agency acceptable to authorities having jurisdiction.
 - b. Annotate to indicate application of each product submitted and compliance with requirements.
 - 2. Interlocking Snubbers: Include ratings for horizontal, vertical, and combined loads.
- 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. Seismic-Restraint Details:
 - a. Design Analysis: To support selection and arrangement of seismic 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. Indicate association with vibration isolation devices.

- c. Preapproval and Evaluation Documentation: By an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).
- C. Coordination Drawings: Show coordination of seismic bracing for plumbing piping and equipment with other systems and equipment in the vicinity, including other supports and seismic restraints.
- D. Welding certificates.
- E. Qualification Data: For professional engineer and testing agency.
- F. Field quality-control test reports.
- G. Operation and Maintenance Data: For air-mounting systems to include in operation and maintenance manuals.

1.06 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 by ICC-ES or preapproved 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

2.01 SEISMIC-RESTRAINT DEVICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide a comparable product by one of the following:
 - 1. Amber/Booth Company, Inc.

2. California Dynamics Corporation.
 3. Cooper B-Line, Inc.; a division of Cooper Industries.
 4. Hilti, Inc.
 5. Kinetics Noise Control.
 6. Loos & Co.; Cableware Division.
 7. Mason Industries.
 8. TOLCO Incorporated; a brand of NIBCO INC.
 9. Unistrut; Tyco International, Ltd.
- C. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to authorities having jurisdiction.
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.
- D. 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.
- E. Channel Support System: MFMA-3, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.
- F. Restraint Cables: ASTM A 603 galvanized or ASTM A 492 stainless-steel 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.
- G. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections or reinforcing steel angle clamped to hanger rod.
- H. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.
- I. 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 used.
- J. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.
- K. 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.

- L. 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.

2.02 FACTORY FINISHES

- A. Finish: Manufacturer's standard prime-coat finish ready for field painting.
- B. 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

3.01 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.

3.02 APPLICATIONS

- A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction.
- 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.

3.03 VIBRATION-CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

- A. Piping Restraints:
 - 1. Comply with requirements in MSS SP-127.
 - 2. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
 - 3. 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 agency acceptable to authorities having jurisdiction providing required submittals for component.
- D. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.
- E. 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.
- F. 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.
- G. 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.

3.04 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

- A. Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment. Comply with requirements in Division 22 Section "Domestic Water Piping" for piping flexible connections.

3.05 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. 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 postconnection 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. Measure isolator restraint clearance.
 7. Measure isolator deflection.
 8. Verify snubber minimum clearances.
 9. Air-Mounting System Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 10. Air-Mounting System Operational Test: Test the compressed-air leveling system.
 11. Test and adjust air-mounting system controls and safeties.
 12. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.
- D. Remove and replace malfunctioning units and retest as specified above.
- E. Prepare test and inspection reports.

END OF SECTION 22 05 48

SECTION 22 05 53
IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Contracting Requirements and Division 01 General Requirements apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Equipment labels.
 - 2. Warning signs and labels.
 - 3. Pipe labels.
 - 4. Valve tags.
 - 5. Warning tags.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
- D. Valve numbering scheme.
- E. Valve Schedules: For each piping system to include in maintenance manuals.

1.04 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 locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.01 EQUIPMENT LABELS

- A. Metal Labels for Equipment:

1. Material and Thickness: Stainless steel, or Aluminum, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
 2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch
 3. Minimum Letter Size: 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.
 4. Fasteners: Stainless-steel rivets.
 5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.
- C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch (A4) bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.02 WARNING SIGNS AND LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
- B. Letter Color: Black
- C. Background Color: Yellow
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch
- F. Minimum Letter Size: 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.
- G. Fasteners: Stainless-steel rivets.
- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.03 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to partially cover circumference of pipe and to attach to pipe without fasteners or adhesive.
- C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
 - 2. Lettering Size: At least 1-1/2 inches high.

2.04 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
 - 1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
 - 2. Fasteners: Brass wire-link or beaded chain; or S-hook.
- B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
 - 1. Valve-tag schedule shall be included in operation and maintenance data.

2.05 WARNING TAGS

- A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.
 - 1. Size: Approximately 4 by 7 inches
 - 2. Fasteners: Brass grommet and wire
 - 3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
 - 4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.02 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.03 PIPE LABEL INSTALLATION

- A. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
 - 1. Near each valve and control device.
 - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 - 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 - 5. Near major equipment items and other points of origination and termination.
 - 6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
 - 7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
- B. Pipe Label Color Schedule:
 - 1. Domestic Cold Water Piping:
 - a. Letter Color: White
 - b. Background Color: Green
 - 2. Domestic Hot Water and Hot Water Return Piping:
 - a. Letter Color: White
 - b. Background Color: Green
 - 3. Non Potable Water Piping:
 - a. Letter Color: Black
 - b. Background Color: Yellow
 - 4. Sanitary Waste and Storm Drainage and Overflow Piping:
 - a. Letter Color: Black
 - b. Background Color: Green
 - 5. Vent Piping:
 - a. Letter Color: Black
 - b. Background Color: Yellow

3.04 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
 - 1. Valve-Tag Size and Shape: Minimum 1-1/2 inches, round
 - 2. Valve-Tag Color: Natural

3. Letter Color: Black

3.05 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 22 05 53

SECTION 22 07 00
PLUMBING INSULATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Contracting Requirements and Division 01 General Requirements apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Insulation Materials:
 - a. Cellular glass.
 - 2. Adhesives.
 - 3. Mastics.
 - 4. Sealants.
 - 5. Field-applied cloths.
 - 6. Field-applied jackets.
- B. Related Sections include the following:
 - 1. Division 23 Section "HVAC Insulation."

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).
- B. Qualification Data: For qualified Installer.
- C. Field quality-control reports.

1.04 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.05 COORDINATION

- A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."

- B. Coordinate clearance requirements with piping Installer for piping insulation application and equipment Installer for equipment insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.06 SCHEDULING

- A. Schedule insulation application after pressure testing and other applicable tests. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.01 INSULATION MATERIALS

- A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cell-U-Foam Corporation; Ultra-CUF.
 - b. Pittsburgh Corning Corporation; Foamglas Super K.
 - c.
 - 2. Block Insulation: ASTM C 552, Type I.
 - 3. Special-Shaped Insulation: ASTM C 552, Type III.
 - 4. Board Insulation: ASTM C 552, Type IV.
 - 5. Preformed Pipe Insulation with Factory-Applied ASJ-SSL: Comply with ASTM C 552, Type II, Class 2.
 - 6. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
- G. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.

1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Aeroflex USA Inc.; Aerocel.
 - b. Armacell LLC; AP Armaflex.
 - c. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180.

2.02 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

2.03 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.
 1. Use mastics that have a VOC content of g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.04 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
 1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Johns Manville; Zeston.
 - b. P.I.C. Plastics, Inc.; FG Series.
 - c. Proto PVC Corporation; LoSmoke.
 - d. Speedline Corporation; SmokeSafe.
 2. Adhesive: As recommended by jacket material manufacturer.
 3. Color: White
 4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
 - a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.
 5. Factory-fabricated tank heads and tank side panels.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
 1. Verify that systems and equipment to be insulated have been tested and are free of defects.

2. Verify that surfaces to be insulated are clean and dry.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:
 1. Stainless Steel: Coat 300 series stainless steel with epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
 2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
- C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.03 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment and piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment and pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.

- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - 1. Install insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
 - 1. Draw jacket tight and smooth.
 - 2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 - 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
 - a. For below ambient services, apply vapor-barrier mastic over staples.
 - 4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
 - 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, and seal patches similar to butt joints.

3.04 PENETRATIONS

- A. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
 - 1. Comply with requirements in Division 07 Section "Penetration Firestopping" and fire-resistive joint sealers.
- B. Insulation Installation at Floor Penetrations:
 - 1. Pipe: Install insulation continuously through floor penetrations.
 - 2. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.05 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.
 9. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the

connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

- D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
 2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
 3. Construct removable valve insulation covers in same manner as for flanges except divide the two-part section on the vertical center line of valve body.
 4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
 5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.06 CELLULAR-GLASS INSULATION INSTALLATION

- A. Insulation Installation on Straight Pipes and Tubes:
1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
 2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
 3. For insulation with factory-applied jackets on above ambient services, secure laps with outward clinched staples at 6 inches o.c.
 4. For insulation with factory-applied jackets on below ambient services, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.
- B. Insulation Installation on Pipe Flanges:
1. Install preformed pipe insulation to outer diameter of pipe flange.
 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as pipe insulation.
 4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.
- C. Insulation Installation on Pipe Fittings and Elbows:
1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.

2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of cellular-glass insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.07 FIELD-APPLIED JACKET INSTALLATION

A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.

1. Draw jacket smooth and tight to surface with 2-inch overlap at seams and joints.
2. Embed glass cloth between two 0.062-inch- thick coats of lagging adhesive.
3. Completely encapsulate insulation with coating, leaving no exposed insulation.

B. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch- wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

C. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

D. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

E. Where PVDC jackets are indicated, install as follows:

1. Apply three separate wraps of filament tape per insulation section to secure pipe insulation to pipe prior to installation of PVDC jacket.
2. Wrap factory-presizes jackets around individual pipe insulation sections with one end overlapping the previously installed sheet. Install presized jacket with an approximate overlap at butt joint of 2 inches over the previous section. Adhere lap seal using adhesive or SSL, and then apply 1-1/4 circumferences of appropriate PVDC tape around overlapped butt joint.
3. Continuous jacket can be spiral wrapped around a length of pipe insulation. Apply adhesive or PVDC tape at overlapped spiral edge. When electing to use adhesives, refer to manufacturer's written instructions for application of adhesives along this spiral edge to maintain a permanent bond.

4. Jacket can be wrapped in cigarette fashion along length of roll for insulation systems with an outer circumference of 33-1/2 inches or less. The 33-1/2-inch- circumference limit allows for 2-inch- overlap seal. Using the length of roll allows for longer sections of jacket to be installed at one time. Use adhesive on the lap seal. Visually inspect lap seal for "fishmouthing," and use PVDC tape along lap seal to secure joint.
5. Repair holes or tears in PVDC jacket by placing PVDC tape over the hole or tear and wrapping a minimum of 1-1/4 circumferences to avoid damage to tape edges.

3.08 FINISHES

- A. Equipment and Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 09 painting Sections.
 1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
 - a. Finish Coat Material: Interior, flat, latex-emulsion size.
- B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.
- C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
- D. Do not field paint aluminum or stainless-steel jackets.

3.09 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
- B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 1. Drainage piping located in crawl spaces.
 2. Underground piping.
 3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.
 4. Vertical roof stormwater and overflow piping.

3.10 INTERIOR PIPING INSULATION SCHEDULE

- A. Domestic Cold Water:
 1. Insulation shall be one of the following:
 - a. Cellular Glass: 1 1/2 inch thick.
 - b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch thick.
 - c. Flexible Elastomeric: 1/2 inch thick.
- B. Domestic Hot and Recirculated Hot Water:
 1. Insulation shall be one of the following:
 - a. Flexible Elastomeric: 1 inch thick.
 - b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
 - c. Cellular Glass: 1 1/2 inch thick.

3.11 INDOOR, FIELD-APPLIED JACKET SCHEDULE

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
- B. If more than one material is listed, selection from materials listed is Contractor's option.
- C. Piping, Concealed:
 - 1. None.
- D. Piping, Exposed:
 - 1. PVC: 20 mils thick.

END OF SECTION 22 07 00

SECTION 22 11 16
DOMESTIC WATER PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Contracting Requirements and Division 01 General Requirements apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. domestic water pipes, tubes, fittings, and specialties inside the building.
- B. Related Section:
 - 1. Division 22 Section "Facility Water Distribution Piping" for water-service piping outside the building from source to the point where water-service piping enters the building.
 - 2. Division 22 Section "Common Work Results for Plumbing" for transition fittings, dielectric fittings, sleeves, sleeve seals, escutcheons, grout etc...

1.03 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Domestic water piping and support and installation shall withstand effects of earthquake motions determined according to ASCE/SEI 7

1.04 SUBMITTALS

- A. Product Data: For the following products:
 - 1. Specialty valves.
 - 2. Flexible connectors.
 - 3. Water meters.
 - 4. Backflow preventers and vacuum breakers.
- B. Coordination Drawings: For piping in equipment rooms and other congested areas, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:
 - 1. Fire-suppression-water piping.
 - 2. Domestic water piping.
 - 3. HVAC hydronic piping.
- C. Field quality-control reports.

1.05 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 61 for potable domestic water piping and components.

- C. To assure uniformity and compatibility of piping components in grooved piping systems, all grooved products utilized shall be supplied by one manufacturer. Grooving tools shall be supplied by the same manufacturer as the grooved components.

1.06 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.

PART 2 - PRODUCTS

2.01 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.02 COPPER TUBE AND FITTINGS

- A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.
 - 1. Cast-Copper Solder-Joint Fittings: ASME B16.18, pressure fittings.
 - 2. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
 - 3. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
 - 4. 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.
 - 5. Grooved-Joint Copper-Tube Appurtenances:
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following
 - 1) Anvil International.
 - 2) Shurjoint Piping Products.
 - 3) Victaulic Company.
 - b. Copper Grooved-End Fittings: ASTM B 75 copper tube or ASTM B 584 bronze castings. Flaring of tube and fitting ends to IPS dimensions is not permitted.
 - c. Grooved-End-Tube Couplings: Copper-tube dimensions and design similar to AWWA C606. Include ferrous housing sections, cast with offsetting, angle-pattern bolt pads and coated with copper-colored enamel; EPDM- synthetic rubber gaskets (UL classified and NSF-61), suitable for hot and cold water, and bolts and nuts.

2.03 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free, unless otherwise indicated; full-face or ring type unless otherwise indicated.
- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

- D. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.04 SPECIALTY VALVES

- A. Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for general-duty metal valves.
- B. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for balancing valves, drain valves, backflow preventers, and vacuum breakers.

PART 3 - EXECUTION

3.01 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are 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. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."
- C. Install ductile-iron piping under building slab with restrained joints according to AWWA C600 and AWWA M41.
- D. Install underground copper tube and ductile-iron pipe in PE encasement according to ASTM A 674 or AWWA C105.
- E. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for pressure gages and Division 22 Section "Domestic Water Piping Specialties" for drain valves and strainers.
- F. Install shutoff valve immediately upstream of each dielectric fitting.
- G. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for pressure-reducing valves.
- H. Install domestic water piping level with 1/32 inch per foot slope downward toward drain and plumb. Provide air vents at the high points of the piping and drain valves on the low points.
- I. Rough-in domestic water piping for water-meter installation according to utility company's requirements.
- J. Install seismic restraints on piping. Comply with requirements in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment" for seismic-restraint devices.

- K. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
- L. 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.
- M. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- N. Install piping adjacent to equipment and specialties to allow service and maintenance.
- O. Install piping to permit valve servicing.
- P. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.
- Q. Install piping free of sags and bends.
- R. Install fittings for changes in direction and branch connections.
- S. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
- T. Install pressure gages on suction and discharge piping from each plumbing pump and packaged booster pump. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for pressure gages.
- U. Install thermostats in hot-water circulation piping. Comply with requirements in Division 22 Section "Domestic Water Pumps" for thermostats.
- V. Install thermometers on outlet piping from each water heater. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for thermometers.

3.02 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- C. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Braze Joints" Chapter.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."
- E. Copper-Tubing Grooved Joints: Roll groove end of tube. Assemble coupling with housing, gasket, lubricant, and bolts. Join copper tube and grooved-end fittings according to AWWA C606 for roll-grooved joints. The gasket style and elastomeric material (grade) shall be

verified as suitable for the intended service as specified. Grooved end shall be clean and free from indentations, projections and roll marks in the area from pipe end to groove for proper gasket sealing. A factory trained field representative shall provide on-site training to contractor's field personnel in the installation of grooved piping products. Factory trained representative shall periodically review the product installation. Contractor shall remove and replace any improperly installed products.

- F. Ductile-Iron-Piping Grooved Joints: Cut groove end of pipe. Assemble coupling with housing, gasket, lubricant, and bolts. Join ductile-iron pipe and grooved-end fittings according to AWWA C606 for ductile-iron-pipe, cut-grooved joints.
- G. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.
- H. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.03 VALVE INSTALLATION

- A. General-Duty Valves: Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for valve installations.
- B. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball valves.
- C. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping. Drain valves are specified in Division 22 Section "Domestic Water Piping Specialties."
 - 1. Hose-End Drain Valves: At low points in water mains, risers, and branches.
 - 2. Stop-and-Waste Drain Valves: Instead of hose-end drain valves where indicated.

3.04 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment" for seismic-restraint devices.
- B. Comply with requirements in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support products and installation.
 - 1. Vertical Piping: MSS Type 8 or 42, clamps.
 - 2. Individual, Straight, Horizontal Piping Runs:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - 3. Base of Vertical Piping: MSS Type 52, spring hangers.
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.

- E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
 - 2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
 - 3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
 - 4. NPS 2-1/2: 108 inches with 1/2-inch rod.
 - 5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
 - 6. NPS 6: 10 feet with 5/8-inch rod.
 - 7. NPS 8: 10 feet with 3/4-inch rod.
- F. Install supports for vertical copper tubing every 10 feet.
- G. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.05 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 domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
 - 1. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Comply with requirements in Division 22 plumbing fixture Sections for connection sizes.
 - 2. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.06 ESCUTCHEON INSTALLATION

- A. Install escutcheons for penetrations of walls, ceilings, and floors.
- B. Comply with requirements of Division 22 Section "Common Work Results for Plumbing" for type of escutcheons.

3.07 SLEEVE INSTALLATION

- A. General Requirements: Install sleeves for pipes and tubes passing through penetrations in floors, partitions, roofs, and walls.
- B. Sleeves are not required for core-drilled holes.
- C. Permanent sleeves are not required for holes formed by removable PE sleeves.
- D. Cut sleeves to length for mounting flush with both surfaces unless otherwise indicated.
- E. Install sleeves in new partitions, slabs, and walls as they are built.

- F. For interior wall penetrations, seal annular space between sleeve and pipe or pipe insulation using joint sealants appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants" for joint sealants.
- G. Seal space outside of sleeves in concrete slabs and walls with grout.
- H. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation unless otherwise indicated.
- I. Install sleeve materials according to the following applications:
 - 1. Sleeves for Piping Passing through Concrete Floor Slabs: Steel pipe.
 - 2. Sleeves for Piping Passing through Concrete Floor Slabs of Mechanical Equipment Areas or Other Wet Areas: Steel pipe.
 - a. Extend sleeves 2 inches above finished floor level.
 - b. For pipes penetrating floors with membrane waterproofing, extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim" for flashing.
 - 3. Sleeves for Piping Passing through Gypsum-Board Partitions:
 - a. Steel pipe sleeves for pipes smaller than NPS 6.
 - b. Galvanized-steel sheet sleeves for pipes NPS 6 and larger.
 - c. Exception: Sleeves are not required for water supply tubes and waste pipes for individual plumbing fixtures if escutcheons will cover openings.
 - 4. Sleeves for Piping Passing through Interior Concrete Walls:
 - a. Steel pipe sleeves for pipes smaller than NPS 6.
 - b. Galvanized-steel sheet sleeves for pipes NPS 6 and larger.
- J. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping" for firestop materials and installations.

3.08 SLEEVE SEAL INSTALLATION

- A. Install sleeve seals in sleeves in exterior concrete walls at water-service piping entries into building.
- B. Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble sleeve seal components and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.09 IDENTIFICATION

- A. Identify system components. Comply with requirements in Division 22 Section "Identification for Plumbing Piping and Equipment" for identification materials and installation.
- B. Label pressure piping with system operating pressure.

3.10 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Piping Inspections:
 - 1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
 - 2. During installation, notify authorities having jurisdiction at least one day 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 final inspection for 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 tests or inspections, make required corrections and arrange for reinspection.
 - 4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- C. Piping Tests:
 - 1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
 - 2. 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 a separate report for each test, complete with diagram of portion of piping tested.
 - 3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - 4. 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.
 - 5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
 - 6. Prepare reports for tests and for corrective action required.
- D. Domestic water piping will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

3.11 ADJUSTING

- A. Perform the following adjustments before operation:
 - 1. Close drain valves, hydrants, and hose bibbs.
 - 2. Open shutoff valves to fully open position.
 - 3. Open throttling valves to proper setting.
 - 4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
 - a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide flow of hot water in each branch.
 - b. Adjust calibrated balancing valves to flows indicated.

5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.12 CLEANING

- A. Clean and disinfect potable and non-potable domestic water piping as follows:
 1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
 2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures 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:
 - 1) 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.
 - 2) 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. Clean non-potable domestic water piping as follows:
 1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
 2. Use purging procedures prescribed by authorities having jurisdiction or; if methods are not prescribed, follow procedures described below:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
- C. Prepare and submit reports of purging and disinfecting activities.
- D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.13 PIPING SCHEDULE

- A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
- B. Flanges, grooved couplings and unions may be used for aboveground piping joints unless otherwise indicated.
- C. Fitting Option: Brazed joints may be used on aboveground copper tubing.

- D. Aboveground domestic water piping, shall be the following:
 - 1. Hard copper tube, ASTM B 88, Type L; cast- or wrought- copper solder-joint fittings; and soldered joints.
 - 2. Hard copper tube, ASTM B 88, Type L; Grooved-Joint Copper-Tube fittings similar to Victaulic can be used for piping 2 1/2" and larger.
- E. Under-building-slab, domestic water, NPS 3 and smaller shall be:
 - 1. Soft copper tube, ASTM B 88, Type K wrought-copper solder-joint fittings; and brazed joints.
- F. Under-building-slab, domestic water, NPS 4 to NPS 8 shall be:
 - 1. Push-on-joint, ductile-iron pipe; standard- or compact pattern push-on-joint fittings; and gasketed joints.

3.14 VALVE SCHEDULE

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Shutoff Duty: Use ball valves.
 - 2. Balancing Duty: Use ball valves for piping NPS 2 and smaller. Use ball valves with flanged ends for piping NPS 2-1/2 and larger.
 - 3. Drain Duty: Hose-end drain valves.
- B. Iron or bronze grooved-end valves may be used with grooved-end piping.

END OF SECTION 22 11 16

SECTION 22 11 19
DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Contracting Requirements and Division 01 General Requirements apply to this Section.

1.02 SUMMARY

- A. This Section includes the following domestic water piping specialties:
 - 1. Vacuum breakers.
 - 2. Water hammer arresters.
 - 3. Hose bibbs.
 - 4. Trap-seal primer valves.
 - 5. Trap-seal primer systems.

- B. Related Sections include the following:
 - 1. Division 22 Section "Domestic Water Piping".

1.03 PERFORMANCE REQUIREMENTS

- A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig, unless otherwise indicated.

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

1.05 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. NSF Compliance:
 - 1. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9."

PART 2 - PRODUCTS

2.01 VACUUM BREAKERS

- A. Pipe-Applied, Atmospheric-Type Vacuum Breakers
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Conbraco Industries, Inc.
 - b. Watts Industries, Inc.; Water Products Div.
 - c. Zurn Plumbing Products Group; Wilkins Div.
 - 2. Standard: ASSE 1001.
 - 3. Size: NPS 1/4 to NPS 3, as required to match connected piping.
 - 4. Body: Bronze.
 - 5. Inlet and Outlet Connections: Threaded.
 - 6. Finish: Chrome plated.
- B. Hose-Connection Vacuum Breakers
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Conbraco Industries, Inc.
 - b. Watts Industries, Inc.; Water Products Div.
 - c. Zurn Plumbing Products Group; Light Commercial Operation.
 - 2. Standard: ASSE 1011.
 - 3. Body: Bronze, nonremovable, with manual drain.
 - 4. Outlet Connection: Garden-hose threaded complying with ASME B1.20.7.
 - 5. Finish: Rough bronze.

2.02 WATER HAMMER ARRESTERS

- A. Water Hammer Arresters See Editing Instruction No. 1 in the Evaluations for cautions about naming manufacturers and products.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Josam Company.
 - b. PPP Inc.
 - c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - 2. Standard: ASSE 1010 or PDI-WH 201.
 - 3. Type: Metal bellows
 - 4. Size: ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.

2.03 TRAP-SEAL PRIMER SYSTEMS

- A. Trap-Seal Primer Systems
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. PPP Inc.
 - 2. Standard: ASSE 1044,
 - 3. Piping: NPS 3/4, ASTM B 88, Type L copper, water tubing.
 - 4. Cabinet: Surface-mounting steel box with stainless-steel cover.
 - 5. Electric Controls: 24-hour timer, solenoid valve, and manual switch for 120-V ac power.

6. Vacuum Breaker: ASSE 1001.
7. Number Outlets: Refer to schedules
8. Size Outlets: NPS 1/2

2.04 HOSE BIBBS

A. Hose Bibbs

1. Standard: ASME A112.18.1 for sediment faucets.
2. Body Material: Bronze.
3. Seat: Bronze, replaceable.
4. Supply Connections: NPS 1/2 or NPS 3/4 threaded or solder-joint inlet.
5. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
6. Pressure Rating: 125 psig
7. Vacuum Breaker: Integral, nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
8. Finish for Equipment Rooms: Rough bronze, or chrome or nickel plated.
9. Finish for Service Areas: Rough bronze.
10. Finish for Finished Rooms: Chrome or nickel plated.
11. Operation for Equipment Rooms: Wheel handle or operating key.
12. Operation for Service Areas: Operating key.
13. Operation for Finished Rooms: Operating key.
14. Include operating key with each operating-key hose bibb.
15. Include integral wall flange with each chrome- or nickel-plated hose bibb.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.
- B. Install balancing valves in locations where they can easily be accessed and adjusted.
- C. Install temperature-actuated water mixing valves with check stops and shutoff valves on inlets and outlet.
 1. Install thermometers and water regulators if specified.
 2. Install cabinet-type units recessed in or surface mounted on wall as specified.
- D. Install Y-pattern strainers for water on supply side of each water pressure-reducing valve, and pump.
- E. Install water hammer arresters in water piping according to PDI-WH 201.
- F. Install air vents at high points of water piping.
- G. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

- H. Install trap-seal primer systems with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust system for proper flow.

3.02 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping and specialties.
- B. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- C. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.03 LABELING AND IDENTIFYING

- A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:
 - 1. Pressure vacuum breakers.
 - 2. Supply-type, trap-seal primer valves.
 - 3. Trap-seal primer systems.
- B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

3.04 FIELD QUALITY CONTROL

- A. Perform the following tests and prepare test reports:
 - 1. Test each pressure vacuum breaker reduced-pressure-principle backflow preventer according to authorities having jurisdiction and the device's reference standard.
- B. Remove and replace malfunctioning domestic water piping specialties and retest as specified above.

3.05 ADJUSTING

- A. Set field-adjustable flow set points of balancing valves.

END OF SECTION 22 11 19

SECTION 22 13 16
SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Contracting Requirements and Division 01 General Requirements apply to this Section.

1.02 SUMMARY

- A. This Section includes the following for soil, waste, and vent piping inside the building:
 - 1. Pipe, tube, and fittings.
 - 2. Special pipe fittings.
 - 3. Encasement for underground metal piping.

1.03 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.04 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure, unless otherwise indicated:
 - 1. Soil, Waste, and Vent Piping: 10-foot head of water
- B. Seismic Performance: Soil, waste, and vent piping and support and installation shall be capable of withstanding the effects of seismic events determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures."

1.05 SUBMITTALS

- A. Product Data: For pipe, tube, fittings, and couplings.
- B. Field quality-control inspection and test reports.

1.06 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.01 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.02 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 74, Service Class and Extra Heavy.
- B. Gaskets: ASTM C 564, rubber.
- C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.03 HUBLESS CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 888 or CISPI 301.
- B. Shielded Couplings: ASTM C 1277 assembly of metal shield or housing, corrosion-resistant fasteners, and rubber sleeve with integral, center pipe stop.
 - 1. Heavy-Duty, Shielded, Stainless-Steel Couplings: With stainless-steel shield, stainless-steel bands and tightening devices, and ASTM C 564, rubber sleeve, similar to husky SD 4000 or Clamp All Hi-Torq 80.
 - a. Manufacturers:
 - 1) Clamp-All Corp.
 - 2) Husky
 - 3) Tyler Pipe; Soil Pipe Div.

2.04 COPPER TUBE AND FITTINGS (can be used for pipe sizes 2 ½" and smaller, shall not be used for urinal waste)

- A. Hard Copper Tube: ASTM B 88, Types 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 DWV fittings if indicated.
 - 2. Copper Flanges: ASME B16.24, Class 150, cast copper with solder-joint end.
 - 3. Copper Unions: MSS SP-123, copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

PART 3 - EXECUTION

3.01 EXCAVATION

- A. Refer to Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3.02 PIPING APPLICATIONS

- A. Flanges and unions may be used on aboveground pressure piping, unless otherwise indicated.

- B. Aboveground, soil and waste piping shall be the following:
 - 1. Hubless cast-iron soil pipe and fittings; heavy-duty shielded, stainless-steel couplings; and hubless-coupling joints.
 - 2. Copper DWV tube, copper drainage fittings, and soldered joints.
- C. Aboveground, vent piping shall be the following:
 - 1. Hubless cast-iron soil pipe and fittings; heavy-duty shielded, stainless-steel couplings; and hubless-coupling joints.
 - 2. Copper DWV tube, copper drainage fittings, and soldered joints.
 - a. Option for Vent Piping, NPS 2-1/2 and smaller Hard copper tube, Type M; copper pressure fittings; and soldered joints.
- D. Underground, soil, waste, and vent piping shall be the following:
 - 1. Service class, cast-iron soil piping; gaskets; and hub and spigot gasketed joints.

3.03 PIPING INSTALLATION

- A. Basic piping installation requirements are specified in Division 22 Section "Common Work Results for Plumbing."
- B. All firestopping is done by Section 078413. Coordinate penetrations with the firestopping contractor.
- C. Install seismic restraints on piping. Seismic-restraint devices are specified in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- D. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.
- E. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Sleeves and mechanical sleeve seals are specified in Division 22 Section "Common Work Results for Plumbing."
- F. 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."
 - 1. Install encasement on underground piping according to ASTM A 674 or AWWA C105.
- G. 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.
- H. 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.

- I. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:
 - 1. Building Sanitary Drain: 1/4" per foot downward in direction of flow for piping NPS 3 and smaller; 1/8" per foot downward in direction of flow for piping NPS 4 and larger.
 - 2. Horizontal Sanitary Drainage Piping: 1/4" per foot downward in direction of flow for piping NPS 3 and smaller; 1/8" per foot downward in direction of flow for piping NPS 4 and larger.
 - 3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- J. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.
- K. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.04 JOINT CONSTRUCTION

- A. Basic piping joint construction requirements are specified in Division 22 Section "Common Work Results for Plumbing."
- B. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- C. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead and oakum calked joints.
- D. Join hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.
- E. 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.

3.05 VALVE INSTALLATION

- A. General valve installation requirements are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."
- B. Shutoff Valves: Install shutoff valve on each sewage pump discharge.
 - 1. Install gate or full-port ball valve for piping NPS 2 and smaller.
 - 2. Install gate valve for piping NPS 2-1/2 and larger.
 - 3. Valves in wet pits shall be factory epoxy coated.
- C. Check Valves: Install swing check valve, between pump and shutoff valve, on each sewage pump discharge. Valves shall be factory epoxy coated.
- D. 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. Backwater valve are specified in Division 22 Section "Sanitary Waste Piping Specialties."

3.06 HANGER AND SUPPORT INSTALLATION

- A. Seismic-restraint devices are specified in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- B. Pipe hangers and supports are specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment." Install the following:
 1. Vertical Piping: MSS Type 8 or Type 42, clamps.
 2. Individual, Straight, Horizontal Piping Runs: According to the following:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet : MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet , if Indicated: MSS Type 49, spring cushion rolls.
 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- C. Install supports according to Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."
- D. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.
- E. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
 1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
 2. NPS 3: 60 inches with 1/2-inch rod.
 3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
 4. NPS 6: 60 inches with 3/4-inch rod.
 5. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.
- F. Install supports for vertical cast-iron soil piping every 15 feet.
- G. Install supports for vertical steel piping every 15 feet.
- H. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 1. NPS 1-1/4: 72 inches with 3/8-inch rod.
 2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
 3. NPS 2-1/2: 108 inches with 1/2-inch rod.
 4. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
 5. NPS 6: 10 feet with 5/8-inch rod.
 6. NPS 8: 10 feet with 3/4-inch rod.

- I. Install supports for vertical copper tubing every 10 feet.

3.07 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect drainage and vent piping to the following:
 - 1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
 - 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
 - 3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
 - 4. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.

3.08 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. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary drainage and vent 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 drainage and vent piping, except outside leaders, 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

pipng 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.
6. Prepare reports for tests and required corrective action.

3.09 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 13 19
SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Contracting Requirements and Division 01 General Requirements apply to this Section.

1.02 SUMMARY

- A. This Section includes the following sanitary drainage piping specialties:
 - 1. Backwater valves.
 - 2. Cleanouts.
 - 3. Floor drains
 - 4. Roof flashing assemblies.
 - 5. Through-penetration firestop assemblies.
 - 6. Miscellaneous sanitary drainage piping specialties.
 - 7. Flashing materials.
 - 8. Gas/oil separators and exterior grease trap.
- B. Related Sections include the following:
 - 1. Division 22 Section "Storm Drainage Piping Specialties" for trench drains for storm water.

1.03 DEFINITIONS

- A. FRP: Fiberglass-reinforced plastic.

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and accessories for the following:
 - 1. Grease interceptors.
 - 2. Oil interceptors.
- B. Field quality-control test reports.
- C. Operation and Maintenance Data: For interceptors to include in emergency, operation, and maintenance manuals.

1.05 QUALITY ASSURANCE

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

1.06 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- B. Coordinate size and location of roof penetrations.

PART 2 - PRODUCTS

2.01 CLEANOUTS

- A. Exposed Metal Cleanouts :
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Josam Company; Josam Div.
 - b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - c. Tyler Pipe; Wade Div.
 - d. Zurn Plumbing Products Group; Specification Drainage Operation.
 - 2. Standard: ASME A112.36.2M for cast iron for cleanout test tee.
 - 3. Size: Same as connected drainage piping
 - 4. Body Material: Hub-and-spigot, cast-iron soil pipe T-branch or hubless, cast-iron soil pipe test tee as required to match connected piping.
 - 5. Closure: Countersunk or raised-head , brass plug.
 - 6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
- B. Cast-Iron Wall Cleanouts
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Josam Company; Josam Div.
 - b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - c. Zurn Plumbing Products Group; Specification Drainage Operation.
 - 2. Standard: ASME A112.36.2M. Include wall access.
 - 3. Size: Same as connected drainage piping.
 - 4. Body: Hubless, cast-iron soil pipe test tee as required to match connected piping.
 - 5. Closure: Countersunk or raised-head, brass plug.
 - 6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
 - 7. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw.
 - 8. Wall Access: Round, nickel-bronze, copper-alloy, or stainless-steel material wall-installation frame and cover.

2.02 FLOOR DRAINS

- A. Refer to schedules for floor drain, garage drains and trench drain types.
- B. Cast-Iron Floor Drains & garage drains:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Josam Company; Josam Div.
 - b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.

- c. Tyler Pipe; Wade Div.
- d. Zurn Plumbing Products Group; Specification Drainage Operation.

2.03 THROUGH-PENETRATION FIRESTOP ASSEMBLIES

- A. Through-Penetration Firestop Assemblies: All firestopping is done by Section 078413. Coordinate penetrations with the firestopping contractor.

2.04 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

- A. Open Drains:
 - 1. Description: Shop or field fabricate from ASTM A 74, Service class, hub-and-spigot, cast-iron, soil-pipe fittings. Include P-trap, hub-and-spigot riser section; and where required, increaser fitting joined with ASTM C 564, rubber gaskets.
 - 2. Size: Same as connected waste piping
- B. Floor-Drain, Trap-Seal Primer Fittings:
 - 1. Description: Cast iron, with threaded inlet and threaded or spigot outlet, and trap-seal primer valve connection.
 - 2. Size: Same as floor drain outlet with NPS 1/2 side inlet.
- C. Air-Gap Fittings:
 - 1. Standard: ASME A112.1.2, for fitting designed to ensure fixed, positive air gap between installed inlet and outlet piping.
 - 2. Body: Bronze or cast iron.
 - 3. Inlet: Opening in top of body.
 - 4. Outlet: Larger than inlet.
 - 5. Size: Same as connected waste piping and with inlet large enough for associated indirect waste piping.
- D. Sleeve Flashing Device:
 - 1. Description: Manufactured, cast-iron fitting, with clamping device that forms sleeve for pipe floor penetrations of floor membrane. Include galvanized-steel pipe extension in top of fitting that will extend 2 inches above finished floor and galvanized-steel pipe extension in bottom of fitting that will extend through floor slab.
 - 2. Size: As required for close fit to riser or stack piping.
- E. Stack Flashing Fittings:
 - 1. Description: Counterflashing-type, cast-iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.
 - 2. Size: Same as connected stack vent or vent stack.
- F. Vent Caps:
 - 1. Description: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and setscrews to secure to vent pipe.
 - 2. Size: Same as connected stack vent or vent stack.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.
- B. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
 - 1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
 - 2. Locate at each change in direction of piping greater than 45 degrees.
 - 3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
 - 4. Locate at base of each vertical soil and waste stack.
- C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.
- D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.
- E. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
 - 1. Position floor drains for easy access and maintenance.
 - 2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
 - a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
 - b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
 - c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.
 - 3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
 - 4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.
- F. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof.
- G. Install flashing fittings on sanitary stack vents and vent stacks that extend through roof.
- H. Assemble open drain fittings and install with top of hub 2 inches above floor.
- I. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.
 - 1. Exception: Fitting may be omitted if trap has trap-seal primer connection.
 - 2. Size: Same as floor drain inlet.
- J. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.

- K. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.
- L. Install vent caps on each vent pipe passing through roof.
- M. Install wood-blocking reinforcement for wall-mounting-type specialties.
- N. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.
- O. 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.

3.02 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. Grease Interceptors: Connect inlet and outlet to unit, and connect flow-control fitting and vent to unit inlet piping. Install valve on outlet of automatic drawoff-type unit.

3.03 LABELING AND IDENTIFYING

- A. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

3.04 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections:
 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.05 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 22 13 19

SECTION 22 40 00
PLUMBING FIXTURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Contracting Requirements and Division 01 General Requirements apply to this Section.

1.02 SUMMARY

- A. This Section includes the following conventional plumbing fixtures and related components:
 - 1. Faucets.
 - 2. Flushometers.
 - 3. Water Closets.
 - 4. Urinals.
 - 5. Lavatories.
 - 6. Service basins.
- B. Related Sections include the following:
 - 1. Division 22 Section "Domestic Water Piping Specialties" for backflow preventers, floor drains, and specialty fixtures not included in this Section.
 - 2. Division 31 Section "Facility Water Distribution Piping" for exterior plumbing fixtures and hydrants.

1.03 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.
- C. Cast Polymer: Cast-filled-polymer-plastic material. This material includes cultured-marble and solid-surface materials.
- D. Cultured Marble: Cast-filled-polymer-plastic material with surface coating.
- E. Fitting: Device that controls the flow of water into or out of the plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, shower heads and tub spouts, drains and tailpieces, and traps and waste pipes. Piping and general-duty valves are included where indicated.
- F. FRP: Fiberglass-reinforced plastic.
- G. PMMA: Polymethyl methacrylate (acrylic) plastic.
- H. PVC: Polyvinyl chloride plastic.

- I. Solid Surface: Nonporous, homogeneous, cast-polymer-plastic material with heat-, impact-, scratch-, and stain-resistance qualities.

1.04 SUBMITTALS

- A. Product Data: For each type of plumbing fixture indicated. Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, construction details, and flow-control rates.
- B. Operation and Maintenance Data: For plumbing fixtures to include in emergency, operation, and maintenance manuals.
- C. Warranty: Special warranty specified in this Section.

1.05 QUALITY ASSURANCE

- A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.
 - 1. 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. 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. 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"; for 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.
- F. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.
- G. Comply with the following applicable standards and other requirements specified for plumbing fixtures:
 - 1. Enameled, Cast-Iron Fixtures: ASME A112.19.1M.
 - 2. Plastic Lavatories: ANSI Z124.3.
 - 3. Plastic Mop-Service Basins: ANSI Z124.6.
 - 4. Plastic Urinal Fixtures: ANSI Z124.9.
 - 5. Porcelain-Enameled, Formed-Steel Fixtures: ASME A112.19.4M.
 - 6. Solid-Surface-Material Lavatories: ANSI/ICPA SS-1.
 - 7. Vitreous-China Fixtures: ASME A112.19.2M.
 - 8. Water-Closet, Flush Valve, Tank Trim: ASME A112.19.5.

9. Water-Closet, Flushometer Tank Trim: ASSE 1037.
- H. Comply with the following applicable standards and other requirements specified for lavatory faucets:
1. Backflow Protection Devices for Faucets with Side Spray: ASME A112.18.3M.
 2. Backflow Protection Devices for Faucets with Hose-Thread or serrated nozzle Outlet: ASME A112.18.3M.
 3. Faucets: ASME A112.18.1.
 4. Hose-Connection Vacuum Breakers: ASSE 1011.
 5. Hose-Coupling Threads: ASME B1.20.7.
 6. Integral, Atmospheric Vacuum Breakers: ASSE 1001.
 7. NSF Potable-Water Materials: NSF 61.
 8. Pipe Threads: ASME B1.20.1.
 9. Sensor-Actuated Faucets and Electrical Devices: UL 1951.
 10. Supply Fittings: ASME A112.18.1.
 11. Brass Waste Fittings: ASME A112.18.2.
- I. Comply with the following applicable standards and other requirements specified for miscellaneous fittings:
1. Atmospheric Vacuum Breakers: ASSE 1001.
 2. Brass and Copper Supplies: ASME A112.18.1.
 3. Manual-Operation Flushometers: ASSE 1037.
 4. Plastic Tubular Fittings: ASTM F 409.
 5. Brass Waste Fittings: ASME A112.18.2.
 6. Sensor-Operation Flushometers: ASSE 1037 and UL 1951.
- J. Comply with the following applicable standards and other requirements specified for miscellaneous components:
1. Flexible Water Connectors: ASME A112.18.6.
 2. Floor Drains: ASME A112.6.3.
 3. Pipe Threads: ASME B1.20.1.
 4. Off-Floor Fixture Supports: ASME A112.6.1M.
 5. Plastic Toilet Seats: ANSI Z124.5.
 6. Supply and Drain Protective Shielding Guards: ICC A117.1.

PART 2 - PRODUCTS

Refer to drawing schedules for the type and model of plumbing fixtures. The following sections summarize acceptable manufacturers for various fixtures.

Subject to compliance with requirements, provide products by one of the following manufacturers:

- 2.01 LAVATORY FAUCETS
- a. Sloan.
 - b. Zurn.
 - c. Chicago Faucets.
- 2.02 FLUSHOMETERS
- a. Sloan.

- b. Zurn.
- 2.03 WATER CLOSETS
 - a. Crane Plumbing.
 - b. Toto.
 - c. Zurn.
- 2.04 URINALS
 - a. Zurn.
 - b. Toto.
 - c. American Standard.
- 2.05 LAVATORIES
 - a. Crane Plumbing.
 - b. Kohler.
- 2.06 SERVICE BASINS
 - a. Crane Plumbing, L.L.C./Fiat Products.
 - b. Mustee, E. L. & Sons, Inc.
 - c. Swan Corporation (The).

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before plumbing fixture installation.
- B. Examine cabinets, counters, floors, and walls for suitable conditions where fixtures will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.
- B. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.
 - 1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
 - 2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
 - 3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.
- C. Install back-outlet, wall-mounting fixtures onto waste fitting seals and attach to supports.
- D. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.
- E. Install wall-mounting fixtures with tubular waste piping attached to supports.

- F. Install floor-mounting, back-outlet water closets attached to building floor substrate and wall bracket and onto waste fitting seals.
- G. Install counter-mounting fixtures in and attached to casework.
- H. Install fixtures level and plumb according to roughing-in drawings.
- I. 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.
 - 1. Exception: Use ball valves if supply stops are not specified with fixture. Valves are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."
- J. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.
- K. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.
- L. Install toilet seats on water closets.
- M. Install traps on fixture outlets.
 - 1. Exception: Omit trap on fixtures with integral traps.
 - 2. Exception: Omit trap on indirect wastes, unless otherwise indicated.
- N. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- O. Install water-supply flow-control fittings with specified flow rates in fixture supplies at stop valves.
- P. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- Q. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Escutcheons are specified in Division 22 Section "Common Work Results for Plumbing."
- R. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Sealants are specified in Division 07 Section "Joint Sealants."

3.03 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

- C. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

3.04 FIELD QUALITY CONTROL

- A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.
- B. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.
- C. Inspect installed plumbing 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.

3.05 ADJUSTING

- A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.
- B. Replace washers and seals of leaking and dripping faucets and stops.
- C. Adjust water pressure at faucets and flushometer valves to produce proper flow and stream.
- D. Install fresh batteries in sensor-operated mechanisms.

3.06 CLEANING

- A. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:
 - 1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
 - 2. Remove sediment and debris from drains.
- B. After completing installation of exposed, factory-finished fixtures, faucets, and fittings, inspect exposed finishes and repair damaged finishes.

3.07 PROTECTION

- A. Provide protective covering for installed fixtures and fittings.
- B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 40 00

SECTION 23 05 00
COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The Drawings and general provisions of the Contract, including General and Supplementary General Conditions, and Division 01 General Requirements, apply to work specified in this Section.

1.02 SUMMARY

- A. Work Included: This Section specifies the following basic mechanical materials and methods to complement other Division 23 Sections.
 - 1. Submittals.
 - 2. Coordination drawings.
 - 3. Record drawings.
 - 4. Cutting and patching.
 - 5. Touchup painting and finishing.
- B. Give necessary notices, obtain permits, pay governmental taxes, fees and other costs as required for the mechanical work, and to file for necessary approvals with the jurisdiction under which the work is to be performed. Obtain Certificate of Inspection for the mechanical work; this certificate is a prerequisite to final acceptance of and final payment for the mechanical work.
- C. Furnish only, for installation under another section:
 - 1. Access doors in finished walls, ceilings and floors, in accordance with Section 08 31 00 specifications.
- D. Related Work Specified in Other Sections:
 - 1. Firestopping of penetrations: Section 07 84 00.
 - 2. Specification for access doors furnished under this section: Section 08 31 00.
 - 3. Installation of access doors, by trade installing the surrounding wall construction: Various sections.

1.03 REFERENCED CODES AND INDUSTRY STANDARDS

- A. Provide materials, equipment and execute the work, including test and inspections, per applicable provisions of Federal, State and Local government laws and ordinances, Utility Company Regulations, latest editions and referenced codes and standards. Governing laws, ordinances, codes and standards constitute minimum requirements.
- B. In case of conflict between the Contract Documents and the requirements of any Code or Authorities having jurisdiction, the most stringent requirements shall govern.

1.04 DEFINITIONS

- A. Wherever the term “mechanical” as in mechanical contractor or mechanical work is used in the specification, it will mean, as appropriate, HVAC, plumbing or fire protection contractor or work.
- B. Wherever the term “shown” is used in the specifications, it shall mean “noted”, “indicated”, “scheduled”, “detailed”, or any other diagrammatic or written reference made on the drawings.
- C. Wherever the term “material” is used in the specifications it will mean any “product”, “equipment”, “device”, “assembly”, or “item” required under the Contract, as indicated by trade or brand name, manufacturer’s name, standard specification reference or other description.
- D. “Concealed” means hidden from sight in chases, furred spaces, shafts, hung ceilings, embedded in construction or in crawl spaces. For exterior installations concealed means concealed from view and also protected from weather conditions
- E. “Exposed” means not installed underground or “concealed” as defined above. For exterior installations, exposed means exposed to view or exposed to weather; roof-top equipment is “exposed” even if it is not visible from the ground.
- F. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below the roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.

1.05 LIST OF SUBMITTALS; SUBSTITUTIONS

- A. Concurrent with the submittal schedule, required by Section 01 33 00 "Submittal Procedures" submit a list identifying the manufacturers from which the Contractor intends to procure all equipment under Division 23.
- B. If the Contractor intends to furnish a product from a manufacturer other than the ones specifically named in this Division 23, then the Contractor shall submit a request for substitution, in accordance with provisions of Section 01 60 00, and this request shall be submitted concurrent with submittal of the list of proposed manufacturers.
- C. The Architect will review proposed substitutions and either accept or reject the proposed manufacturer. If the Architect rejects the proposed substitution, resubmit conforming product within 15 days.
- D. No shop drawings will be reviewed until the list of proposed manufacturers has been approved in its entirety, including substitutions, by the Architect.

1.06 SUBMITTALS

- A. Items to be Submitted: Specific items to be submitted are specified in other Division 23 Sections. Definitions and type of information required for each type of submittal are specified below. When required, include the following information, as a minimum, with each submittal:

1. **Make and Model Number:** Submit the manufacturer's name, the trade name and the complete model number for the listed product or device. Also, indicate the applicable catalog number and date of publication wherein the product or device is fully described.
2. **Shop drawings:** Prepare shop drawings to accurate scale except where diagrammatic representations are specifically requested. Show clearance dimensions of critical locations and show dimensions of spaces required for operation and maintenance of equipment. Show piping and ductwork connections and other service connections and show interfaces with other work including structural support. Indicate portions of mechanical work shown on the shop drawings which deviates from requirements indicated in contract documents and explain reasons for the deviations. Show how such deviations coordinate with other portions of the work and with data currently or previously submitted.
3. **Product Data:** Submit samples specified in the individual Division 23 sections. In addition, where operating ranges are shown, mark data to show portion of range required for project application. Expansion or elaboration of standard data to describe non-standard product must be processed as a shop drawing submittal. For each product, include manufacturer's production specifications, installation or fabrication instructions, nearest source of supply (including telephone number), piping, ductwork and service line connection sizes and locations, evidence of compliance with required standards and governing regulations (include manufacturer's signed statements if not covered in printed data), and similar information needed to represent compliance with requirements. Submitted data shall be original printed material, not photocopies or facsimile (Fax) copies.
4. **Certifications:** When indicated, submit warranty which, in addition to execution by authorized officer of each guarantor, is attested to by Secretary of each guarantor and bears corporate seal. Submit draft of each warranty (for Owner's acceptance of text) prior to execution.
5. **Test Reports:** Submit test reports of the product or device which have been dated and signed by representatives of the testing agency performing test. Prepare test reports in manner consistent with standard or regulation governing test procedure (if any) as indicated. Test reports shall be clear, concise, complete and in typed tabular form.
 - a. Provide notarized executions on test reports. Include name of testing agency and name of individual performing or responsible for the testing.
6. **Product Warranties:** Submit only specified warranties. Where special project warranty is specified, submit warranty prepared specifically for this project and executed by an authorized officer of the warranting firm.
7. **Operating Instructions:** Submit type written operating instructions for each product or device and supplement with additional project application instructions where necessary. Prepare and submit specific operating instructions for each system which involves multiple items of equipment, including instructions for charging, start-up, control or sequence of operation, phase or seasonal variations, shut-down, safety and similar operational instructions. Include valve schedule, filter schedule and belt schedule.

8. Maintenance Manual: Prepare maintenance manuals in accordance with the requirements of Section 01 77 00 "Closeout Procedures". In addition to the requirements specified in Division 1, include the following information for equipment items:
 - a. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
 - b. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
 - c. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
 - d. Servicing instructions and lubrication charts and schedules.
 - e. Automatic temperature controls as-built shop drawings and start-up, adjustment & testing reports.
 - f. Final Balancing reports.
 - g. Ductwork test reports.

9. Maintenance Materials: Deliver required quantity of product or device to Owner's representative at location as directed, in containers or packages suitable for storage and fully identified.

10. Record Drawings: Prepare record documents in accordance with the requirements of Section 01 77 00 "Closeout Procedures". In addition to the requirements specified in Division 1, indicate the following installed conditions:
 - a. Ductwork mains and branches, size and location, for both exterior and interior; locations of dampers and other control devices; filters, boxes, and terminal units requiring periodic maintenance or repair.
 - b. Approved substitutions, Contract Modifications, and actual equipment and materials installed.
 - c. Contract Modifications, actual equipment and materials installed.

B. Comply with USM IDAT.

1.07 QUALITY ASSURANCE

- A. Manufacturers: Companies specializing in manufacturing the products specified; demonstrate a minimum three years documented experience but in no case less than specified in other sections.
- B. Installers: Companies which have been specializing in performing work of the type specified for at least three years but in no case less than specified in other sections. Foreman shall have at least five years experience.
- C. Source Limitations: To the fullest extent possible, provide products of the same kind from a single source.
- D. ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

1.08 WARRANTY

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

1.09 DELIVERY, STORAGE AND HANDLING

- A. Acceptance at the Site: Upon receipt, inspect mechanical equipment (including Owner furnished equipment) in accordance with manufacturer's instructions.
 - 1. Do not install equipment until all defects detected during inspection have been corrected.

1.10 SEQUENCE AND SCHEDULING

- A. Coordinate mechanical work with work of other trades, so that all work will be completed without interruption. Make adjustments necessary to conform to structural and architectural conditions.
- B. Connections to Owner-Furnished Equipment: Coordinate location of all equipment with General Contractor. Install all equipment in strict accordance with manufacturer's installation diagrams and methods of installation. If additional information is required, obtain from the Architect.
- C. Any changes in construction required for coordination, which deviate from the intent or requirements of the specifications and/or drawings, must be described and detailed in writing and submitted to the Architect for approval.
- D. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.

PART 2 - PRODUCTS

2.06 ACCESS DOORS.

- A. Furnish doors complying with 08 31 00.

PART 3 - EXECUTION

3.01 SUMMATION

- A. The installation is to be in full compliance with the contract documents and, as such, no additional approval by the Architect is required. The various suppliers are expected to submit information that represents equipment that is in full compliance; the various sub-contractors are expected to have checked the submitted information for full compliance prior to forwarding, where required, to the General Contractor; and the General Contractor is expected to have further checked the submitted information for full compliance prior to forwarding, where required to the Architect.
 - 1. Where submittals are required, they shall either be in full compliance or include a separate typewritten statement that clearly and concisely defines how the submittal varies from the contract documents.

3.02 EXAMINATION

- A. The Contract Drawings are diagrammatic only intending to show general runs and locations of ductwork and specialties and not necessarily showing all required offsets, details and accessories and equipment to be connected. Install the work to fulfill the diagrammatic intent expressed on the Mechanical Drawings, but in conformity with the dimensions indicated on the final working drawings, field layouts, and shop drawings of all trades. Lay out work accurately in coordination with other Trades to avoid conflicts in placement of the piping, ductwork, pumps, equipment, and similar items, and to obtain a neat installation which will afford maximum accessibility for operation, maintenance and headroom. In case of conflict between sizes shown on plans, details or diagrams, allow for the largest size.
- B. Examine existing conditions and prior construction to determine that they are in proper condition to receive mechanical work prior to beginning installation. Do not permit mechanical work to proceed until conditions detrimental to the installation have been corrected.
- C. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

3.03 CLEANING AND TOUCH-UP

- A. Remove waste materials from the premises promptly as the work progresses.
- B. At the completion of the work, thoroughly clean and polish equipment and installed materials. Turn the mechanical work over to the Owner in a condition satisfactory to the Architect.
- C. Clean mill scale, grease, and protective coatings from exterior of valves and prepare valves to receive finish painting or insulation.

- D. Damage and Touch Up: Touch-up damaged finishes on equipment; use same paint as applied in the shop and prepare surfaces and apply paint in accordance with paint manufacturers instructions. Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.04 ERECTION OF METAL SUPPORTS AND ANCHORAGE

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.
- B. Field Welding: Comply with AWS D1.1 "Structural Welding Code--Steel."

3.05 CUTTING AND PATCHING

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of the trades involved.
- B. Repair cut surfaces to match adjacent surfaces.

3.06 DEMONSTRATION

- A. Within 7 days of the issuance of the Certificate of Substantial Completion, provide an experienced and competent Engineer to instruct the Owner's representative in the proper operation of all systems and equipment provided, prior to the final acceptance of his work. Make arrangements with the Owner, who will designate the person or persons who will be instructed in the operation of the basic and auxiliary mechanical systems. The Owner shall be satisfied that instruction has been thorough and complete and the Mechanical Subcontractor shall provide additional instruction before final payment is made.
- B. Provide an experienced and competent Engineer to provide an additional period of instruction for the Owner's representative in the proper operation of all systems and equipment provided, at some period after the final acceptance of his work (as defined in the General and Supplementary General Conditions, and Division 1 General Requirements). Make arrangements with the Owner, who will designate the person or persons who will be instructed in the operation of the basic and auxiliary mechanical systems.

END OF SECTION 23 05 00

SECTION 23 05 93
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 General Requirements, apply to work specified in this Section.
- B. Comply with Section 23 05 00, "Common Work results for HVAC".

1.02 SUMMARY

- A. This Section includes testing, adjusting, and balancing HVAC systems to produce design objectives, including the following:
 - 1. Balancing airflow within distribution systems, including submains, branches, and terminals, to indicated quantities according to specified tolerances.
 - 2. Adjusting total HVAC systems to provide indicated quantities, including replacement of sheaves and pulleys to achieve desired flow rate.
 - 3. Measuring electrical performance of HVAC equipment.
 - 4. Setting quantitative performance of HVAC equipment.
 - 5. Verifying that automatic control devices are functioning properly.
 - 6. Measuring sound and vibration.
 - 7. Reporting results of the activities and procedures specified in this Section.
 - 8. Testing of performance of fume hoods in accordance with ASHRAE Standard 110.
- B. Test, adjust and balance the following mechanical systems:
 - 1. Exhaust air systems.

1.03 DEFINITIONS

- A. Adjust: To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.
- B. Balance: To proportion flows within the distribution system, including submains, branches, and terminals, according to design quantities.
- C. Draft: A current of air, when referring to localized effect caused by one or more factors of high air velocity, low ambient temperature, or direction of airflow, whereby more heat is withdrawn from a person's skin than is normally dissipated.
- D. Procedure: An approach to and execution of a sequence of work operations to yield repeatable results.
- E. Report Forms: Test data sheets for recording test data in logical order.
- F. System Effect: A phenomenon that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.

- G. System Effect Factors: Allowances used to calculate a reduction of the performance ratings of a fan when installed under conditions different from those presented when the fan was performance tested.
- H. Terminal: A point where the controlled medium, such as fluid or energy, enters or leaves the distribution system.
- I. Test: A procedure to determine quantitative performance of a system or equipment.
- J. Testing, Adjusting, and Balancing Agent: The entity responsible for performing and reporting the testing, adjusting, and balancing procedures.
- K. AABC: Associated Air Balance Council.
- L. AMCA: Air Movement and Control Association.
- M. NEBB: National Environmental Balancing Bureau.
- N. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.

1.04 SUBMITTALS

- A. Quality-Assurance Submittals: With the General Contractor's initial application for payment, as specified in Section 01 29 00, "Payment Procedures", submit 2 copies of evidence that testing, adjusting, and balancing Agent and this Project's testing, adjusting, and balancing team members meet the qualifications specified in the "Quality Assurance" Article below.
- B. Contract Documents Examination Report: Within 45 days from the Contractor's Notice to Proceed, submit 2 copies of Contract Documents examination report as specified in Part 3 of this Section.
- C. Strategies and Procedures Plan: Within 60 days from the Contractor's Notice to Proceed, submit 2 copies of the testing, adjusting, and balancing strategies and step-by-step procedures as specified in Part 3 "Preparation" Article below. Include a complete set of report forms intended for use on this Project.
- D. Certified Testing, Adjusting, and Balancing Reports: Submit 2 copies of reports prepared, as specified in this Section, on approved forms certified by the testing, adjusting, and balancing Agent.
- E. Warranty: Submit 2 copies of special warranty specified in the "Warranty" Article below.

1.05 QUALITY ASSURANCE

- A. Agent Qualifications: Engage a testing, adjusting, and balancing agent certified by either AABC or NEBB.
- B. Testing, Adjusting, and Balancing Conference: Meet with Owner's and Architect's representatives on approval of testing, adjusting, and balancing strategies and procedures plan to develop a mutual understanding of the details. Ensure participation of testing, adjusting, and balancing team members, equipment manufacturers' authorized service representatives, HVAC

controls Installer, and other support personnel. Provide 7 days advance notice of scheduled meeting time and location.

1. Agenda Items: Include at least the following:
 - a. Submittal distribution requirements.
 - b. Contract Documents examination report.
 - c. Testing, adjusting, and balancing plan.
 - d. Work schedule and Project site access requirements.
 - e. Coordination and cooperation of trades and subcontractors.
 - f. Coordination of documentation and communication flow.
 - C. Certification of Testing, Adjusting, and Balancing Reports: Certify the testing, adjusting, and balancing field data reports. This certification includes the following:
 1. Review field data reports to validate accuracy of data and to prepare certified testing, adjusting, and balancing reports.
 2. Certify that testing, adjusting, and balancing team complied with approved testing, adjusting, and balancing plan and procedures specified and referenced in this Specification.
 - D. Testing, Adjusting and Balancing Reports: Use standard forms from AABC's "National Standards for Testing, Adjusting, and Balancing", or from NEBB's "Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems".
 - E. Instrumentation Type, Quantity, and Accuracy: As described in AABC national standards, as described in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems," Section II, "Required Instrumentation for NEBB Certification."
 1. When testing fume hoods, in addition comply with the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) 110 "Method of Testing Performance of Laboratory Fume Hoods."
 - F. Instrumentation Calibration: Calibrate instruments at least every 6 months or more frequently if required by instrument manufacturer.
 - G. Comply with USM IDAT.
- 1.06 PROJECT CONDITIONS
- A. Systems Operation: Systems shall be fully operational prior to beginning procedures.
 - B. Partial Owner Occupancy: The Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during testing, adjusting, and balancing operations to minimize conflicts with Owner's operations.
- 1.07 COORDINATION
- A. Coordinate efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist testing, adjusting, and balancing activities.
 - B. Notice: Provide 7 days' advance notice for each test. Include scheduled test dates and times.

- C. Perform testing, adjusting, and balancing after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

1.08 WARRANTY

- A. General Warranty: The national project performance guarantee specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Provide a guarantee on AABC'S "National Standards" forms, or on NEBB forms, stating that AABC or NEBB, respectively, will assist in completing the requirements of the Contract Documents if the testing, adjusting, and balancing Agent fails to comply with Contract Documents. Guarantee includes the following provisions:
 - 1. The certified Agent has tested and balanced systems according to the Contract Documents.
 - 2. Systems are balanced to optimum performance capabilities within design and installation limits.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine the Contract Documents to become familiar with project requirements and to discover conditions in system designs that may preclude proper testing, adjusting, and balancing of systems and equipment.
- B. Examine approved submittal data of HVAC systems and equipment.
- C. Examine project record documents described in Section 01 77 00 "Closeout Procedures."
- D. Examine equipment performance data, including fan curves. 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. Calculate system effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from those presented when equipment was performance tested at factory. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," Sections 7 through 10; or in SMACNA's "HVAC Systems--Duct Design," Sections 5 and 6. Compare this data with design data and installed conditions.
- E. Examine system and equipment installations to verify they are complete and that testing, cleaning, adjusting, and start-up specified in individual Specification Sections have been performed.
- F. Examine system and equipment test reports.
- G. Examine HVAC system and equipment installations to verify indicated balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and

fittings, and manual volume dampers, are properly installed, and their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.

- H. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.
- I. Report deficiencies discovered before and during performance of testing, adjusting, and balancing procedures.

3.02 PREPARATION

- A. Prepare a testing, adjusting, and balancing plan that includes strategies and step-by-step procedures.

3.03 GENERAL TESTING AND BALANCING PROCEDURES

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC national standards, or in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and this Section.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to insulation Specifications for this Project.
- C. Mark equipment settings with paint or other suitable, permanent identification material, including damper-control positions, valve indicators, fan-speed-control levers, and similar controls and devices, to show final settings.

3.04 FUNDAMENTAL AIR SYSTEM BALANCING PROCEDURES

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Cross-check summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems "as-built" duct layouts.
- C. Determine best locations in main and branch ducts for accurate duct airflow measurements.
- D. Check airflow patterns from outside-air louvers and dampers and return- and exhaust-air dampers, through supply-fan discharge and mixing dampers.
- 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.

3.05 TOLERANCES

- A. Set HVAC system airflow and water flow rates within the following tolerances:
 1. Exhaust Fans: Minus 5 to plus 5 percent.

2. Air Outlets and Inlets: Minus 5 to plus 5 percent.

3.06 REPORTING

- A. Contract Documents Examination Report: Based on examination of the Contract Documents as specified in "Examination" Article above, prepare a report on the adequacy of design for system balancing devices. Recommend changes and additions to system balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.
- B. Status Reports: As Work progresses, prepare reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.07 FINAL REPORT

- A. General: Typewritten, or computer printout in letter-quality font, on standard bond paper, in 3-ring binder, tabulated and divided into sections by tested and balanced systems.
- B. Include a certification sheet in front of binder signed and sealed by certified testing and balancing engineer.
 1. Include a list of instruments used for procedures, along with proof of calibration.
- C. Final Report Contents: In addition to certified field report data, include the following:
 1. Field test reports prepared by system and equipment installers.
 2. Other information relative to equipment performance, but do not include approved Shop Drawings and Product Data.
- D. General Report Data: In addition to form titles and entries, include the following data in final report, as applicable:
 1. Title page.
 2. Name and address of testing, adjusting, and balancing Agent.
 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 testing, adjusting, and balancing Agent who certifies the report.
 10. Summary of contents, including the following:
 - a. Design versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 11. Nomenclature sheets for each item of equipment.
 12. Notes to explain why certain final data in the body of reports vary from design values.
- E. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data: Include the following:
 - a. System and air-handling unit number.
 - b. Location and zone.
 - c. Traverse air temperature in deg F (deg C).
 - d. Duct static pressure in inches wg (Pa).
 - e. Duct size in inches (mm).
 - f. Duct area in sq. ft. (sq. m)).
 - g. Design airflow rate in cfm (L/s).
 - h. Design velocity in fpm (m/s).
 - i. Actual airflow rate in cfm (L/s).
 - j. Actual average velocity in fpm (m/s).
 - k. Barometric pressure in psig (Pa).

- F. Instrument Calibration Reports: Include the following data:
 1. Instrument type and make.
 2. Serial number.
 3. Application.
 4. Dates of use.
 5. Dates of calibration.

END OF SECTION 23 05 93

SECTION 23 31 13
DUCTWORK

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 General Requirements, apply to work specified in this Section.
- B. Requirements of Section 23 05 00, "Common Work results for HVAC" apply to work specified in this Section.

1.02 SUMMARY

- A. This Section specifies ducts, plenums and casings for heating, ventilating, and air conditioning systems in pressure classes from minus 2 inches to plus 10 inches water gage.
- B. Related Work Specified in Other Sections:
 - 1. Fire-resistant sealants for use around duct penetrations and fire damper installations in fire rated floors, partitions, and walls: Section 07 84 00, "Firestopping".
 - 2. Access panels and doors for access to concealed ducts: Section 08 31 00, "Access Doors."
 - 3. Flexible duct materials, dampers, duct-mounted access panels and doors, turning vanes, sound attenuators and other accessories: Section 23 33 00, "Air Duct Accessories".
 - 4. Diffusers, registers and grilles: Section 23 37 13, "Diffusers, Registers, and Grilles".
 - 5. Testing, adjusting, and balancing of ductwork: Section 23 05 93, "Testing, Adjusting and Balancing".

1.03 REFERENCED STANDARDS

- A. NAIMA's "Fibrous Glass Duct Liner Standard"
- B. Sheet Metal and Air Conditioning Contractor's Association (SMACNA)
 - 1. HVAC Duct Construction Standards, Latest Edition

1.04 DEFINITIONS

- A. Thermal Conductivity and Apparent Thermal Conductivity (k-Value): As defined in ASTM C 168. These values are the result of the formula $Btu \times in./h \times sq. ft. \times deg. F$.
- B. Seams: A seam is defined as joining of two longitudinally (in the direction of airflow) oriented edges of duct surface material occurring between two joints. All other duct surface connections made on the perimeter are deemed to be joints.
- C. Joints: Joints include girth joints; branch and subbranch intersections; so-called duct collar tap-ins; fitting subsections; louver and air terminal connections to ducts; access door and access panel frames and jambs; duct, plenum, and casing abutments to building structures.

1.05 SYSTEM DESCRIPTION

- A. The duct system design, as indicated, has been used to select and size air moving and distribution equipment and other components of the air system. Changes to the layout or configuration of duct system must be specifically approved in writing by Architect. Accompany requests for layout modifications with calculations showing that proposed layout will provide original design results without increasing system total pressure.
- B. Design and obtain approval from authority with jurisdiction over seismic restraint hangers and support for ductwork.

1.06 SUBMITTALS

- A. Product Data: Manufacturer's illustrated product literature, including details of construction, dimensions of individual components, profiles, and finishes for the following items:
 - 1. Ductwork, Shop Standards
 - 2. Sealing Materials.
- B. Fabrication, assembly, and installation details, including plans, elevations, sections, details of components, and attachments to other work. Include copy of SMACNA Tables and Figure numbers and configurations marked to identify which are to be used. After review, of fabrication details, submit duct fabrication drawings. (Duct fabrication drawings will not be reviewed prior to review of fabrication details.)
- C. Duct fabrication drawings from duct fabrication shop, drawn to a scale not smaller than 1/4 inch equals 1 foot, on drawing sheets same size as the Contract Drawings, detailing:
 - 1. Duct layout, indicating pressure classifications, gauges and sizes in plan view.
 - 2. Fittings.
 - 3. Reinforcement and spacing.
 - 4. Seam and joint construction.
 - 5. Penetrations through fire-rated and other partitions.
 - 6. Hangers and supports, including methods for building attachment, vibration isolation, seismic restraint, and duct attachment.
- D. Licensed Engineers hanger and support drawings specified in the "Quality Assurance Article" below.
- E. Perform tests specified in "Field Quality Control". Modify mock-up construction and perform additional tests as required to achieve specified minimum acceptable results.
- F. Quality Assurance Submittals: Coordination drawings for ductwork installation in accordance with Section 01 31 00, "Project Management and Coordination".
- G. Closeout Submittals: Submit record drawings including duct systems routing, fitting details, reinforcing, support, installed accessories and devices in accordance and with Section 01 77 00, "Closeout Procedures".

1.07 QUALITY ASSURANCE

- A. Licensed Engineer: Prepare hanger and support design drawings, and calculations for seismic restraint of ductwork. Include seal and signature of Registered Engineer, licensed in

jurisdiction where project is located, certifying compliance with The Maine State Building Code.

- B. NFPA Compliance: Comply with the following NFPA Standards:
 - 1. NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems".
 - 2. NFPA 90B, "Standard for the Installation of Warm Air Heating and Air Conditioning Systems".
- C. NAIMA Compliance: Comply with the NAIMA's "Fibrous Glass Duct Liner Standard".
- D. UL Compliance: UL listed and labeled as complying with UL 181, Class 1 for fibrous glass duct.
- E. Comply with USM IDAT.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sealant 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. Store and handle sealant materials in compliance with manufacturer's recommendations.
- C. Deliver and store stainless steel sheets with mill-applied adhesive protective paper, maintained through fabrication and installation.
- D. Deliver shop-fabricated and factory-fabricated casings, accessories and purchased accessories with protective crating and covering.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with requirements, provide products of one of the following:
- B. Transverse Duct Connectors:
 - 1. Ductmate
 - 2. TDC
 - 3. United McGill
- C. Duct Sealant
 - 1. Hardcast.
 - 2. United McGill.

2.02 DUCT MATERIALS

- A. Sheet Metal, General: Provide sheet metal in thicknesses indicated, packaged and marked as specified in ASTM A 700.
- B. Galvanized Sheet Steel: Lock-forming quality, ASTM A 527, Coating Designation G 90. Provide mill phosphatized finish for surfaces of ducts exposed to view.
- C. Reinforcement Shapes and Plates: Unless otherwise indicated, provide galvanized steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for all other ducts.
- D. 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.

2.03 SEALING MATERIALS

- A. Joint and Seam Sealant: All purpose industrial grade indoor/outdoor, water based sealant complying with ASTM C 731, ASTM C 732 and ASTM D 2202; formulated with a minimum of 63 percent solids.
 - 1. Sealant for exterior applications shall have a service temperature of -30 deg F to 175 deg F; ultraviolet ray- and ozone-resistant.
- B. Flanged Joint Mastics: One-part, acid-curing, silicone elastomeric joint sealants, complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.

2.04 HANGERS AND SUPPORTS

- A. Building Attachments: Concrete inserts, powder actuated fasteners, or structural steel fasteners appropriate for building materials. Do not use powder actuated concrete fasteners for lightweight aggregate concretes or for slabs less than 4 inches thick.
- B. Hangers: Galvanized, sheet steel, or round, threaded steel rod.
 - 1. Hangers Installed In Corrosive Atmospheres: Electro galvanized, all-thread rod or hot-dipped-galvanized rods with threads painted after installation.
 - 2. Straps and Rod Sizes: Comply with SMACNA "HVAC Duct Construction Standards - Metal and Flexible," Latest Edition, for sheet steel width and gage and steel rod diameters.
- C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- D. Trapeze and Riser Supports: Steel shapes conforming to ASTM A 36/A 36M.
 - 1. Supports for galvanized steel ducts: Hot-dipped-galvanized steel shapes and plates.
 - 2. Supports for stainless steel ducts: Stainless steel support materials.

3. For aluminum ducts: Aluminum support materials, except where materials are electrolytically separated from ductwork.

2.05 PRESSURE CLASSIFICATIONS

- A. Static Pressure Classifications: Except where otherwise indicated, construct duct systems to the following pressure classifications.
 1. Classify as medium pressure and construct the following work for minimum of 6 inch wg static pressure positive, Seal Class A, Leakage Class 6 for rectangular ductwork and Class 3 for round ductwork as recommended in SMACNA HVAC Duct Construction Standards, Latest Edition, and HVAC Air Duct Leakage Test Standards.
 - a. Supply ductwork for variable air volume systems up to the inlet side of variable air volume terminals.
 3. Classify as industrial duct and construct the following work for minimum of 6 inch wg static pressure negative, Seal Class A, Leakage Class 6 for rectangular ductwork and Class 3 for round ductwork as recommended in SMACNA Round Industrial Duct Construction Standards Latest Edition, and HVAC Air Duct Leakage Test Standards.
 - a. Exhaust ductwork for general lab, animal lab, fume hoods and distribution ductwork associated with fume exhaust.
 4. Classify as low pressure and construct all ductwork and casings other than that listed above for minimum of 2 inch wg static pressure positive or negative as recommended in SMACNA HVAC Duct Construction Standards, Latest Edition, except as follows:
 - a. Seal seams, joints, fastener penetrations and connections in all ductwork Seal Class A, Leakage Class 6 for rectangular ductwork and Class 3 for round ductwork.
 - b. Construct seams and joints in supply ductwork as recommended in SMACNA HVAC Duct Construction Standards, Latest Edition, for minimum of 4 inches static pressure, positive.
 - c. Button punch snaplocks and pocket locks are not permitted.

2.06 DUCT FABRICATION

- A. General: Except as otherwise indicated, fabricate ducts, elbows, transitions, offsets, branch connections and other construction with galvanized sheet steel, in accordance with SMACNA "HVAC Duct Construction Standards - Metal and Flexible," latest Edition. Comply with the requirements for metal thickness, reinforcing types and intervals, tie rod applications, and joint types and intervals.
 1. Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure classification.
 2. Provide materials that are free from visual imperfections such as pitting, seam marks, roller marks, stains, and discolorations.
- B. Duct dimensions indicated on Drawings are inside clear dimensions.
- C. Crossbreaking or Cross Beading: Crossbreak or cross bead duct sides that are 19 inches and larger and are 20 gage or less, with more than 10 sq. ft. of unbraced panel area, as indicated in

SMACNA "HVAC Duct Construction Standards-Metal and Flexible", Latest Edition, unless they are lined or externally insulated.

2.07 ROUND AND FLAT OVAL DUCT FABRICATION

- A. General: "Diameter" as applied to flat-oval ducts in this Article is the diameter of the size of round duct that has a circumference equal to the perimeter of a given size of flat oval duct. Except where interrupted by fittings, provide round and flat oval ducts in lengths not less than 12 feet.
- B. Round Ducts: Fabricate round ducts with spiral lockseam construction, except where diameters exceed 72 inches. Fabricate ducts having diameters greater than 72 inches with longitudinal butt-welded seams. Comply with SMACNA "HVAC Duct Construction Standards-Metal and Flexible", Latest Edition, for galvanized steel gages.
- B. Round Ducts: Fabricate round ducts using seam types identified in SMACNA "HVAC Duct Construction Standards-Metal and Flexible", Latest Edition, Figure 3-1, RL-1, RL-4, or RL-5. Seam Types RL-2 or RL-3 must be spot-welded on 1-inch intervals. Comply with SMACNA "HVAC Duct Construction Standards-Metal and Flexible", Latest Edition for galvanized steel gages.
- C. Flat Oval Ducts: Fabricate flat oval ducts with standard spiral lockseams (without intermediate ribs) or with butt-welded longitudinal seams in gages listed in SMACNA "HVAC Duct Construction Standards-Metal and Flexible," Latest Edition.

2.10 ROUND AND FLAT OVAL SUPPLY AND EXHAUST FITTINGS FABRICATION

- A. 90-Degree Tees and Laterals and Conical Tees: Fabricate to conform to SMACNA "HVAC Duct Construction Standards-Metal and Flexible", Latest Edition, and 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: Fabricate in die-formed, gored, pleated, or mitered construction. Fabricate bend radius of die-formed, gored, and pleated elbows 1.5 times elbow diameter. Unless elbow construction type is indicated, provide elbows meeting the following requirements:
 - 1. Mitered Elbows: Fabricate mitered elbows with solid welded construction. Complying with SMACA "HVAC Duct Construction Standards-Metal and Flexible", Latest Edition for gauge and number of pieces.
 - a. Flat Oval Mitered Elbows: Solid welded with same metal guage as longitudinal seam flat oval duct.
 - 2. Round Elbows - 8 Inches and Smaller: Die-formed elbows for 45- and 90-degree elbows and pleated elbows for 30, 45, 60, and 90 degrees only. Fabricate nonstandard bend angle configurations or 1/2-inch-diameter (e.g. 3-1/2- and 4-1/2-inch) elbows with gored construction.
 - 3. Round Elbows - 9 Through 14 Inches: Gored or pleated elbows for 30, 45, 60, and 90 degrees, unless space restrictions require a mitered elbow. Fabricate nonstandard bend

angle configurations or 1/2-inch-diameter (e.g. 9-1/2- and 10-1/2-inch) elbows with gored construction.

4. Round Elbows - Larger Than 14 Inches and All Flat Oval Elbows: Gored elbows, unless space restrictions require a mitered elbow.
5. Die-Formed Elbows for Sizes Through 8 Inches and All Pressures: 20 gage with 2-piece welded construction.
6. Round Gored Elbows Gages: Same as for non-elbow fittings specified above.
7. Flat Oval Elbows Gages: Same as longitudinal seam flat oval duct.
8. Pleated Elbows Sizes Through 14 Inches and Pressures Through 10 Inches: 24 gage.

PART 3 - EXECUTION

3.01 DUCT INSTALLATION, GENERAL

- A. Install metal ducts and fittings in accordance with SMACNA "HVAC Duct Construction Standards - Metal and Flexible", Latest Edition.
- B. Duct System Pressure Class: Construct and install each duct system for the specific duct pressure classification indicated.
- C. Install ducts with the fewest possible joints.
- D. Install fabricated fittings for all changes in direction, changes in size and shape, and connections.
- E. Install couplings tight to duct wall surface with a minimum of projections into duct .
- F. Install ducts, unless otherwise indicated, vertically and horizontally, parallel and perpendicular to building lines; avoid diagonal runs.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- H. Install ducts with a minimum clearance of 1-inch plus allowance for insulation thickness.
- I. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions, unless as specifically indicated.
- J. Coordinate layout with suspended ceiling, fire-and smoke-control dampers, and lighting layouts and similar finished work.
- K. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same gage as duct. Overlap opening on four sides by at least 1-1/2 inches.

- L. Fire-Rated Partition Penetrations: Where ducts pass through fire-rated partitions and walls, install appropriately rated fire damper and sleeve.

3.02 SEAM AND JOINT SEALING

- A. General: Seal duct seams and joints in accordance with pressure class indicated and as described in SMACA "HVAC Duct Construction Standards-Metal and Flexible", Latest Edition.:
- B. Pressure Classification Less than 2 Inches Water Gage: Transverse joints only.
- C. Seal externally insulated ducts prior to insulation installation.

3.03 HANGING AND SUPPORTING

- A. Install rigid round, rectangular, and flat oval metal duct with support systems indicated in SMACNA "HVAC Duct Construction Standards-Metal and Flexible", Latest Edition, Tables 4-1 through 4-3 and Figures 4-1 through 4-8, and SMACNA "Fibrous Glass Duct Construction Standards," Latest Edition.
- B. Support horizontal ducts within 2 feet of each elbow and within 4 feet of each branch intersection.
- C. Support vertical ducts at a maximum interval of 16 feet and at each floor.
- D. Upper attachments to structures shall have an allowable load not exceeding one-fourth the failure (proof test) load.
- E. Install powder actuated concrete fasteners after concrete is placed and completely cured.

3.04 CONNECTIONS

- A. Equipment Connections: Connect equipment with flexible connectors in accordance with Section 23 33 00," Air Duct Accessories."
- B. Branch, Diffuser, Register, Grille, and Terminal Unit Connections: Comply with SMACNA "HVAC Duct Construction Standards-Metal and Standard," Latest Edition.

3.05 FIELD QUALITY CONTROL

- A. Test all supply, return and exhaust ductwork during installation and before application of any exterior insulation or enclosing of ductwork, in accordance with SMACNA "HVAC Air Duct Leakage Test Manual".
 - 1. Disassemble, reassemble, and seal segments of the systems as required to accommodate leakage testing, and as required for compliance with test requirements.
 - 2. Conduct tests, in presence of Arch/Owner, at static pressures equal to maximum design pressure of system or section being tested. If pressure classifications are not indicated, test entire system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure. Give seven days' advance notice for testing.
 - 3. Remake leaking joints and retest until leakage is less than maximum allowable leakage.

B. Comply with USM IDAT.

3.06 ADJUSTING AND CLEANING

- A. Refer to Section 23 05 93, "Testing, Adjusting, and Balancing" for requirements and procedures for adjusting and balancing air systems.
- B. After completing installation, including outlet fittings and devices, inspect the system. Vacuum ducts prior to final acceptance to remove dust and debris.
- C. Clean dust and debris from each casing section as it is installed. Clean external surfaces of foreign substances that might deteriorate metal or interface with painting or insulating of casings.
- D. Maintain temporarily closed openings in casings until permanently closed by duct connections, equipment installation, and completion of similar work. Cover openings with polyethylene film or other covering to prevent entrance of moisture, dust and debris.

END OF SECTION 23 31 13

SECTION 23 33 00
AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 General Requirements, apply to work specified in this Section.
- B. Requirements of Section 23 05 00, "Common Work results for HVAC" apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Manual volume dampers.
 - 2. Full length splitter vanes.
 - 3. Splitter vanes.
 - 4. Duct-mounted access doors and panels.
 - 5. Flexible ducts.
 - 6. Accessories.
- B. Related Work Specified in Other Sections:
 - 1. Ceiling- and wall-mounted access panels and doors: Section 08305, "Access Panels".
 - 2. Diffusers, registers, and grilles: Section 23 37 00, "Diffusers, Registers and Grilles".

1.03 SUBMITTALS

- A. Product data including details for materials, dimensions of individual components, profiles, and finishes for the following items:
 - 1. Manual volume control dampers.
 - 2. Duct-mounted access panels and doors.
 - 3. Full length splitter vanes.
 - 4. Turning vanes splitter vanes.
 - 5. Flexible ducts.
 - 6. Flexible connectors.
- B. Shop drawings from manufacturer detailing assemblies. Include dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection. Detail the following:
 - 1. Special fittings and volume control damper installation details.

1.04 QUALITY ASSURANCE

- A. NFPA Compliance: Comply with the following NFPA Standards:
 - 1. NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems."
 - 2. NFPA 90B, "Standard for the Installation of Warm Air Heating and Air Conditioning Systems."

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Volume Dampers: Subject to compliance with requirements, provide products of one of the following:
 - 1. Buckley Air Products, Inc.
 - 2. Ruskin Mfg. Co.
 - 3. United McGill Corporation
- B. Full Length Splitter Vanes:
 - 1. Custom fabricated in accordance with SMACNA "HVAC Duct Construction Standards".
- C. Flexible Connectors: Subject to compliance with requirements, provide products of one of the following:
 - 1. Duro Dyne Corporation
 - 2. Ventfabrics, Inc.
- D. Flexible Ducts: Subject to compliance with requirements, provide products of one of the following:
 - 1. Flexmaster, Buckley Associates, Inc.
 - 2. Thermaflex

2.02 MANUAL VOLUME DAMPERS

- A. General: Factory-fabricated with required hardware and accessories. Stiffen damper blades for stability. Provide locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.
 - 1. Pressure Classifications of 3-inch w.g. or Higher: End bearings or other seals for ducts. Axles full length of damper blades and provide bearings at both ends of operating shaft. Identify dampers on dwg as "standard", "low leakage", or "high performance". Otherwise, spec only one type of damper.
- B. Provide volume dampers at all low pressure branch take-offs for return, exhaust or supply and at each register, grill or diffuser.
- C. Standard Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, standard leakage rating, with linkage outside of air stream, and suitable for horizontal or vertical applications.
- D. Low-Leakage Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, low-leakage rating, with linkage outside of air stream, and suitable for horizontal or vertical applications.
- E. Jackshaft: 1-inch-diameter, galvanized-steel pipe rotating within a pipe-bearing assembly mounted on supports at each mullion and at each end of multiple damper assemblies. Provide appropriate length and number of mountings to connect linkage of each damper of a multiple damper assembly.

- F. Damper Hardware: Zinc-plated, die-cast core with dial and handle made of 3/32-inch-thick zinc-plated steel, and a 3/4-inch hexagon locking nut. Provide center hole to suit damper operating rod size. Provide elevated platform for insulated duct mounting.

2.03 FULL LENGTH SPLITTER VANES

- A. Fabricate Splitter Vanes: Provide fabricated full length splitter vanes, constructed in accordance with SMACNA "HVAC Duct Construction Standards" and as shown on drawing.
- B. Turning vanes will not be acceptable in place of full radius elbows or short radius elbows with full length splitter vanes.

2.04 DUCT-MOUNTED ACCESS DOORS AND PANELS

- A. General: Fabricate doors and panels airtight and suitable for duct pressure class.
- B. Frame: Galvanized, sheet steel, with bend-over tabs and foam gaskets.
- C. Door: Double-wall, galvanized sheet metal construction with insulation fill and thickness, number of hinges and locks as indicated in SMACNA "HVAC Duct Construction Standards - Metal and Flexible," Latest Edition, (two locks minimum) for duct pressure class. Provide vision panel where indicated. Provide 1-inch by 1-inch butt hinge or piano hinge and cam latches.
- D. Seal around frame attachment to duct and door to frame with neoprene or foam rubber.
- E. Insulation: 1-inch thick fiber glass or polystyrene foam board.

2.05 FLEXIBLE CONNECTORS

- A. General: Flame-retarded or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.
- B. Standard Metal-Edged Connectors: Factory-fabricated with a strip of fabric 3-1/2 inches wide attached to two strips of 2-3/4-inch-wide, 24-gage, galvanized sheet steel or 22-gage aluminum sheets. Select metal compatible with connected ducts.
- C. Conventional, Indoor System Flexible Connector Fabric: Glass fabric double coated with polychloroprene.
 - 1. Minimum Weight: 26 oz. per sq yd.
 - 2. Tensile Strength: 480 lb per inch in the warp and 360 lb per inch in the filling.
- D. High-Temperature System Flexible Connectors: Glass fabric coated with silicone rubber and having a minimum weight of 16 oz. per sq yd and tensile strength of 285 lb per inch in the warp, and 185 lb per inch in the filling.
- E. High-Corrosive-Environment System Flexible Connectors: Glass fabric coated with a chemical-resistant coating.
 - 1. Minimum Weight: 14 oz. per sq yd.
 - 2. Tensile Strength: 450 lb per inch in the warp and 340 lb per inch in the filling.

2.06 FLEXIBLE DUCTS

- A. Provide Underwriters Laboratory listed (UL 181 Class 1) insulated metal duct constructed in accordance with NFPA Standards 90A with a smoke/flame rating of 50/25.
- B. Factory-fabricated, insulated, round duct, with an outer jacket enclosing glass fiber insulation, inner jacket around aluminum perforated corrugated spiral duct.
 - 1. Acoustical triple lock low-pressure aluminum flexible duct shall be comprised of an inner perforated core with an open area 20% to 25%. The perforated inner duct shall be sheathed in a UL approved seamless polyethylene jacket. A 1 1/2 inch thick fiber glass insulation having a density of 1/2 LB shall be totally encapsulated and sealed at each end to maintain a thermal barrier and prevent entrainment of particulate into the air stream. The outer jacket shall consist of a black fire-retardant polyethylene.
- C. Pressure Rating: 2-inch w.g. positive, 1-inch w.g. negative.

2.07 ACCESSORIES

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments, length to suit duct insulation thickness.
- B. Flexible Duct Clamps: Stainless steel band with cadmium-plated hex screw to tighten band with a worm-gear action, sizes 3 to 18 inches to suit duct size.
- C. Adhesives: High strength, quick setting, neoprene based, waterproof and resistant to gasoline and grease.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of duct accessories. Do not proceed with installation until unsatisfactory conditions are corrected.

3.02 INSTALLATION

- A. Install duct accessories according to manufacturer's installation instructions and applicable details shown in SMACNA "HVAC Duct Construction Standards – Metal and Flexible," Latest edition, for metal ducts and NAIMA's "Fibrous Glass Duct Construction Standards" for fibrous-glass ducts.
- B. Install Hospital Grade Acoustical flexible duct throughout. Minimum installation length equal to 5 feet.
- C. Install volume control dampers in lined duct with methods to avoid damage to and erosion of duct liner.
- D. Provide test holes at fan inlet and outlet and elsewhere as indicated.

- E. Install fire dampers according to the manufacturer's UL-approved printed instructions.
 - 1. Install fusible links in fire dampers.

- F. Install duct access panels for panels for access to both sides of duct mounted coils. Install duct access panels downstream of volume dampers, fire dampers, turning vanes, and equipment.
 - 1. Install duct access panels to allow access to interior of ducts for cleaning, inspecting, adjusting, and maintaining accessories and terminal units.
 - 2. install access panels on side of duct where adequate clearance is available.

3.03 ADJUSTING

- A. Adjust duct accessories for proper settings.

- B. Final positioning of manual dampers is specified in Section 23 05 93 "Testing, Adjusting, and Balancing."

END OF SECTION 23 33 00

SECTION 23 37 13
REGISTERS AND GRILLES

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 General Requirements, apply to work specified in this Section.
- B. Requirements of Section 23 05 00, "Common Work results for HVAC" apply to work specified in this Section.

1.02 SUMMARY

- A. Extent of diffuser, register and grille work is indicated by drawings and schedules, and by requirements of this Section.
- B. Types of registers and grilles required for project include the following:
 - 1. Ceiling registers and grilles.
- C. Related Work Specified in Other Sections:
 - 1. Refer to other Division-23 Sections for ductwork and duct accessories required in conjunction with diffusers, registers and grilles.
 - 2. Refer to other Division-23 Sections for balancing of diffusers, registers and grilles.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data for diffusers, registers and grilles including the following:
 - 1. Schedule of registers and grilles indicating drawing designation, room location, number furnished, model number, size, and accessories furnished.
 - 2. Data sheet for each type of register and grille, and accessory furnished; indicating construction, finish, and mounting details.
 - 3. Performance data for each type of register and grille furnished, including aspiration ability, temperature and velocity traverses; throw and drop; and noise criteria ratings. Indicate selections on data.
- B. Shop Drawings: Submit manufacturer's assembly-type shop drawing for each type of register and grille, indicating materials and methods of assembly of components.
- C. Maintenance Data: Submit maintenance data, including cleaning instructions for finishes, and spare parts lists. Include this data, product data, and shop drawings in maintenance manuals; in accordance with requirements of Division 1.

1.04 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of diffusers, registers and grilles of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Codes and Standards:
 - 1. ARI Compliance: Test and rate diffusers, registers and grilles in accordance with ARI 650 "Standard for Air Outlets and Inlets".
 - 2. ASHRAE Compliance: Test and rate diffusers, registers and grilles in accordance with ASHRAE 70 "Method of Testing for Rating the Air Flow Performance of Outlets and Inlets".
 - 3. NFPA Compliance: Install diffusers, registers and grilles in accordance with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver diffusers, registers and grilles wrapped in factory-fabricated fiber-board type containers. Identify on outside of container type of register or grille and location to be installed. Avoid crushing or bending and prevent dirt and debris from entering and settling in devices.
- B. Store diffusers, registers and grilles in original cartons and protect from weather and construction work traffic. Where possible, store indoors; when necessary to store outdoors, store above grade and enclose with waterproof wrapping.

1.06 MAINTENANCE MATERIALS

- A. Furnish to Owner, with receipt, 3 operating keys for each type of diffuser and register that requires them.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Diffusers, Registers and Grilles: Subject to compliance with requirements, provide products of one of the following:
 - 1. Titus Products Div.; Philips Industries, Inc.
 - 2. Metal*Aire.
 - 3. Anemostat Products Div.; Dymanics Corp. of America.
 - 4. Air Factors, Inc.
 - 5. United McGill

2.02 REGISTERS AND GRILLES

- A. General: Except as otherwise indicated, provide manufacturer's standard registers and grilles where shown, constructed of materials and components as indicated, and as required for complete installation.
- B. Ceiling Compatibility: Provide registers and grilles with border styles that are compatible with adjacent ceiling systems, and that are specifically manufactured to fit into ceiling module with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems which will contain each type of diffuser, register and grille.
 - 1. Provide units mounted on walls or plaster/drywall ceilings with sponge rubber seal around edge.
 - 2. Provide antimudge frames or plaques on diffusers located in rough textured surfaces such as acoustical plaster.
- C. Registers and Grilles
 - 1. Provide registers and grilles with key operated, multishutter, streamlined contour, opposed blade dampers.
 - 2. Return Air, Relief Air and Exhaust Intakes: Provide with streamlined, horizontal fixed bar grille faces with bars set straight for ceiling installation and set at an angle of 45°, turned down for low sidewall installation and turned up for high sidewall installation.
 - 3. Fabricate of steel with 20 gauge minimum frames and 22 gauge minimum blades, aluminum of equivalent gauges or aluminum extrusions. Provide countersunk screw holes in margin.
 - 4. Finish: Factory applied baked on white enamel to match ceiling grid.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions under which registers and grilles are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install registers and grilles in accordance with manufacturer's written instructions and in accordance with recognized industry practices to insure that products serve intended function.
- B. Coordinate with other work, including ductwork and duct accessories, as necessary to interface installation of diffusers, registers and grilles with other work.
- C. Locate ceiling air registers, and grilles, as indicated on general construction "Reflected Ceiling Plans". Unless otherwise indicated, locate units in center of acoustical ceiling module.
- D. All ductwork behind registers and grilles shall be painted flat black.

END OF SECTION 23 37 13

SECTION 26 03 00
ELECTRICAL SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The Drawings and General Provisions of the Contract, including General and Supplementary General Conditions, and Division 01 General Requirements, apply to work specified in this Section.

1.02 SUMMARY

- A. Section Includes: Selective demolition of electrical service and equipment, including:
 1. Service disconnection.
 2. Temporary shut-down of electrical power.
 3. Removal and disposal of electrical equipment.
 4. Removal and disposal of fire detection and alarm equipment.
 5. Removal and disposal of communications equipment.
 6. Removal and disposal of lighting fixtures, ballasts and lamps.
 7. Recycling of lamps containing mercury.

1.03 QUALITY ASSURANCE

- A. Hazardous Material Disposal: Lamp recycling and PCB waste hauler shall meet the following minimum qualifications.
 1. The PCBs waste hauler shall have all Federal, state, and local permits for handling and transporting PCBs.
 2. The PCBs waste hauler shall be an EPA approved Commercial Storage Facility for PCBs Waste pursuant to 40 CFR 761.65(d).
 3. Contractor's process of ballast recycling shall be approved as an Alternative Disposal Method pursuant to 40 CFR 761.60(e).
 4. Contractor's workers who are handling PCBs materials shall have received 24 hour OSHA training pursuant to OSHA 1910 or HAZWOPER. All supervisors shall have received 40 hour OSHA training.
 5. Contractor and/or Contractor's Transporter shall have and implement a Spill Prevention Control and countermeasure (SPCC) Plan pursuant to 40 CFR 761.6 (c) (7)(ii).
- B. Referenced Standards: Execute the work in accordance with applicable provisions of Federal, State, local government laws, ordinances, reference codes. Governing laws, ordinances, codes, and standards constitute minimum requirements.

1.04 COORDINATION.

- A. Coordinate the demolition and rearrangement work of this section with other work of the Contract. Coordinate rearrangement of equipment with HVAC, and Plumbing equipment prior to installation.

PART 2 - PRODUCTS

2.01 CONTAINERS FOR HAZARDOUS WASTE

- A. Provide packing materials and related products required for collection, storage, and transportation of hazardous materials in compliance with Department of Environmental Protection (DEP), EPA, and U.S. Department of Transportation (DOT) requirements. Waste containers must meet or exceed the requirements of the DOT 49 Code of Federal Regulations (CFR) 173.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Demolition drawings are based on casual field observation and existing record documents. Verify that field measurements and circuiting arrangements are as shown on Drawings. Verify that abandoned wiring and equipment serve only abandoned facilities.
- B. Report discrepancies to Architect before disturbing existing installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Notification: Notify the Owner at least 24 hours in advance of shutting down electrical service, fire detection and alarm system, and telephone system.
- B. De-energize and disconnect electrical systems in walls, floors, and ceilings scheduled for removal.
- C. Maintain existing electrical service in operation until new system is complete and ready for service. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.
- D. Maintain existing fire alarm system in service until new system is accepted. Disable system only for switchovers and connections.
 - 1. Notify the Owner at least 24 hours before partially or completely disabling system.
 - 2. Provide temporary connections to maintain service in areas adjacent to work area.

3.03 SELECTIVE DEMOLITION

- A. General: Remove electrical devices such as panelboards, lighting fixtures, wiring devices, speakers, fire alarm devices, disconnect motors, etc., that are located on existing walls or partitions which are to be demolished. Remove exposed portions of the branch and signal circuit wiring and conduits, but maintain the continuity of existing circuits feeding devices that are to remain.
- B. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as required.

- C. Where existing walls, partitions, or ceilings are to remain, remove raceways, wiring devices, outlet boxes, etc., which are not to be reused. When approved by the Architect, existing outlet boxes and raceway systems may be left in place and reused, but in any case remove existing devices and wiring unless specifically indicated to remain.
- D. Remove abandoned electrical conduit and wiring to the facility source of supply (building bus duct, motor control center, load center, substation or power panel).
- E. Remove abandoned conduit, including conduit installed above accessible ceiling. Cut conduit flush with walls and floors and remove supports for abandoned conduit.
- F. Disconnect and remove abandoned outlets and devices.
- G. Remove receptacle branch circuit wiring back to the multi-circuit junction box, or remove back to the panel.
- H. Disconnect and remove abandoned transformers, panels, bus ducts, and other power distribution equipment.
- I. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
- J. Identification: Remove labels at the service source and replace with a label indicating "spare" where appropriate. Rewrite panel directories to indicate "spare" or "space" where appropriate.

3.04 HAZARDOUS MATERIALS

- A. Remove and check the ballast in each light fixture which is removed, to determine whether the light ballast contains PCB-containing capacitors. Light ballasts are imprinted with the words "No PCBs" on the label of the ballast if they do not contain PCBs. If the "No PCBs" wording is not observed on the ballasts, the Contractor shall assume that the ballasts contain PCB and they must be disposed of as hazardous waste.
- B. Remove and properly dispose of fluorescent light bulbs containing mercury. Handle and recycle the other lamps as universal waste.

3.05 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.06 CLEANING AND REPAIR

- A. Clean and repair existing materials and equipment which remain or are to be reused.
- B. Panels: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.
- C. Repair adjacent construction and finishes damaged during demolition and rearrangement work.

SECTION 26 05 00
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The Drawings and General Provisions of the Contract, including General and Supplementary General Conditions, and Division 01 General Requirements, apply to work specified in this Section.

1.02 SUMMARY

- A. Work Included: Electrical Subcontractor shall provide electrical work shown on the drawings and described in the specifications. Include all labor, materials, tools, equipment, transportation, supervision and incidental items essential for proper installation and operation. Electrical scope work includes E-Series drawings and the specifications for Division 26 and 28 sections.
- B. Provide electrical equipment coordination, sleeves and sleeve seals for raceways and cables, and common electrical installation requirements.
- C. Provide conduit and power wiring connections to Architectural, Civil, HVAC and Plumbing/Fire Protection equipment that is furnished under other Sections of the specifications and require electrical power.
- D. Connections to Architectural, HVAC, Plumbing and Owner-Furnished Equipment: Provide conduit connections to equipment provided under other Sections of the specifications as shown on the drawings, including final connections to equipment to result in a complete system, fully operational.
- E. Related Work Specified in Other Sections: Unless otherwise indicated, the following work is not included as work under this Section, except for coordination, and it is to be performed under other Divisions or by other entities.
 - 1. Firestopping of electrical penetrations: Division 7.
 - 2. Finish painting of electrical items: Div. 9
 - 3. Automatic temperature control and instrumentation systems, their components and interlock wiring associated with HVAC and Plumbing: Division 23.
 - 4. Installation of duct smoke detectors: Division 23.
 - 5. Temporary Electricity: Division 1.
 - 6. Motors for HVAC and Plumbing systems, and variable frequency drives: Furnished under Division 23, installed and power wired under Division 26.
- F. Pre-purchased Equipment: Equipment pre-purchased by the General Contractor on behalf of the Owner or by the Owner, if assigned to the Electrical Subcontractor, shall be received, installed, etc., as if the equipment was purchased by the Electrical Contractor. All guarantees, service contracts, etc., shall be same as for all other equipment provided under this Contract.
- G. Give necessary notices, obtain permits, pay governmental taxes, fees and other costs as required for the electrical work, and to file for necessary approvals with the jurisdiction under which the

work is to be performed. Obtain Certificate of Inspection for the electrical work; this certificate is a prerequisite to final acceptance of and final payment for the electrical work.

- H. Furnish for installation by other trades:
 - 1. Access panels required for access to electrical controls specified in this Section. Type of access panels to be furnished shall be as specified in Division 8.
 - 2. Metal counterflashing for electrical conduit which penetrates the roof.
- I. Commissioning: Refer to Section 01 81 20 "Integrated Deliverables and Testing(IDAT) " for scope of work and general requirements for the electrical systems commissioning. The Contractor responsibilities shall include but not limited to:
 - 1. Perform commissioning tests at the direction of the Commissioning Authority.
 - 2. Attend construction phase controls coordination meetings.
 - 3. Attend testing review and coordination meetings.
 - 4. Participate in the electrical systems equipment and component maintenance orientation and inspection as directed by the Commissioning Authority.
 - 5. Provide information requested by the Commissioning Authority for final commissioning documentation.
 - 6. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.

1.03 COORDINATION

- A. Coordinate arrangement, mounting, and support of electrical equipment:
 - 1. Allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 - 2. Provide for ease of equipment disconnecting with minimum interference to other installations.
 - 3. Allow right of way for piping and conduit installed at required slope.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed.
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 7 Section "Penetration Firestopping."

1.04 REFERENCED CODES AND INDUSTRY STANDARDS

- A. Materials and workmanship shall comply with all applicable Codes, Specifications, Local and State Ordinances, Industry Standards, and Utility Company Regulations, latest editions.
- B. The "Electrical Code" is the National Electrical Code, published by the National Fire Protection Association as NFPA-70.
- C. NFPA 72 National Fire Alarm Code.
- D. NFPA 101 The Life Safety Code.

- E. In case of conflict between the Contract Documents and the requirements of the Electrical Code or any other regulations or Authorities having jurisdiction, the most stringent requirements shall govern.
- F. Should the Electrical Contractor perform any work that does not comply with the requirements of the applicable Building Codes, State Laws, Local Ordinances, Industry Standards and Utility Company Regulations, the Electrical Contractor shall bear all costs arising in correcting the deficiencies, as approved by the Architect and the Owner.
- G. Provide materials, equipment and execute the work, including test and inspections, per applicable provisions of Federal, State and Local government laws and ordinances and referenced codes and standards. Governing laws, ordinances, codes and standards constitute minimum requirements.

1.05 DESIGN AND PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Furnish and install electrical equipment to resist seismic forces in accordance with the referenced Building code.
- B. Seismic restraint shall be provided for the electrical equipment such as switchboards, panels, transformers, generators, conduits, cable trays and lighting fixtures.
 - 1. Shop drawings, certified by a professional engineer, shall be provided for the seismic restraints. The shop drawings shall include details for restraints' fabrication and installation including anchorages and attachments to the structure.
- C. Manufacturer of the seismic control products shall have the following responsibilities.
 - 1. Determine seismic restraint sizes, type and locations.
 - 2. Provide equipment seismic restraints.
 - 3. Provide installation instructions, drawings and field supervision to insure proper installation and performance.
 - 4. Certify seismic restraint design and installation upon completion of work.
 - 5. Seismic control products manufacturer: Mason Berger Northeast or equal.

1.06 SUBMITTALS

- A. Product Data and Shop Drawings: For each type of material and system listed in this article in the various sections, submit manufacturer's illustrated product literature, with item and options which are proposed clearly marked, and submit manufacturer's technical specifications, preparation and installation instructions. Submit additional pertinent data as required by the Architect for evaluation of the product.
- B. Data submitted including wiring diagrams shall be complete for all equipment and shall apply only to this specific project.
- C. It is intended that Submittal data be complete and accurate at the first submission. If the Submittal is returned marked "Resubmit" only one additional submission will be permitted.
- D. Regardless of any information included in the submittals, the requirements of the Drawings and Specification shall not be superseded in any way by the review. Review by the Architect does not relieve responsibility for submittal errors or from meeting the requirements of the Contract Documents.

- E. Record Drawings: Comply with requirements for record drawings specified in Section 01 77 00 "Closeout Procedures."
- F. Operation and Maintenance Manual: Submit the required typed sets, bound neatly in loose-leaf binders, of instructions for the installation, operation, care and maintenance of all equipment and systems (including instructions for the ordering and stocking of spare parts for all equipment installed under this Contract), as specified in Section 01 77 00 "Closeout Procedures." The list shall include manufacturer's guarantee and warranty data.
- G. Comply with USM IDAT specified in Section 01 81 20.

1.07 QUALITY ASSURANCE

- A. Manufacturers: Companies specializing in manufacturing the products specified; demonstrate a minimum 3 years documented experience
- B. Installers: Companies which have been specializing in performing work of the type specified for at least three years. Foreman shall have at least 5 years experience.
- C. Pre-Installation Conference: Conduct conference at Project site to comply with requirements of Section 01310, "Project Management and Coordination." At least 30 days prior to start of the installation of work included in this specification, conduct a meeting to review the proposed hanging and support of work from the building structure and to discuss the required details, methods and procedures to achieve the required support. Review requirements for submittals including details for hanging or supporting the work, and the coordination of the work with other trades. Establish preliminary work progress schedule, procedures for coordination, and Contractor's quality control procedures.
 - 1. Require representatives of each trade or entity directly concerned with hanging and supporting work from the building structure attend the conference, including, but not limited to, the following:
 - a. Contractor's Superintendent.
 - b. Contractor's representative responsible for field quality control.
 - c. Representative from each trade.
 - 2. Notify the Architect and the Owner's representative at least 48 hours in advance of the meeting so that they may attend.

1.08 PROJECT/SITE CONDITIONS

- A. Field Measurements: Make necessary field measurements to ascertain space requirements, for electrical equipment and connections, and to furnish such sizes and shapes of equipment to allow for the final installation to conform to the drawings and specifications.
- B. Comply with manufacturer's directions regarding environmental conditions during installation of electrical equipment. Promptly notify the Architect in writing of any conflict between any requirements of the Contract Documents and the manufacturer's directions.

1.09 COORDINATION

- A. Coordinate electrical work with work of other trades, so that work will be completed without interruption. This shall include all adjustments necessary to conform to structural and architectural conditions.
- B. Connections to Architectural, HVAC, Plumbing and Owner-Furnished Equipment: Obtain installation diagrams and methods of installation of all equipment, from manufacturers. Follow instructions strictly. If additional information is required, obtain from the Architect.
- C. Changes in construction required for coordination, which deviate from the intent or requirements of the specifications and/or drawings, must be described and detailed in writing and submitted to the Architect for approval.
- D. The Contract Drawings are intended to show general runs and locations of conduit, equipment, terminals and specialties and not necessarily showing all required offsets, details and accessories and equipment to be connected. The work shall, therefore, be installed to fulfill the intent expressed on the Electrical Drawings, but in conformity with the dimensions indicated on the final working drawings, field layouts, and shop drawings of all trades. Lay out work accurately in coordination with other Trades to avoid conflicts in placement of the conduits, boxes, electrical panels, motor starters, disconnect switches, lighting fixtures, wiring devices, etc., and to obtain a neat installation which will afford maximum accessibility for operation, maintenance and headroom. In case of conflict between conduit sizes shown on plans, details or diagrams, allow for the largest conduit size.
- E. Require trades providing openings (except core drilling) to coordinate dimensions with actual dimensions of equipment furnished under this section. Furnish to other trades requiring them, dimensions, templates, bolts, and anchors for support or attachment of electrical work.

1.10 DELIVERY, STORAGE AND HANDLING

- A. Acceptance at the Site: Upon receipt, inspect electrical equipment (including switchboards, motor control centers, emergency generator, and other capital equipment) in accordance with the manufacturer's instructions.
 - 1. Do not install equipment until all defects detected during inspection have been corrected.
 - 2. Acceptance of electrical equipment shall not be considered to be final until the equipment is installed and the Electrical Inspector, the Architect, and the Owner's Representative inspect the installation and witness a successful demonstration of equipment performance and operation.
- B. Deliver materials and equipment to the site and store in original sealed containers, suitably sheltered from the elements, but readily accessible for inspection by the Owner's representative and Architect until installed. Store items which may be subject to moisture damage, such as controls, in spaces which are dry and heated. Tightly cover materials and equipment and protect it against dirt, water, and chemical or mechanical injury and theft.
- C. Provide adequate locked storage space for the materials, be responsible for materials after receipt from the supplier, and replace materials lost or damaged after delivery.
- D. Follow manufacturer's directions regarding the delivery, storage and protection of electrical equipment.

1.11 WARRANTY

- A. Attention is directed to the General Requirements of the Contract regarding guarantees warranties for work under this Contract.
- B. Submit manufacturers' standard warranties for equipment furnished under work specified in this section. However, such warranties shall be in addition to and not in lieu of other rights and remedies which the Owner may have by law or by other provisions of the Contract Documents.
- C. Electrical Subcontractor's Guarantee: As a pre-requisite to final payment, provide a written guarantee, executed by the Electrical Contractor, stating that:
 - 1. All elements of the systems provided under the Electrical Contract meet performance requirements specified in this section or shown or implied by the drawings.
 - 2. Upon receipt of notice from the General Contractor or the Owner of failure of any part of the systems or equipment during the guarantee period, the Electrical Subcontractor will promptly return to the site and repair or replace the affected part or parts and make good the Electrical Work.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Furnish products by one of the named manufacturers, or submit a formal, written request for Substitution in accordance with procedures described in Division 1.
 - 1. If a substitution is accepted by the Architect, provide redesign of electrical and mechanical work which is required to accommodate the substituted product, subject to approval by Architect.
- B. Furnish all equipment of one type from a single manufacturer.

2.02 MATERIALS, GENERAL

- A. Material and equipment shall meet requirements of the latest Standards of NEMA, UL, ICEA, ANSI and IEEE.
- B. Colors: When shop-finished equipment is exposed to view in public areas (areas other than electrical or mechanical rooms), Architect will select color from equipment manufacturer's standard color options.
- C. Corrosion Resistance: When material or equipment is exposed to corrosive environment, such as in a fabrication area, or a waste treatment plant, or a swimming pool environment, use corrosion-resistant materials and corrosion-resistant finish approved by Architect.

2.03 MISCELLANEOUS MATERIALS

- A. Access Panels: Furnish panels specified in Division 8.
- B. Conduit Sleeves:
 - 1. Sleeves through unrated walls and floors: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel.

2. Sleeves through fire-rated partitions and floors: 10 gauge galvanized steel.
- C. Steel Channels (for equipment supports): Mild steel channels as manufactured by Unistrut, Kindorf or Husky Products Company; equal to Unistrut "P1000."
- D. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, non-corrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Relocate or reroute existing equipment and systems to accommodate new work or new connections, as indicated on the drawings and in the specification Section 26 03 00, as required by job conditions, and as determined by the Architect in the field.
- B. Maintain existing electrical systems in continuous operation during demolition and construction. Consult with Owner's representative and schedule necessary outages at a mutually agreeable time, and obtain Owner's approval before shutting off any service. Limit duration of outages to the shortest practical period of time, and promptly restore service after tie in is made, or at the end of the agreed-upon time period. Repeat this procedure as many times as required to suit the Owner's working schedule until all work is completed.
- C. The Owner reserves the right to inspect the material scheduled for removal and salvage any items he deems usable as spare parts.

3.02 GENERAL INSTALLATION REQUIREMENTS

- A. Coordination: Coordinate electrical work with general conditions work and with other Contractors working at the site. The Owner will not reimburse the Contractor for overtime hours worked or additional costs incurred due to lack of or improper coordination with other Trades.
- B. Protect electrical equipment from damage during construction, including protection from moisture and contamination.
- C. Prior to installation, coordinate the exact mounting arrangement and location of equipment indicated on the drawings to allow proper space requirements as indicated in the Electrical Code. Pay particular attention in the field to group installations. If it is questionable that sufficient space, conflict with the work of other Contractors, architectural or structural obstructions will result in an arrangement which will prevent proper access, operation or maintenance of the indicated equipment, the Electrical Contractor shall immediately notify the Architect and not proceed with this part of the Contract work until definite instructions have been given to him by the Architect.
- D. Arrange for chases, slots and openings in other building components during progress of construction, to allow for electrical installations.

- E. Equipment Supports: Provide adequate supports wherever required, whether or not indicated. Fabricate supports from steel channels 1-5/8 inch minimum width, 0.105 inch minimum wall thickness. Use larger size or gauge if required to support weight.
- F. Do not allow equipment or piping foreign to the electrical installation to be installed or pass through electric rooms, electric closets, telephone or data closets, except as approved by the Architect.
- G. Arrange for chases, slots and openings in other building components during progress of construction, to allow for electrical installations.
- G. Comply with NECA 1.

3.03 TEMPORARY POWER AND LIGHTING

- A. Connect to existing services in the existing building, and provide grounded electric power distribution for the use of all trades on the site. Include transformers, overload protected disconnects, automatic ground-fault interrupters and distribution switch gear as required.
 - 1. Furnish and install temporary equipment and wiring for power and lighting in accordance with the referenced Electrical Code. Maintain temporary installations in a safe manner. Control use of power to prevent overloading of equipment and lines.
 - 2. Owner will pay for electrical power for construction; metering is not required.
- B. Illumination: Provide temporary lighting sufficient to provide at least 0.5 watt per square foot of floor area throughout the building. Install sufficient wiring, lamps, and outlets to insure proper lighting in all rooms, spaces, stairwells, and corridors. Minimum sized lamp used shall be 100 watt. Where higher lighting intensities are required by Federal or State laws or regulations, or are otherwise specified, increase wattage to provide these increased intensities.
 - 1. In addition, when finishes such as gypsum board and paint are being installed, provide lighting in the work areas equal in illumination to the permanent lighting indicated for these areas, as verified by the Owner's Project Representative; such temporary lighting shall be maintained until the Architect has inspected and accepted the finished Work.
- C. Provide transformers, meters, cables, panelboards, switches, temporary lamp replacements and accessories required for the temporary light and power installation.
- D. Provide and maintain on each floor of the building, a feeder or feeders of sufficient capacity for the requirements of the entire floor and shall provide a sufficient number of outlets, located at convenient points, so that extension cords of not over 50 ft. in length will reach all work requiring temporary light or power.
- E. Install and maintain the wiring and accessories for the offices of the Contractor and the Owner's Project Representative. Requirements for the trailer for the Owner's Project Representative are specified in Division 1 of these Specifications.
- F. Temporary electrical work shall meet the requirements of the Referenced Electrical Code, Article 590, "Temporary Installations", and the requirements of the Local Utility Company and applicable Federal Standards and Laws.
- G. Remove temporary wiring and accessories after their purposes have been served.

- H. Just prior to the inspection at the time of Substantial Completion, replace all burned out lamps installed in permanent lighting fixtures and used for lighting during construction.
- I. Provide temporary lighting and power required above during the normal working hours of the project or a total of 10 hours per normal working day. The 10 hours per day shall include manning the temporary power and lighting 1/2 hour before and 1/2 hour after a normal 8 hour working day. In addition, provide and maintain, to the satisfaction of the local authorities having jurisdiction, temporary lighting and power that may be required for safety purposes.
 - 1. The General Contractor shall compensate the Electrical Subcontractor for additional time, materials or equipment required by the General Contractor or other Subcontractors beyond the normal working hours, as defined above.

3.04 CORING AND SLEEVES

- A. Electrical Contractor shall be responsible for all core drilling required for his work, but in no case shall the Contractor cut into any structural elements without the written approval of the Architect. Refer to Division 1 section "Cutting and Patching", for a delineation of the responsibilities of the Electrical Contractor and the General Contractor with respect to coring, cutting, and patching.
- B. Where conduits pass through masonry or concrete walls, foundations, or floors, set such sleeves as are necessary for passage of the conduits. Sleeves shall be of sufficient size to provide air space around the conduit passing through. Electrical Contractor shall be responsible for the exact location of sleeves provided under this Contract.
- C. Do not install sleeves or inserts in any portions of the building where their use would impair strength or construction features of the building. Elimination of sleeves must be approved by Architect.
- D. Conduit sleeves:
 - 1. Use sleeve at least 2 inches larger in diameter than the conduit passing through it.
 - 2. Set sleeves securely in place before concrete is poured.
 - 3. Set sleeves 1 inch above finish floor and flush on each side of walls, except sleeves through floor occurring in walls and partitions shall terminate flush with finish floor.

3.05 CLEANING, TOUCH-UP AND REPAIR

- A. Remove waste materials from the premises promptly as the work progresses.
- B. At the completion of the work, thoroughly clean and polish equipment and materials installed under this section. Turn the electrical work over to the Owner in a condition satisfactory to the Architect.
- C. Touch-up damaged finishes on equipment; use same paint as applied in the shop and prepare surfaces and apply paint in accordance with paint manufacturers instructions.
- D. Repair damage which electrical work causes to the work of other Trades. Contractor may charge such repairs to the electrical subcontractor.

3.06 DEMONSTRATION

- A. Instruct the Owner's representative in the proper operation of all systems and equipment provided, prior to the final acceptance of his work. Make arrangements with the Owner, who will designate the person or persons who will be instructed in the operation of the basic and auxiliary electrical systems. The Owner shall be satisfied that instruction has been thorough and complete before final payment is made, or the Electrical Contractor shall provide additional instruction.

3.07 TESTING AND INSPECTION

- A. Test and inspect all parts of the work provided under this Contract, and as required by codes, standards or authorities having jurisdiction. Conduct all tests and inspections to the complete satisfaction of the Architect and the authorities. Notify the Architect and the authorities at least 48 hours prior to testing or inspection. Do not cover work prior to testing or inspection.
- B. All systems shall test free from short circuits and grounds, shall be free from mechanical and electrical defects, and shall show an insulation resistance between phase conductors and ground of not less than the values recommended by the manufacturers.
- C. Promptly correct failures and defects in workmanship or materials revealed by tests or inspection, and retest. Replace defective material at no additional expense to the Owner.
- D. Prepare systems for testing and protect from damage during testing. Provide all temporary connections, necessary testing equipment, labor and materials, required for the testing of the systems and equipment.
- E. Verify and correct as necessary the following: Voltages, tap settings, trip settings, and phasing on all equipment from the secondary distribution system to points of utilization. Test secondary voltages at the bus in the main switchboard, at panelboards, and at such other locations on the distribution systems as necessary. Test secondary voltages under no-load and full-load conditions.
- F. Comply with USM IDAT specified in Section 01 81 20.

3.08 CERTIFICATES OF APPROVAL

- A. Upon completion of the work, and as a condition to receiving payment at Substantial Completion, furnish to the Architect the following signed certificates and include the copies of these certificates in the Operation and Maintenance manuals:
 - 1. Certificate from the Electrical Contractor stating that all electrical systems have been installed, tested and inspected in compliance with the Contract Documents, applicable codes and referenced standards. Where the subcontractors perform a portion of the work of this Section, include the certificates from them.
 - 2. Certification from the manufacturers authorized representatives confirming that respective equipment has been installed and tested in accordance with the manufacturer's requirements, and equipment is in satisfactory operating condition. This certification shall be provided for the equipment where services of the manufacturer's representative are required by the specification.
 - 3. Certification of inspection from the appropriate inspectional authorities stating that all portions of the work have been inspected and are installed in conformance with the

applicable codes and standards. Provide written evidence of all exceptions or variances given by any Inspector.

END OF SECTION 26 05 00

SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The Drawings and General Provisions of the Contract, including General and Supplementary General Conditions, and Division 01 General Requirements, apply to work specified in this Section.

1.02 SUMMARY

- A. This Section includes furnishing, installation and termination of the conductors required for power feeders, branch circuits, control wiring, fire alarm system, and other auxiliary systems shown on the drawings and/or included in the Specification, rated 600 volts and below.
- B. Installation includes placement, splicing, terminating conductors (including spare conductors), identification, testing, and verification of each circuit, cable, and conductor. Termination includes attaching each conductor in its designated location using the specified materials, and insulating the entire connection where specified or required by the application.
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.
 - 3. Low tension control wiring.
 - 4. Electric heat tracing cables.
 - 5. Mineral-insulated (MI) cables.
- C. Related Sections include the following:
 - 1. Division 28 Section "Fire Alarm System" for cabling used for fire alarm circuits.
 - 2. Division 23 "HVAC Instrumentation and Control" includes electric control systems for HVAC equipment, furnishing and installation of control wiring between field installed devices, including motor starters, control panels, control and pilot devices, thermostats, relays, pressure and float switches and similar appurtenances. The work specified in Section 23 shall be performed in accordance with applicable provisions of this section.

1.03 SUBMITTALS

- A. Product Data: Technical specification and literature for each type of product provided on the project.
- B. Field quality control test reports.

1.04 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in referenced Electrical Code, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

- C. Comply with Underwriter's Laboratories (UL) standards:
 1. UL 4: Armored Cable.
 2. UL 62: Flexible Cord and Fixture Wire.
 3. UL 83: Thermoplastic-Insulated Wires and Cables.
 4. UL 486A: Wire Connectors and Soldering Lugs for Use with Copper Conductors.
 5. UL1569: Metal -Clad Cables.
- D. Comply with NEMA WC-5: Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

1.05 COORDINATION

- A. Set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Feeder and branch circuit conductors:
 1. Southwire
 2. American Insulated Wire Corp.
 3. Pirelli Cable Corp.
 4. General Cable Corporation.
 5. Rome Cable
- B. MC Cable:
 1. AFC.
 2. Alliance Cable.
 3. Alcatel.
 4. Cablec Corporation.
 5. Alflex.
- C. Low Tension Cable:
 1. Belden.
 2. Cablex, Inc.
 3. West Penn Wire Corp.
- D. Lugs and Wire Connectors:
 1. Buchanan
 2. Ideal
 3. Burndy
 4. Thomas and Betts.
 5. O-Z/Gedney.
 6. 3M Electrical Products Division.

2.02 CONDUCTORS AND CABLES

- A. Conductors: Copper wire, soft drawn, annealed, 98% conductivity, rated at 600 volts, and complying with reference Electrical Code. Minimum size # 12 AWG for the power circuits.

- B. Conductor Insulation:
 1. Conductors in raceways: Types THHN, THWN or XHHW, 90 degree C dry locations and 75 degree C wet locations. Ampacity of the conductors shall be based on a 75 deg.C. insulation level.
 2. Conductors within lighting fixtures: Insulation for maximum operating temperature 150°C.
- C. Metal Clad Cable (Type MC): 600 volt copper conductors with THWN-THHN insulation and full size insulated green jacket grounding conductor.
- D. Low Tension Wiring:
 1. Fire Alarm, Class 1 and Class 2 Control System Wiring: Solid copper wire, single conductors, rated 600 volts.
 2. Conductor Size: Circuits at 120 volt AC: Minimum #14 AWG conductors, types THHN or THWN.
 3. Circuits at 24 volt AC or DC: Minimum size as required by the system manufacturer.
 4. Fire alarm wiring: Metal clad cable (Type MC) approved for fire-protective signaling circuits, where it is allowed.

2.03 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.
- B. For copper wire No 14 through No. 8 AWG, solid or stranded, furnish screw-on pressure type connectors incorporating zinc-coated spring and insulating vinyl jacket with skirt.
- C. For copper wire No. 6 AWG and larger, furnish bolt-on mechanical lugs with hex socket screws.

2.04 ACCESSORIES

- A. Cable Ties: Furnish one of the following, or equal:
 1. Thomas & Betts "Ty-Raps"
 2. Holub Industries, Inc., "Quick-Wrap"
 3. Burndy "Unirap"
- B. Electrical Tape: Vinyl plastic, weatherproof electrical tape; 3M "Scotchbrand No. 88" or equal by Permacel or Plymouth Company.
- C. Cable Supports for Metallic Sheathed Cable: Basket weave or other supports approved by cable manufacturer; O.Z./Gedney or approved equal

2.05 COLOR CODING

- A. Feeders and branch circuits:
 1. Use following color coding:

Phase	208/120 Volts	480/277 Volts
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Grey

- | | | | |
|--|--------|-------|-------|
| | Ground | Green | Green |
|--|--------|-------|-------|
2. Conductors #8 AWG or smaller: Continuous color coding.
 3. Conductors # 6 AWG and larger: Provide continuous color coding or mark with colored tape at connections.
- B. Low Tension Conductors: Color code as required by each system manufacturer.

PART 3 - EXECUTION

3.01 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders and Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.02 CONDUCTOR INSULATION AND CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type XHHW, single conductors in raceway.
- B. Feeders Exposed or Concealed in Ceilings, Walls, and Partitions: Type THHN, THWN or XHHW in dry locations, and Type THWN or XHHW in wet locations, single conductors in raceway.
- C. Branch Circuits Exposed: Type THHN or THWN in dry locations, and Type THWN in wet locations, single conductors in raceway.
- D. Branch Circuits Concealed in Ceilings, Walls, and Partitions: In dry locations -Type THHN, THWN, single conductors in raceway or Metal-clad cable, Type MC.
- E. Branch Circuits below Slabs-on-Grade and Underground: Type THWN or XHHW, single conductors in raceway.
- F. Low Tension Wiring: Fire alarm wiring: In the conduits or metal clad cable (Type MC) approved for fire-protective signaling circuits where is allowed by the Code.

3.03 INSTALLATION OF CONDUCTORS AND CABLES

- A. Install all power and 120 volt control wire and cable in approved raceways and as approved by Authorities Having Jurisdiction. When low tension wiring is run exposed, install it in conduit. Plenum rated low tension cable may be used for installation above suspended ceilings where it is allowed by the Code and is allowed in the specification for the specific system.
- B. Wire Size:
 1. Install minimum No. 12 AWG for power and lighting circuits.
 2. Install minimum No. 10 AWG for 120 volt 20 ampere branch circuits of 75 feet to 150 feet, and minimum No. 8 AWG for the circuits of 150 feet to 250 feet unless otherwise shown on the drawings or required by the equipment shop drawings.
 3. Install minimum No. 10 AWG for 277 volt 20 ampere branch circuits of more than 150 feet unless otherwise shown on the drawings.

- C. Metal clad cable type MC may be used for branch circuit wiring above suspended ceilings and for device wiring in the metal stud partitions. MC cable shall not be used for branch circuit homeruns or run exposed.
- D. Bundle conductors #10 and smaller in branch circuit panelboards, signal cabinets, signal control boards in switchboards and motor control centers.
- E. Homerun Circuits:
 - 1. Follow homerun circuit numbers shown on the drawings to connect circuits to the panelboards. Where homerun circuit numbers are not shown on the drawings, divide similar types of connected loads among phase busses so that currents in each phase are within 10% of each other during normal usage.
 - 2. Wire multi-wire branch circuit homerun with two or three single phase and common neutral conductors to a panel in a such manner that each phase circuit is fed from the adjacent circuit breakers. Do not combine circuits so that any homerun has more than three circuits (total of five wires) installed in one conduit, unless the circuit conductors are de-rated in strict accordance with the referenced Electrical Code.
- F. Properly group feeders, branch circuit and auxiliary system wiring passing through pull boxes and/or being made up in panelboards; neatly bind each group of wires together with plastic cable ties, and trim loose ends of the ties.
- G. Peel branch circuits and auxiliary system wiring out of the wiring gutters at the terminal cabinet and panels at 90 degrees to circuit breakers and terminal lugs before making connections.
- H. Color code conductors No. 6 AWG and larger by applying colored plastic tape at ends and where connections and splices are made. Wrap tape around the conductor three complete turns.
- I. Splices and Terminations:
 - 1. Make splices and joints by means of UL-listed, solderless connectors rated 600 volt, of sizes and types required by manufacturer's recommendations, with temperature ratings equal to that of wire.
 - 2. Attach copper wire to panelboards, switchboards, disconnect switches and other electrical equipment by means of bolt-on lugs with hex screws. Properly size lugs; do not cut strands from a conductor in order to fit conductor into a lug.
 - 3. Connectors for cables 250 MCM and larger shall have two clamping elements and terminals for bus connections shall have two bolt holes.
- J. Identification: Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems." Label feeder and branch circuits in pull and junction boxes, handholes and at cable terminations in the panelboards, motor control centers, and switchboards. Use non-ferrous tags or labels stamped or printed to correspond with markings on the drawings or marked so that feeder or cable may be identified readily. If suspended tags are provided, attach with nylon line or cable lacing.
- K. Connect branch circuits to the breakers in multi-phase panelboards as required to balance loads.
- L. Low Tension Cables: Provide separation from power wiring and lighting fixtures as follows:
 - 1. Lighting fixtures - at least 6 inches.
 - 2. Power branch circuit wiring with MC type cable - at least 12 inches.
 - 3. Power branch circuit wiring in metal conduit - at least 6 inches.

- M. When cables are not in conduit or trays, support cables from the deck and/or beams, spacing supports no farther apart than 6'-0" on center. Provide hangers, clips or other approved method of grouping the cables and keeping them away from other systems. Take care to ensure that ties, clips and other support devices do not compress the cable or damage cable insulation; use J-hooks whenever possible.
- N. Cable Supports:
 - 1. Support and secure metal-clad cable Type MC at intervals not exceeding 6 feet and within 12 inches from every outlet box, junction box or cabinet.
 - 2. Support metal clad cable Type MC with cable supports equal to Caddy WMX-6, MX-3, and clamps equal to Caddy 449. Where cables are supported by the structure and only need securing in place, then cable ties will be acceptable.
- O. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- P. 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.
- Q. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- R. For wiring in high temperature areas or high temperature equipment (i.e. boiler rooms, water heaters/boosters, etc.), furnish conductors for 90°C dry and wet rating.

3.04 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.
- 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.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.05 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."

3.06 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections: After installing conductors and cables and before electrical circuitry has been energized, perform insulation-resistance test on each power conductor with respect to ground and adjacent conductors. Applied potential to be 1,000 volts dc for one minute. Perform continuity test to insure correct cable connection. Minimum insulation-resistance values shall be not less than 50-megohms.

- 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.

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

1.01 PROVISIONS INCLUDED

- A. The Drawings and General Provisions of the Contract, including General and Supplementary General Conditions, and Division 01 General Requirements, apply to work specified in this Section.

1.02 SUMMARY

- A. This Section includes methods and materials for furnishing and installation of the solid grounding system for protection of life, equipment and circuits, including all bus bars, cable, ground rods, clamps, connectors, bolts

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Informational Submittals: Plans showing dimensioned as-built locations of grounding features.
- C. Field quality-control test reports.
- D. Operation and Maintenance Manuals:
 - 1. Instructions for periodic testing and inspection of grounding features.
 - a. Tests shall be to determine if ground resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if they do not.
 - b. Include recommended testing intervals.

1.04 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in the referenced Electrical Code, 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.
- C. Comply with IEEE 142, Recommended Practice for Grounding of Industrial and Commercial Power Systems.
- D. Comply with NFPA 70.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by the following:
 - 1. Erico Products, Inc.
 - 2. O-Z/Gedney Co.

3. Thomas & Betts Corp.
4. Ideal Industries, Inc.

2.02 CONDUCTORS

- A. Insulated Conductors: Soft drawn, Class B stranded copper with green polyvinyl chloride insulation jacket, insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Grounding Bus: Rectangular bars of soft copper, cross not less than 1/4 inch thick by 2 inch wide, ASTM B 187, unless otherwise indicated; with the insulators.

2.03 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. Hardware: Clamps, connectors, bolts, washers, nuts, and other hardware used with the grounding system shall be high-strength, high conductivity copper or copper alloy, bolted pressure-type, with at least two bolts.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

PART 3 - EXECUTION

3.01 APPLICATIONS

- A. System shall comply with Article 250 of the referenced electrical code, modified as shown on the drawings and as specified.
- B. Equipment grounding system shall be installed so the metallic structures, enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, portable equipment and other conductive items in proximity to electrical circuits operate continuously at ground potential and provide low impedance path for possible ground fault currents.

3.02 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

- A. Comply with IEEE C2 grounding requirements.

3.03 EQUIPMENT GROUNDING

- A. Provide separate green insulated equipment grounding conductor for each single or three-phase feeder and each branch circuit. Install grounding conductor in common conduit with related phase or neutral conductors, or both. Parallel feeders installed in more than one raceway shall have individual full size green insulated equipment ground conductors in each.
- B. Install insulated equipment grounding conductors with the following items:
 1. Feeders and branch circuits.

2. Lighting circuits. From panelboard grounding bus to a machine screw in ceiling outlet box, through flexible conduit to ground terminal on lighting fixtures. From a machine screw in ceiling outlet box through flexible conduit to a machine screw in switch outlet box
 3. Receptacle circuits. From ground terminals of the receptacles to a machine screw in an outlet box, and to panelboard grounding bus.
 4. Single-phase motor and appliance branch circuits.
 5. Three-phase motor and appliance branch circuits.
 6. Flexible raceway runs.
 7. Armored and metal-clad cable runs.
 8. Ground conductors for motors with the separate starters and disconnect devices shall originate at grounding bus in panelboard and shall be bonded to each starter and disconnect device enclosure.
 9. Panelboards: Install insulated equipment grounding conductor from grounding bus in the switchboard to a ground bus in all downstream distribution, power and lighting panels.
- C. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
- D. Water Heater: Install a separate insulated equipment grounding conductor to each electric water heater. Bond conductor to heater units, piping, connected equipment, and components.
- E. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.
- F. Conduit Grounding: All grounding bushings within all enclosures, including equipment enclosures, shall be bonded together and connected internally to the enclosure grounding lug or grounding bus with a bare copper conductor. Grounding bushings shall be grounded with conductors sizes in accordance with the referenced Electrical Code, but not smaller than 12 AWG.
- G. Nonmetallic Raceways: Install an insulated equipment grounding conductor in non-metallic raceways.
- H. Signal and Communication: For telephone, alarm and communication systems, provide a No. 6 AWG minimum insulated copper conductor in raceway from the grounding electrode system to each terminal cabinet and central equipment location.

3.04 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. Ground Rods: Drive rods until tops at least 6 inches below finished floor or final grade, unless otherwise indicated. Interconnect ground rods with grounding electrode conductor below grade.

3.05 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections and prepare test reports:
 - 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with the requirements.
 - 2. Measure ground resistance level at the service disconnect grounding terminal.
 - 3. Make tests at ground rods before any conductors are connected
 - a. Measure ground resistance in dry weather, and without soil being moistened by any means other than natural drainage.
 - b. Perform tests by fall-of-potential method according to IEEE 81.

SECTION 26 05 29
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The Drawings and General Provisions of the Contract, including General and Supplementary General Conditions, and Division 01 General Requirements, apply to work specified in this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.
 - 2. Vibration and seismic controls for electrical equipment and systems.

1.03 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Shop drawings, certified by a professional engineer, shall be provided for the seismic restraints. The shop drawings shall include details for restraints' fabrication and installation including anchorage and attachments to the structure.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.04 SUBMITTALS

- A. Product Data: For each type of hanger or support furnished under this Section. Indicate materials, gauges, and methods of attachment.
 - 1. Steel slotted support systems.
 - 2. Hanger rods.
 - 3. Pipe clamps.
 - 4. Bracket supports.
 - 5. Concrete anchors.
 - 6. Vibration mounts.
- B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:

1. Trapeze hangers. Include Product Data for components.

PART 2 - PRODUCTS

2.01 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Hot-dip galvanized, comply with MFMA-4, factory-fabricated components for field assembly. Fittings and clips for construction of exterior supports.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line.
 - c. GS Metals Corp.
 - d. Thomas & Betts Corporation.
 - e. Unistrut.
 2. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Galvanized steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. 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 concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Hilti Inc.
 - 2) ITW Ramset/Red Head.
 - 3) MKT Fastening.
 - 4) Simpson Strong-Tie Co.
 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used. Stainless steel type in corrosive environment.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Empire Tool and Manufacturing Co.
 - 2) Hilti Inc.
 - 3) ITW Ramset/Red Head.
 - 4) MKT Fastening, LLC.
 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: Galvanized threaded steel, at least 3/8 inch diameter or larger if required to support loads.

2.02 SEISMIC REQUIREMENTS

- A. Seismic Performance: Furnish and install electrical equipment to resist seismic forces in accordance with referenced Building code.
- B. Seismic restraint shall be provided for the electrical equipment such as, panels, conduits, cable trays and lighting fixtures.
- C. Manufacturer of the seismic control products shall have the following responsibilities.
 1. Determine seismic restraint sizes, type and locations.
 2. Provide equipment seismic restraints.
 3. Provide installation instructions, drawings and field supervision to insure proper installation and performance.
 1. Certify seismic restraint design and installation upon completion of work.
- C. Seismic control products manufacturers:
 1. Ace Mountings Co., Inc.
 2. Isolation Technology, Inc.
 3. Mason Industries.
 4. Vibration Eliminator Co., Inc.
 5. Vibration Mountings & Controls, Inc.

2.03 VIBRATION ISOLATORS

- A. Vibration Isolation Type DNP (Double Neoprene Pad)
 1. Neoprene pad isolators shall be formed by two layers of 1/4 inch to 5/16 inch thick ribbed or waffled neoprene, separated by a stainless steel or aluminum plate. These layers shall be permanently adhered together. The pads shall be sized so that they will be loaded within the manufacturer's recommended range.
 2. Manufacturers: Vibration Mountings and Controls, Inc.- Series Shear Flex, Mason Industries- type WSW, Amber/Booth – type NR, or equal.
- B. Vibration Isolation Type HN (Hanger Neoprene)
 1. Vibration isolation hangers shall consist of neoprene-in-shear or glass fiber element contained in steel housing. Neoprene neck bushing shall be provided where the hanger rod passes through the hanger housing to prevent the rod from contacting the hanger housing. The diameter of the hole in the housing shall be sufficient to permit the hanger rod to swing through a 30 degree arc before contacting the hanger housing.
 2. Manufacturers: Vibration Mountings and Controls, Inc.- type RHD or RFD, Mason Industries- type HD, Amber/Booth – type BRD-A, or equal.

PART 3 - EXECUTION

3.01 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by referenced Electrical Code. .
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so a capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
- D. Conduit Supports:
 - 1. Conduits in single runs or groups of two: Support by means of one-hole cast metal clamps and clamp backs.
 - 2. Banks of three more conduits: Construct racks from steel support channels, channel fittings, and thermoplastic fasteners with associated conduit or tubing clips.
 - 3. For support of conduit exposed to exterior, use hot-dip galvanized channels and fittings and hot-dip galvanized, stainless steel, or other non-corroding fasteners.
- E. Cabinet and Box Supports: Field fabricate mounting racks from steel support channels and fittings. Fabricate racks for use outdoors from hot-dip galvanized support channels, fittings and fastening hardware.
- F. Supports for Conduit and Equipment in Corrosive Areas: In areas designated on the drawings as "corrosive," field-fabricate racks from fiberglass support channels and channel fittings, and thermoplastic fastening hardware.
 - 1. Provide free-standing or wall-mounted equipment racks as indicated on the drawings.
 - 2. Secure free-standing racks to the floor or slab using stainless steel expansion anchors and hardware.
 - 3. Rigidly mount wall-mounted equipment and cabinets; fasten to concrete and masonry with stainless steel expansion anchors and fastening hardware.

3.02 SUPPORT INSTALLATION

- A. Attachment to Roof Joists: Attach hangers to the top chord or bottom chord panel point or panel point provided by applying a vertical web member. The maximum load shall be as allowed by the structural drawings and specification.
- B. Attachment to Beams: Attach hangers to beams with clamp attachments which engage both edges of the beam flange. Locate the hanger directly below the web of the beam; limit hanger load to 1,000 pounds in area above mechanical room and to 250 pounds in remaining areas, unless otherwise approved by the Architect.

- C. **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.

- D. **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 Masonry:** Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 2. **To Existing Concrete:** Expansion anchor fasteners.
 - 3. 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 thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
 - 4. **To Steel:** Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69 or spring-tension clamps.
 - 5. **To Light Steel:** Sheet metal screws.
 - 6. **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.
 - 7. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.03 PAINTING

- A. **Touchup:** Comply with requirements in Division 09 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
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The Drawings and General Provisions of the Contract, including General and Supplementary General Conditions, and Division 01 General Requirements, apply to work specified in this Section.

1.02 SUMMARY

- A. Furnishing and field installation of the complete raceway system in accordance with the specifications and as indicated on the drawings. Furnish raceways in quantities sufficient for a complete installation. The raceway system includes raceways, fittings, boxes, cabinets, and all materials and devices required to install, support, secure a complete system for electrical wiring.

1.03 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Custom enclosures and cabinets.
- C. Coordination: Coordinate the work specified in this section with other work of the Contract. Coordinate the placement of raceways with Structural drawings, HVAC and Plumbing ductwork, piping and equipment prior to installation. If required for proper coordination, prepare Coordination Drawings with conduit routing plans, drawn to scale.
- D. Manufacturer Seismic Qualification Certification: Submit certification that enclosures and cabinets and their mounting provisions, including those for internal components, will withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems." Include the following:
 - 1. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

1.04 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in referenced Electrical Code, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.01 METAL CONDUIT AND TUBING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Allied Tube & Conduit; a Tyco International Ltd. Co.
 - 3. Electri-Flex Co.
 - 4. Wheatland.
- B. Rigid Steel Conduit (RSC), couplings and elbows: ANSI C80.1 and UL 6; hot-dip galvanized, rigid mild steel, zinc-coated on interior and exterior surfaces.
- C. Intermediate Metal Conduit (IMC): Hot-dip galvanized mild steel conforming to ANSI C80.6, and UL 1242.
- D. Electrical Metallic Tubing (EMT): Zinc-coated steel conforming to ANSI C80.3 and UL 797. Fabricate tubing, elbows and bends from steel, coated on interior and exterior surfaces with a continuous zinc coating.
- E. Flexible Conduit: Galvanized, interlocking steel construction (Greenfield), meeting the requirement of UL 1.
- F. Liquid-Tight Flexible Conduit: Plastic or plenum-rated jacket material, flexible, galvanized steel, Sealtite Type EF for general service areas or Type HC for high temperature locations.

2.02 NONMETALLIC CONDUIT AND TUBING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. R&G Sloan.
 - 3. Electri-Flex Co.
 - 4. Carlon Electrical Products.
 - 5. RACO; a Hubbell Company.
 - 6. Thomas & Betts Corporation.
- B. Non-Metallic Conduit (NMC): Rigid polyvinyl chloride (PVC), Schedule 40, rated for use with 90 degree conductors, UL rated or approved equal, conforming to industry standards and specifications NEMA TC-2, NEMA TC-3, Fed. Spec. W-C-1094, and UL 651.
 - 1. Furnish conduit, fittings, and cement produced by the same manufacturer, who must have had at least 3 years of experience in manufacturing the products.
 - 2. Joints: Join sections of PVC pipe using solvent recommended by the pipe manufacturer and acceptable to the Owner. Use solvent and make joints in accordance with the recommendations of the pipe manufacturer.
- C. Fittings for NMC: NEMA TC 3; match to conduit or tubing type and material.

2.03 FITTINGS

- A. Metal conduit fittings: UL 514, galvanized iron or galvanized steel threaded fittings with steel conduit. Do not use compression fittings with RSC and IMC.
- B. Fittings for electrical metallic tubing: For tubing up to and including 2 inch trade size, furnish galvanized steel compression type fittings. Fittings for tubing sizes larger than 2 inches may be set screw type.
- C. Liquid-tight flexible conduit fittings: Galvanized malleable iron or steel, bearing the UL label.
- D. Flexible metal conduit fittings: Galvanized malleable iron or steel.
- E. Expansion fittings: Weatherproof, galvanized steel, with bonding jumpers; Crouse-Hinds or acceptable equal.
- F. Special Fittings: Furnish conduit sealing, explosion proof, dust proof, and other types of special fittings as required by the drawings and these specifications, consistent with the area and equipment with which they are associated, and in accordance with the following requirements:
 - 1. Fittings installed outdoors: Heavy cast construction; sealed and gasketed.
 - 2. Fittings installed indoors in damp locations: Sealed, gasketed.
- G. Combination Fittings: For connection rigid steel conduit to electrical metallic tubing, furnish fittings which have a threaded throat to receive the rigid steel conduit and a compression type throat to receive the electrical metallic tubing.
- H. Bushings: Galvanized bushings for the termination of all conduit not terminated in hubs and couplings. Provide grounding type insulated bushings with insulating inserts in metal housings for conduit 1-1/4 inches and larger.
- I. Locknuts: Interior and exterior locknut for all conduit terminations not provided with threaded hubs or connectors. Provide locknuts which will securely bond the conduit to the box when tightened, and which will not be loosened by vibration.
- J. Conduit Unions: Watertight conduit unions, Crouse-Hinds "Type UNF" or approved equal.

2.04 METAL WIREWAYS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cooper B-Line, Inc.
 - 2. Hoffman.
 - 3. Square D.
- B. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 1 for indoor and 3R for outdoor installation, unless otherwise indicated. Steel enclosed wiring trough designed to house electrical wiring. Fabricate from steel gauges as specified below, in sizes shown on drawings.
 - 1. Wireway sizes less than 8 inch square: 16 gauge steel
 - 2. Wireway sizes 8 inch square or larger: 14 gauge steel

- C. Elbows: Use 45 degree elbow bends with inside radius of elbow at least 12 inches. Make up 90 degree bends from two 45-degree elbows; do not use 90 degree elbows.
- D. Fittings and Accessories: Include 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.
- E. Wireway Covers: Furnish straight wireway lengths with hinged cover.
- F. Finish: Manufacturer's standard enamel finish.

2.05 SURFACE RACEWAYS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Hubbell.
 2. Wiremold Company .
 3. Mono Systems.
- B. Surface Metal Raceway: Two-piece construction with snap-on cover; fabricated from cold-rolled steel, 0.040 inch minimum thickness for base and cover sections. Finish with ANSI 61 gray epoxy paint. Wiremold G 3000, Hubbell HBL3000 or equal.
- C. Two-Compartment Surface Metal Raceway: Two-piece construction with snap-on cover, capable of being divided into two separate wiring compartments to facilitate installation of power and low tension wiring. Fabricate from cold-rolled steel and finish with ANSI 61 gray epoxy paint. Wiremold G 4000, Hubbell HBL4750 or equal.
- D. Fittings & Accessories: A full compliment of fittings required for a complete installation has to be available including but not limited to couplings, flat, internal and external elbows, tees, entrance end fittings, blank end fittings, cover clips, and bushings. The fitting covers shall be painted with a powder coat finish to match the raceway. All fittings shall be supplied with a base where applicable. Transition fittings shall be available to adapt to a flush wall box.
- E. Device Brackets & Plates: Device brackets shall be available to install single- or two-gang devices either horizontal or vertical within the raceway. Horizontal device brackets to be provided with a single two-gang cover plate. Devices both power and data/communication shall have the capacity of mounting flush or in conjunction with faceplates. Faceplates to conceal seam between raceway cover and installed faceplate. Device brackets and plates shall be colored to match the raceway.
- F. Fiber Optic / UTP/ STP Radius Full Capacity Fittings & Inserts: A complete line of full capacity corner elbows and tee fittings must be available to maintain a controlled 1 1/4" min cable bend radius, which meets the specifications for Fiber Optic and UTP/STP cabling and exceeds the TIA 569 requirements for communications pathways.
- G. Communication Devices & Accessories: The raceway manufacturer will provide a complete line of connectivity outlets and modular inserts for UTP, STP (150 ohm), and fiber optic, coaxial and other cabling types with faceplates and bezels to facilitate mounting.

2.06 SURFACE NON-METALLIC RACEWAYS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Panduit.
 - 2. Wiremold Company .
 - 3. Hubbell .

- B. Single-Compartment Surface Raceway: Two-piece construction, rigid polyvinyl chloride (PVC) plastic with matte texture in manufacturer's standard color (white or ivory).
 - 1. Wiring Capacity: Equal to 3/4 inch conduit; UL listed as suitable for use in applications having no more than 300 volts between conductors.
 - 2. Acceptable Product: Panduit LD Series, Wiremold "2300 Series".
 - 3. Furnish extension boxes, elbows, device boxes and face plates required for a complete installation. Type of devices, locations and spacing are shown on the drawings.

- C. Two-Compartment Surface Raceway: Two-piece construction with snap-on cover, being divided into two separate wiring compartments to facilitate installation of power cables up to 600 volt and low tension wiring per TIA/EIA-569 standard.
 - 1. Rigid polyvinyl chloride (PVC) high impact resistant plastic with the manufacturer's standard color – gray, white and ivory, to be selected by Architect.
 - 2. Faceplates: Standard NEMA faceplates to accept 20 Amp duplex receptacles or communication jack modules.
 - 3. Accessories and fittings: Furnish elbows, end cap and couplings, mounting brackets, device mounting brackets and wire retainers for a complete installation. Type of the devices, locations and spacing are shown on the drawings.
 - 4. Acceptable Product: Panduit Type Twin-70, Wiremold Type 5400.

2.07 PULL AND JUNCTION BOXES

- A. Manufacturer: Furnish products manufactured by one of the following:
 - 1. Appleton Electric Company
 - 2. Commercial Sheet Metal Company.
 - 3. Lee Products Company.
 - 4. Harry Richmond Company.
 - 5. RACO.

- B. Fabrication, Standard Boxes: Construct pull and junction boxes in accordance with UL 50 and ANSI/NEMA OS1. Fabricate from 16 gauge or heavier sheet steel; with removeable, full access covers, attached with corrosion-resistant machine screws. Finish boxes with one coat of grey enamel. Boxes with covers which have pre-punched knockouts will not be acceptable.

- C. Weatherproof Boxes: For installation in wet locations, furnish cast metal, NEMA FBI boxes with gasketed covers.

- D. Corrosion Resistant Boxes: For installation in areas exposed to corrosive atmosphere, furnish PVC Schedule 40 boxes.
- E. Junction Boxes in Metal Stud Partitions: Galvanized pressed steel boxes with blank cover plates. Minimum size 4-11/16 inches square by 1-1/2 inches deep.
- F. Junction Boxes Installed Above Suspended Ceiling: Galvanized pressed steel boxes with blank cover plates. Minimum size 4-11/16 inches square by 2-1/8 inch deep.
- G. Dimensions: Not less than that required by the referenced Electrical Code, Article 314.

2.08 OUTLET AND SWITCH BOXES

- A. Manufacturer: Furnish products manufactured by one of the following:
 1. Appleton Electric Company
 2. Crouse-Hinds Company
 3. Hubbell
 4. Raco
 5. Steel City Electric Company
 6. Thomas & Betts.
- B. Furnish outlet boxes, switch boxes, and associated fittings which conform to UL 514.
- C. Outlet Boxes in Dry Locations: ANSI/NEMA OS1, fabricated from galvanized steel sheet; minimum depth 2-1/8 inches deep; equipped with plaster rings or gasketed covers as necessary.
- D. Outlet and Switch Boxes for Wet Locations and Corrosive Locations: NEMA FBI, ferrous alloy or aluminum, Type FD, with gasketed cover, or ANSI/NEMA OS 2 non-metallic PVC where allowed.
- E. Boxes which support lighting and equipment: Provide boxes rated for weight of equipment where supported; include 1/2 inch male fixture studs where required.
- F. Floor Outlet Boxes: Pressed steel, unless indicated otherwise. Furnish cast iron boxes for slab on grade outlets. Furnish with compatible accessories, including gaskets, flush floor plates, device mounting plates and covers.
- G. Concrete Ceiling Boxes: Concrete type.
- H. Telephone Outlets: Provide 4 inch square box with a single gang device plate. Plate material shall match material and finish of the switch and receptacle plates, unless otherwise indicated.

2.09 CABINETS AND ENCLOSURES

- A. Manufacturers: Furnish products manufactured by one of the following:
 1. Hoffman.
 2. Lee Products.
 3. Steel City.
- B. Hinged Cover Enclosures: NEMA 250 steel enclosure with cover with continuous hinge and flush latch. Finish inside and out with manufacturer's standard enamel.
- C. Cabinets:

1. NEMA 250, Type 1, 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.

2.10 SLEEVES FOR RACEWAYS

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

PART 3 - EXECUTION

3.01 RACEWAY APPLICATION

<u>Type of conduit</u>	<u>Applications/Locations:</u>
A. Rigid steel conduit:	Exterior exposed conduit runs. Conduit penetrations of the floor slab or foundation wall. Where a conduit penetrates a foundation wall, install rigid steel conduit within 5 feet from the foundation wall.
B. Rigid or intermediate steel conduit:	Concealed outdoor conduit runs. Interior exposed locations below 8 feet above finish floor. Interior wet locations.
C. Non-metallic conduit:	Conduit installed underground (minimum size 3/4 inch). Where a conduit penetrates a foundation wall, make transition to a rigid steel conduit at a distance of 5 feet from the wall. Conduit embedded in a concrete slab (maximum size 1 inch, multiple parallel runs are not allowed) when specifically approved by the Architect.
D. EMT:	Feeders and branch circuit runs installed above ceiling, in wall spaces, and in exposed locations 8 feet above finish floor. Do not use EMT for exterior runs, runs buried in concrete, in wet locations, or where conduit may be subject to mechanical abuse.
E. Flexible Conduit:	Connections to electrical equipment and other equipment furnished under HVAC and Plumbing Sections that are subject to movement, vibration, or misalignment, where available space dictates, and where noise transmission must be eliminated or reduced. Limit length of flexible conduit in these applications to no more than 24

inches.

Flexible conduit may be used for connecting to light fixtures. Maximum length of flexible conduit allowed shall be 6'-0" from junction box to light fixture. Lighting branch circuit home runs to panelboard shall be in conduit or EMT.

- F. Liquid-Tight Flexible Conduit: Applications specified for flexible conduit which are in addition:
1. Exterior locations.
 2. Moisture or humidity-laden atmospheres.
 3. Corrosive atmospheres.
 4. Locations where washdown operations are possible.
 5. Locations where seepage or dripping of oil, grease or water is possible.

3.02 INSTALLATION

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
- B. Install all wiring, in minimum 1/2 inch size, rigid metal conduit, intermediate metal conduit or EMT, subject to the restrictions of the referenced Electrical Code, unless otherwise noted on the drawings or in the conduit schedule.
- C. Type of Conduit: Comply with the raceway application for each type of conduit.
- D. Run conduit concealed in finished areas above suspended ceilings, in wall spaces, etc. Exposed conduit runs in finished areas require Architect's approval. Properly group conduit runs. Install conduit parallel to walls and ceilings, and support with proper hangers and clamps. Check door swings before installing back boxes for switches and receptacles.
- E. Where conduit passes through a building expansion joint, use weatherproof, telescopic type expansion fittings which permit at least 4 inches of movement.
- F. Form bends in conduit by means of a conduit bending machine or by an approved hickey. To fasten conduit to outlet boxes, cabinets, etc., use locknuts and insulated throat bushings of compatible material.
- G. Cut conduit ends square, thread conduit, and ream to remove burrs and sharp edges. Field threads shall be of the same type and have the same effective length as factory cut threads. Turns, wherever required in exposed conduit runs, shall be made by the use of factory-made bends, or field-made bends as approved. In the event of a multiplicity of conduits making the same turn, a steel junction box with a removable steel cover may be used. Offsets and bends for changes in elevation of exposed conduit runs shall be made at walls or beams and not in open spaces between walls or beams. Rout conduits as required to avoid interfere with the operation or maintenance of equipment.
- H. Group related conduits. Refer to Section "Hangers and Supports" for conduit racks, supports and fittings. When groups are supported on conduit rack, provide enough excess capacity to accommodate 25 percent additional conduit runs.

- I. Plug or cap conduit ends as soon as conduit is installed, to prevent entrance of moisture or other debris during construction. Do not pull wire into any conduit until the conduit system is complete.
- J. Drawings, in relation to the routing of conduits, are diagrammatic. Except where additional conduits may be required to avoid derating of branch circuits, as required elsewhere within this Section, the number and size of conduits and wire shall be furnished and installed as indicated by the drawings. Coordinate routing of conduits in the field with the building structure. Run conduit in straight lines parallel and perpendicular to walls, beams, and columns and with right angle bends and threaded conduit fittings. Maintain 12 inches clearance between conduit and surface with temperatures exceeding 104 degrees F.
- K. Conduits passing through floors, walls and beams shall be of such size, number, and in such locations so as not to impair the strength of the construction.
- L. Route raceways in ceiling spaces in an orderly and organized manner, and to eliminate or minimize the number of junction boxes required. Support and secure conduits by means of rods, clamps and other conduit support devices approved by the Architect. Do not use wire to support conduits.
- M. Where rigid metal conduit is threaded in the field, use a standard conduit cutting die providing 3/4 inch taper per foot.
- N. Conduit and EMT runs shall be mechanically and electrically continuous from service entrance to outlets. Secure conduit to cabinet, junction box, pull box or outlet box with locknut outside and bushing inside, or with liquid-tight, threaded, self-locking, cold-weld wedge adapter. Locknuts and bushings or self-locking adapters will not be required where conduits are screwed into tapped connections. Before installing conductions, protect vertical conduit runs that terminate in bottoms of wall boxes or cabinets from entrance of foreign material.
- O. Size rigid steel conduit, EMT and flexible metallic conduit as required by the referenced Electrical Code, except as otherwise specified or shown on the drawings. Check raceway sizes to determine that equipment grounding conductor fits in same raceway with phase and neutral conductors to meet the Electrical Code percentage of fill requirements.
- P. Where conduit is secured rigidly on opposite sides of building expansion joints, and where runs of exposed conduit are long and subject to stress, provide expansion fittings capable of safely deflecting and expanding to twice the distance of structural movement. Provide separate external copper bonding jumper secured with grounding straps on each end of fitting.
- Q. Install a pull or junction box every 100 feet of straight conduit run, and wherever there is an equivalent of four 90 degree elbows or a total of 360 degree bend. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.
- R. Install sealing fittings at following points, and elsewhere as shown:
 - 1. Where conduits enter or leave hazardous areas equipped with explosion proof lighting fixtures, switches, receptacles, and other electrical devices.
 - 2. Where conduits pass from warm to cold locations.

- S Pull cords: In each empty raceway, provide nylon fishing line having tensile strength not less than 200 lbs, or provide No. 14 AWG steel wire. Label each end of each line or wire with a securely attached tag which indicates the location of the other end.
- T Liquid-tight type flexible conduits installed in the air-handling plenum space shall be with a plenum-rated outer jacket.
- U 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.
- V Exposed conduits above roof: Provide a clearance at least 4 in. from roof to the bottom of the conduit.
- W Raceways for Optical Fiber and Communications Cable: Install raceways, metallic and nonmetallic, rigid and flexible, as follows:
 1. 3/4-Inch Trade Size and Smaller: Install raceways in maximum lengths of 50 feet.
 2. 1-Inch Trade Size and Larger: Install raceways in maximum lengths of 75 feet.
 3. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.
- X Raceways and boxes below roof: Install and support to provide not less than 1-1/2 in. clearance from the lowest surface of the roof decking to the top of the raceway or box.

3.03 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both surfaces of walls.
- F. Extend sleeves installed in floors 2 inches above finished floor level.
- G. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway penetrations. Install sleeves and seal with firestop materials. Comply with Division 07 Section "Penetration Firestopping."
- H. Roof-Penetration Sleeves: Seal penetration of individual raceways with flexible, boot-type flashing units applied in coordination with roofing work.

3.04 BOXES INSTALLATION

- A. Electrical drawings and specification indicate general locations and mounting heights of wall outlets, switches, and similar devices; architectural details, wall elevations, and floor plans take precedence over information on electrical drawings. Verify all locations and mounting heights with Architect before roughing in.
- B. Provide outlet boxes for all wiring devices as shown on the drawings. Use bar hanger type outlet boxes in steel stud partitions. Provide gang box partitions in the multi-gang outlet box installation when the voltage between adjacent lighting switches exceeds 300 volts.
- C. Stagger outlet boxes on opposite sides of partitions a minimum of 12 inches on center; do not install back-to-back.
- D. When setting boxes into surfaces which are to be finished, offset boxes as required to allow for proper adjustment to finished surfaces.
- E. Cut openings in brick, concrete block, and tile construction as required for outlets.
- F. Mount boxes rigidly and screw-fasten covers. Plug unused open knockouts with suitable blanking devices. Provide blank covers for boxes that do not have equipment mounted on them.
- G. Install pull boxes and junction boxes concealed (above accessible ceilings or in unfinished areas), unless shown otherwise on the Drawings.
- H. In hazardous locations, install only boxes of type approved for use in the specific environment, as classified in the referenced Electrical Code, Article 500.

3.05 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

3.06 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The Drawings and General Provisions of the Contract, including General and Supplementary General Conditions, and Division 01 General Requirements, apply to work specified in this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Identification for raceways.
 - 2. Identification of power and control cables.
 - 3. Identification for conductors.
 - 4. Warning labels and signs.
 - 5. Equipment identification labels.
 - 6. Miscellaneous identification products.

1.03 SUBMITTALS

- A. Product Data: For each electrical identification product indicated.

1.04 QUALITY ASSURANCE

- A. Comply with ANSI A13.1 and IEEE C2 with regard to type and size of lettering for raceway and cable labels.
- B. Comply with NFPA 70.
- C. Comply with ANSI Z535.4 for safety signs and labels.
- D. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.05 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. 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

2.01 POWER RACEWAY

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- B. Colors for Raceways Carrying Circuits at 600 V or Less:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage and system or service type (Power, Lighting, Emergency, Control, etc.).
- C. Colors for Raceways Carrying Circuits at More Than 600 V:
 - 1. Black letters on an orange field.
 - 2. Legend: "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch- high letters.
- D. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- E. Tape and Stencil for Raceways Carrying Circuits More Than 600 V: 4-inch- wide black stripes on 10-inch centers diagonally over orange background that extends full length of raceway. Stop stripes at legends.
- F. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.
- G. Write-On Tags: Polyester tag, with corrosion-resistant grommet and cable tie for attachment to conductor or cable. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2.02 ARMORED AND METAL-CLAD CABLE

- A. 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.
- B. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches wide; compounded for outdoor use.

2.03 POWER AND CONTROL CABLE

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

- 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.
- C. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.
- D. Write-On Tags: Polyester tag, with corrosion-resistant grommet and cable tie for attachment to conductor or cable. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
- E. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

2.04 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches 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.
- C. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- D. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
- E. Write-On Tags: Polyester tag, with corrosion-resistant grommet and cable tie for attachment to conductor or cable. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2.05 WARNING LABELS AND SIGNS

- A. 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.
- B. Baked-Enamel Warning Signs:

Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application. Nominal size, 7 by 10 inches.
- C. Metal-Backed, Butyrate Warning Signs:

Weather-resistant signs, non-fading, preprinted, cellulose-acetate butyrate signs with galvanized-steel backing; and with colors, legend, and size required for application. Nominal size, 10 by 14 inches.

- D. Safety signs shall warn of potential electrical hazard and shall include, but are not limited to, the following legends:
 - 1. Multiple power source warning.
 - 2. Workspace clearance warning.
 - 3. Potential electric arc flash hazard.

2.06 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.
- B. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.
- C. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

2.07 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.
 - 2. Color: Black except where used for color-coding.
- B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self extinguishing, one piece, self locking, Type 6/6 nylon.
- C. Plenum-Rated Cable Ties: Self extinguishing, UV stabilized, one piece, self locking. UL 94 Flame Rated.

2.08 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

3.01 INSTALLATION

- A. Verify identity of each item before installing identification products. Coordinate names, abbreviations, colors, and other designations used in electrical identification work with corresponding designations specified or indicated. Install numbers, lettering, and colors as approved in submittals and as required by code.

- 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. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- F. 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 maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- G. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.
- H. 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.
- I. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.
- J. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.
- K. Renovation Projects: For alterations and additions to existing facilities, use existing identification system. Where systems have not been standardized, use the identifying and marking system specified in this standard.
- L. Distribution Equipment: Identify major components of the distribution system (such as circuit breakers, switches, transformers, switchboards, panelboards, motor control centers, etc.) with nameplates. Nameplates on disconnect switches and control stations shall identify the equipment served.
- M. Circuit Tagging and Identification: Identify power, control, and instrument circuit cables with the circuit and conductor identification nomenclature shown on the drawings, in accordance with the following:
 - 1. Identify branch circuits in the pull boxes or panels in which they connect.
 - 2. Label with two separate wire markers each conductor of single or multiconductor control or instrument cables. The first marker shall display the designated equipment/terminal identification number of the nearest equipment to which the conductor terminates. The second

marker shall display the designated equipment/terminal identification number to which the opposite end of the conductor or cable is terminated.

- N. Ground Fault Protected Devices: Identify devices protected by personnel ground fault interrupters. Receptacles not otherwise identified by the manufacturer shall have cover plates with the works "Protected by GFI".

- 1.If device is protected by a remote panel circuit breaker, also indicate on the cover plate the panel and circuit identifications.

- 2.If device is protected by GFCI receptacle with feed-through feature, indicate on the cover plate the GFCI receptacle location.

- N. Lighting and Receptacle Outlet Boxes: Identify with the panel and circuit number.

3.02 IDENTIFICATION SCHEDULE

- A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for service, feeder, and branch circuits more than 30A and 120V to ground: Identify with self-adhesive vinyl label applied at 10-foot maximum intervals.

- B. Identify high-voltage feeder conduits (above 600 V) by words "DANGER-HIGH VOLTAGE" in black letters 2 inches high, stenciled at 10-foot intervals over continuous painted orange background.

- 1. The following areas shall be identified:

- a. On entire floor area directly above conduits running beneath and within 12 inches of a basement or ground floor that is in contact with earth or is framed above unexcavated space.
 - b. On wall surfaces directly external to conduits run concealed within wall.
 - c. On all accessible surfaces of concrete envelope around conduits in vertical shafts, exposed at ceilings or concealed above suspended ceilings.
 - d. On entire surface of exposed conduits.

- C. Power-Circuit Conductor Identification, 600 V or Less: Identify conductors in the panels, pull and junction boxes, manholes, handholes, etc.

- 1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors for ungrounded service, feeder and branch-circuit conductors as specified in Division 26 Section "Low-Voltage Power Conductors".

- a. Factory applied continuous color coding for conductors No.8 AWG and smaller.
 - b. Field-applied, color coding conductor tape: For conductors No.6 AWG and larger. Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made.
 - c.

- 2. Terminal Blocks: Attach numbered nameplates to terminal blocks which require identification numbers; use the designations shown on the wiring diagrams. Install nameplate at the top of vertically mounted terminal blocks and at the end of horizontally mounted terminal blocks. Indicate the individual terminal point designation shown on the wiring diagrams.

3. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
4. Future Connections: Conductors indicated to be for future connection or connection under another contract with identification indicating source and circuit numbers.
5. Multiple Circuits: Where multiple branch circuits or control wiring or communications/signal conductors are present in the same box or enclosure (except for three-circuit, four-wire home runs), label each conductor or cable.

Provide legend indicating source, voltage, circuit number, and phase for branch circuit wiring. Phase and voltage of branch circuit wiring may be indicated by mean of coded color of conductor insulation. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.

6. For control and communications/signal wiring, use color coding or wire/cable marking tape at terminations and at intermediate locations where conductors appear in wiring boxes, troughs, and control cabinets. Use consistent letter/number conductor designations throughout on wire/cable marking tapes.
 7. Lighting and Receptacle Outlet Boxes: Identify with the panel and circuit number.
- D. Power-Circuit Conductor Identification, above 600 V: For conductors in the vaults, pull and junction boxes, manholes and handholes, use write-on tags.
 - E. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
 - F. Match identification markings with designations used in panelboards shop drawings, Contract Documents, and similar previously established identification schemes for the facility's electrical installations.
 - G. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in the finished spaces.
 - H. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Apply warning, caution, and instruction signs where required by the referenced Electrical code, or where reasonably required to assure safe operation and maintenance of electrical systems and of the items to which they connect. Install self-adhesive warning labels or baked-enamel warning signs with approved legend where instructions or explanations are needed for system or equipment operation. Install metal-backed, butyrate warning signs for outdoor items.
 - I. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch high letters for emergency instructions at equipment used for power transfer, load shedding and other emergency operations.
 - J. Safety sign for the switchboards, panelboards and motor control centers: Provide a sign to warn qualified persons of potential electric arc flash hazard.

- K. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to the disconnect switches and protection equipment, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
1. Labeling Instructions:
 - a. Indoor Equipment: Self-adhesive, laminated acrylic or melamine label.
 - b. Outdoor Equipment: Engraved, laminated acrylic.
 - c. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.
 2. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be engraved laminated acrylic. Panelboard directories shall identify the load name and location (i.e. AHU-1, Room # , FCU-1, Room #).

SECTION 26 09 23
LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The Drawings and General Provisions of the Contract, including General and Supplementary General Conditions, and Division 01 General Requirements, apply to work specified in this Section.

1.02 SUMMARY

- A. This Section includes the following lighting control devices:
 - 1. Indoor occupancy sensors.
 - 2. Lighting contactors.
 - 3. Emergency bypass relays.
- B. Related Sections include the following:
 - 1. Division 26 Section "Wiring Devices" for wall-box dimmers, wall-switch occupancy sensors, and manual light switches.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated. Include wiring diagrams and ratings.
- B. Field quality-control test reports.
- C. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals.

1.04 QUALITY ASSURANCE

- A. Comply with NFPA 70
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in referenced Electrical Code, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.05 COORDINATION

- A. Coordinate layout and installation of the devices with other trades construction.

PART 2 - PRODUCTS

2.01 INDOOR OCCUPANCY SENSORS

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

1. Hubbell Lighting.
2. Leviton Mfg. Company Inc.
3. Watt Stopper

- B. General Description: Ceiling-mounting, solid-state units with a separate relay unit.
1. Operation: Unless otherwise indicated, turn lights on when covered area is occupied and off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
 2. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit.
 3. Relay Unit: At least two dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten load at 120-V ac.
 4. Mounting: Sensor: Suitable for mounting in any position on a standard outlet box.
 5. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.
 6. Bypass Switch: Override the on function in case of sensor failure.
 7. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc; keep lighting off when selected lighting level is present.
- C. PIR Type: Ceiling mounting; detect occupancy by sensing a combination of heat and movement in area of coverage. Watt Stopper CI-200 or equal to detect occupancy in a circular area up to 1200 sq. ft. Watt Stopper CI-200-1 or equal to detect occupancy in a circular area up to 500 sq. ft.
- D. Ultrasonic Type: Ceiling mounting; detect occupancy by sensing a change in pattern of reflected ultrasonic energy in area of coverage. Frequency range of operation – 30KHZ and above. Watt Stopper WT-1105 or equal to detect occupancy in a circular area up to 1100 sq. ft. Watt Stopper WT-605 or equal to detect occupancy in a circular area up to 600 sq. ft.
- E. Dual-Technology Type: Ceiling mounting; detect occupancy by using a combination of PIR and ultrasonic detection methods in area of coverage.
1. Sensitivity Adjustment: Separate for each sensing technology.
 2. Detection Coverage: Watt Stopper DT-300 or equal to detect occupancy in a circular area up to 1000 sq. ft.

2.02 EMERGENCY BYPASS RELAY

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Lighting Control and Design, Inc.
 2. Bodine.
 3. Watt Stopper.
- B. Description: Emergency lighting control device, UL 924 listed, with an electrically held relay, arranged for wiring in parallel with manual or automatic switching contacts of the emergency lighting circuits. Relay shall allow shunt emergency power around a control device when normal power fails. Relay shall provide low-voltage wiring interface for remote activation (NC dry contacts of the fire alarm and/or security systems).
1. Voltage Rating: universal 120 / 277 V.
 2. Current Rating: minimum 10 Amp fluorescent, incandescent and HID.
 3. Relay shall be equal to Watt Stopper ELCU-100.

PART 3 - EXECUTION

3.01 SENSOR INSTALLATION

- A. 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.

3.02 WIRING INSTALLATION

- A. Wiring within Enclosures: Comply with NECA 1.
- B. Size conductors according to lighting control device manufacturer's written instructions, unless otherwise indicated.

3.03 IDENTIFICATION

- A. Identify components and power and control wiring according to Division 26 Section "Identification for Electrical Systems."
 - 1. Identify controlled circuits in lighting contactors.
 - 2. Identify circuits controlled by photoelectric and occupancy sensors at each sensor.

3.04 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. After installing time switches and sensors, and after electrical circuitry has been energized, adjust and test for compliance with requirements.
 - 2. Operational Test: Verify operation of each lighting control device, and adjust time delays.

3.05 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting sensors to suit occupied conditions.

3.06 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

SECTION 26 27 26
WIRING DEVICES

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The Drawings and General Provisions of the Contract, including General and Supplementary General Conditions, and Division 01 General Requirements, apply to work specified in this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
 - 2. Twist-locking receptacles.
 - 3. Receptacles with integral surge suppression units.
 - 4. Wall-box occupancy sensors /switches.
 - 5. Wall-box dimmers.
 - 6. Isolated-ground receptacles.
 - 7. Snap switches and wall-box dimmers.
 - 8. Pendant cord-connector devices.
 - 9. Cord and plug sets.
- B. Related Sections include the following:
 - 1. Division 26 Section "Lighting Control Devices".

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.
- C. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals.
- D. Sole Source: Furnish all wiring devices from a single manufacturer, unless Contract Documents give specific instructions to the contrary.

1.04 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 referenced Electrical Code, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.05 COORDINATION

- A. Receptacles for Owner-Furnished Equipment: Match plug configurations.
 - 1. Cord and Plug Sets: Match equipment requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
 - 1. Cooper Wiring Devices.
 - 2. Hubbell.
 - 3. Leviton.
 - 4. Pass & Seymour.

2.02 STRAIGHT BLADE RECEPTACLES

- A. Duplex Receptacles: FS W-C-596, heavy-duty specification grade, straight-blade, 2 pole 3 wire grounding type, back and side wired, nylon face, rated for 120 volts, 20 amperes. Hubbell No. 5362 (NEMA 5-20R) or equal. Weather Resistant 2 pole 3 wire grounding (NEMA 5-20R) Hubbell No. HBL5362WR Series or equal.
- B. Ground fault circuit interrupter (GFCI) receptacles: Duplex receptacles conforming to UL 943 and UL 498 specification grade, NEC Compliant Tamper & Weather Resistant, feed-through type, rated for 120 volt, 20 amperes, NEMA 5-20R, GFCI Class "A" with a minimum of 50 joule metal oxide varistor, LED indication for end of life use. Hubbell No. GFTR20 or equal.
- C. Transient-Voltage Surge-Suppressor (TVSS) Receptacles: Duplex type, NEMA 5-20R configuration, with integral transient-voltage surge protection in a minimum of 3 modes: line-to-ground, line-to-neutral, and neutral-to-ground; listed as complying with UL 1449. Hubbell HBL5362SA or equal.
- D. Safety/Tamperproof Duplex Receptacles: Designed to prevent electrical shock caused by accidental insertion of metal objects, Hospital grade; rear Pig Tail leads, sealed body, 20 amperes, 120 volts, NEMA 5- 20R; listed as tamper-resistant with "TR" marking, equal to Hubbell HBL8300SGA.
- E. Isolated Ground (IG) Receptacles: Duplex type, specification grade, straight-blade, 2 pole 3 wire grounding type, orange color, back and side wired, nylon face, rated for 120 volts, 20 amperes. Hubbell No. CR5362IG (NEMA 5-20R) or equal.
 - a. Killark.

2.03 TWIST-LOCKING RECEPTACLES

- A. Single Convenience Receptacles, 125 V and 250 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration L5-20R and L6-20R, and UL 498. Hubbell HBL2310 (L5-20R), HBL2320 (L6-20R), or equal.

- B. Refer to floor plans for additional types required that may not be specified here.

2.04 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.

2.05 SNAP SWITCHES

- A. Comply with NEMA WD 1 and UL 20.
- B. Toggle switches: Furnish full size, heavy duty industrial series, back and side wired, AC type, rated for 120/277 volts, 20 amperes; equal to the following :
 - 1. Single Pole: Hubbell # 1221.
 - 2. Three-way: Hubbell # 1223.
 - 3. Four-way: Hubbell # 1224
 - 4. Key Switches: (Barrel Key Locking Type) Hubbell # HBL1221RKL

B. WALL-BOX DIMMERS

- C. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.
- D. Control: Continuously adjustable, with single-pole or three-way switching. Comply with UL 1472. Furnish thin profile dimmer, equal to Lutron "NT Series" with linear slide control to adjust lighting level. Dimmer shall have no fins or screws visible on the front of the unit
- E. Incandescent Lamp Dimmers: 120 V, 600 W to 2000 W as shown on the drawings; control shall follow square-law dimming curve. On-off switch positions shall bypass dimmer module.
- F. Fluorescent Lamp Dimmer Switches: Modular; compatible with dimmer ballasts; trim potentiometer to adjust low-end dimming; dimmer-ballast combination capable of consistent dimming with low end not greater than 20 percent of full brightness.

2.06 WALL SWITCH OCCUPANCY SENSORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Watt Stopper
 - 2. Hubbell.
 - 3. Leviton.
 - 4. Pass & Seymour.

- B. Wall-Switch Sensors: Passive-infrared type, 120/277 V, adjustable time delay up to 30 minutes, 180-degree field of view, with a coverage area up to 300 sq. ft., choice of Auto-ON or Manual-ON operation.
 - a. Watt Stopper WA-100 or equal, for single-level lighting control.
 - b. Watt Stopper WA-300 or equal, for two-level lighting control.
- C. Wall-Switch Sensors: Dual technology, with both passive-infrared- and ultrasonic-type sensing, 120/277 V, adjustable time delay up to 30 minutes, 180-degree field of view, and a coverage area up to 1000 sq.ft., choice of Auto-ON or Manual-ON operation, Hubbell LHMTD2 or equal.

2.07 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 Spaces: satin-finished Type 302 stainless steel.
 - 3. Material for Unfinished Spaces: Galvanized steel.
 - 4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in "wet locations."
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with type 3R weather-resistant die-cast aluminum.

2.08 FINISHES

- A. Color: Wiring device catalog numbers in Section Text do not designate device color.
 - 1. Wiring Devices Connected to Normal Power System: white unless otherwise indicated or required by referenced Electrical Code or device listing.
 - 2. Wiring Devices Connected to Emergency Power System: Red.
 - 3. TVSS Devices: Blue.
 - 4. Isolated-Ground Receptacles: Orange.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install work in accordance with the printed specifications and installation instructions of each of the manufacturers and with to the approved shop drawings. Installed work shall conform with NECA 1.
- B. Install wiring devices in appropriately sized outlet boxes. Where more than one switch or a duplex receptacle is indicated on the drawings, gang outlet boxes together to install all devices at the same location.
- C. Mount duplex convenience and power receptacles vertically, unless otherwise indicated, with grounding posts at the top of the device. Where duplex receptacles are indicated to be mounted horizontally, locate the grounding post on the left as the outlet is viewed from the front.

- D. On finished walls, flush-mount switches. Do not install outlet boxes back-to-back in the drywall construction. Where two or more switches are shown at one location, install them under a common wall plate. Mount switches on the knob side of doors, approximately 4 feet above the floor.
- E. Appropriately label each receptacle, either wall or raceway mounted, as specified in Section 16075; indicate the panel and circuit number from which the receptacle is served.
- F. 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.
- G. Install toggle switches, except 3-way switches, so that posts are in the down position when lights are off.
- H. Securely fasten wiring devices in place, plumb, level, and true to finished lines and surfaces.
- I. 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.

3.02 IDENTIFICATION

- A. Comply with Division 26 Section "Identification for Electrical Systems." Receptacles: Identify panelboard and circuit number from which served.

3.03 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.
 - 3. Check that switching is properly installed including dimmers.
- B. Tests for Convenience Receptacles:
 - 1. Line Voltage: Acceptable range is 105 to 132 V.
 - 2. Check for proper polarity and grounding.
 - 3. Check for damaged or missing device plates.
 - 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.

SECTION 26 51 00
INTERIOR LIGHTING

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The Drawings and General Provisions of the Contract, including General and Supplementary General Conditions, and Division 01 General Requirements, apply to work specified in this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Interior lighting fixtures, lamps, and ballasts.
 - 2. Emergency lighting units.
 - 3. Exit signs.
 - 4. Lighting fixture supports.
- B. Related Sections include the following:
 - 1. Division 26 Section "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.
 - 2. Division 26 Section "Wiring Devices" for manual wall-box dimmers for incandescent lamps.

1.03 SUBMITTALS

- A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:
 - 1. Physical description of lighting fixture including dimensions.
 - 2. Ballast.
 - 3. Energy-efficiency data.
 - 4. Photometric data, in IESNA format, based on the certified laboratory tests of each lighting fixture type, outfitted with lamps, ballasts as applied in the Project.
- B. Samples for Verification: If requested by the Architect, lighting fixtures sample shall be submitted.
- C. Requests for Substitutions: If a substitution is proposed for any fixture indicated on the drawings, submit complete information for the proposed luminaire, including ballast sound rating and electrical data, lamp and fixture photometric data, materials and finish, type of mounting, dimensional data, lighting quality, lens design, and reflector design.
- D. Operation and Maintenance Data: For lighting equipment and fixtures to include in operation, and maintenance manuals.
- E. Warranties: Special warranties specified in this Section.

1.04 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.
- 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.

1.05 COORDINATION

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

1.06 WARRANTY

- A. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period for Emergency Lighting Unit Batteries, Emergency Fluorescent Ballast and Self-Powered Exit Sign Batteries: 7 years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining nine years.
- B. Special Warranty for Ballasts: Manufacturer's standard form in which ballast manufacturer agrees to repair or replace ballasts that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period for Electronic Ballasts: Five years from date of Substantial Completion.

1.07 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.
 - 1. Lamps: 10 for every 100 of each type and rating installed. Furnish at least one of each type.
 - 2. Ballasts: 1 for every 100 of each type and rating installed. Furnish at least one of each type.

PART 2 - PRODUCTS

2.01 LIGHTING FIXTURES AND COMPONENTS, GENERAL REQUIREMENTS

- A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
- B. Fluorescent Fixtures: Comply with UL 1598.
- C. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.

- D. 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 re-lamping and when secured in operating position.
- E. Plastic Diffusers, Covers, and Globes:
 - 1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
 - a. Lens Thickness: At least 0.125 inch minimum unless different thickness is indicated.
 - b. UV stabilized.
 - 2. Glass: Annealed crystal glass, unless otherwise indicated.
- F. Air-Handling Fluorescent Fixtures: For use with plenum ceiling for air return and heat extraction. For static fixtures the air supply slots are blanked off, and fixture appearance matches active units.

2.02 BALLASTS FOR LINEAR FLUORESCENT LAMPS

- A. Manufacturers: Universal, GE, Advance, Osram/Sylvania.
- B. Electronic Ballasts: Comply with ANSI C82.11; Programmed- Start type, unless otherwise indicated, and designed for type and quantity of lamps served. Ballasts shall be designed for full light output unless dimmer or bi-level control is indicated.
 - 1. Sound Rating: Class A.
 - 2. Total Harmonic Distortion Rating: Less than 20 percent.
 - 3. Transient Voltage Protection: IEEE C62.41, Category A or better.
 - 4. Operating Frequency: 20 kHz or higher.
 - 5. Lamp Current Crest Factor: 1.7 or less.
 - 6. BF: 0.86 or higher.
 - 7. Power Factor: 0.95 or higher.
 - 8. Parallel Lamp Circuits: Multiple lamp ballasts connected to maintain full light output on surviving lamps if one or more lamps fail.
- C. Electronic Programmed-Start Ballasts for T5 and T5HO Lamps: Comply with ANSI C82.11 and the following:
 - 1. Lamp end-of-life detection and shutdown circuit for T5 diameter lamps.
 - 2. Automatic lamp starting after lamp replacement.
 - 3. Sound Rating: A.
 - 4. Total Harmonic Distortion Rating: Less than 20 percent.
 - 5. Transient Voltage Protection: IEEE C62.41, Category A or better.
 - 6. Operating Frequency: 20 kHz or higher.
 - 7. Lamp Current Crest Factor: 1.7 or less.
 - 8. BF: 0.95 or higher, unless otherwise indicated.
 - 9. Power Factor: 0.95 or higher.
- D. Single Ballasts for Multiple Lighting Fixtures: Factory-wired master-slave arrangement with ballast arrangements and bundled extension wiring to suit final installation conditions without modification or rewiring in the field.

- E. Ballasts for Low-Temperature Environments: Rated for 0 deg F starting and operating temperature with indicated lamp types.
- F. Ballasts for Dimmer-Controlled Lighting Fixtures: Electronic type, with dimming range 100 to 5 percent of rated lamp lumens. Certified by manufacturer for use with specific dimming control system and lamp type indicated.

2.03 BALLASTS FOR COMPACT FLUORESCENT LAMPS

- A. Description: Electronic programmed rapid-start type, complying with ANSI C 82.11, designed for type and quantity of lamps indicated. Ballast shall be designed for full light output unless dimmer or bi-level control is indicated:
 1. Lamp end-of-life detection and shutdown circuit.
 2. Automatic lamp starting after lamp replacement.
 3. Sound Rating: A.
 4. Total Harmonic Distortion Rating: Less than 20 percent.
 5. Transient Voltage Protection: IEEE C62.41, Category A or better.
 6. Operating Frequency: 20 kHz or higher.
 7. Lamp Current Crest Factor: 1.7 or less.
 8. BF: 0.95 or higher, unless otherwise indicated.
 9. Power Factor: 0.95 or higher.

2.04 EXIT SIGNS

- A. Description: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
- B. Internally Lighted Signs:
 1. Lamps for AC Operation: LEDs, 70,000 hours minimum rated lamp life.
 2. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
 - a. Battery: Sealed, maintenance-free, nickel-cadmium type.
 - b. Charger: Fully automatic, solid-state type with sealed transfer relay.
 - c. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
 - d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 - f. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and flashing red LED.

2.05 FLUORESCENT LAMPS

- A. Low-Mercury Lamps: Comply with EPA's toxicity characteristic leaching procedure test; shall yield less than 0.2 mg of mercury per liter when tested according to NEMA LL 1.

- B. T8 low-mercury lamps, rated 32 W maximum, nominal length of 48 inches, 2850 initial lumens (minimum), CRI 85 (minimum), color temperature 3500 K, and average rated life 30,000 hours, unless otherwise indicated. The lamps shall be equal to Philips T8, Plus 800 Series.
- C. T5 low-mercury lamps, rated 28 W maximum, nominal length of 48 inches, 2900 initial lumens (minimum), CRI 85 (minimum), color temperature 3500 K, and average rated life of 25,000 hours, unless otherwise indicated.
- D. T5HO high-output low-mercury lamps, rated 54 W maximum, nominal length of 48 inches, 5000 initial lumens (minimum), CRI 85 (minimum), color temperature 3500 K, and average rated life of 25,000 hours, unless otherwise indicated.
- E. Compact Fluorescent Lamps: 4-Pin, low mercury, CRI 82 (minimum), color temperature 3500 K, average rated life of 12,000 hours or higher at 3 hours operation per start, unless otherwise indicated.
 - 1. 13 W: double or triple tube, rated 900 initial lumens (minimum).
 - 2. 18 W: double or triple tube, rated 1200 initial lumens (minimum).
 - 3. 26 W: double or triple tube, rated 1800 initial lumens (minimum).
 - 4. 32 W: double or triple tube, rated 2400 initial lumens (minimum)

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Mounting: Provide hangers, channels, bars, supports and such additional equipment as may be required to align and to provide independent support. Do not support suspended fixtures from ductwork or piping.
- B. Fixture locations indicated on the drawings are approximate; coordinate locations with other work in the same area to prevent interference between lighting fixtures, piping, and other equipment.
- C. Secure each fixture to its support assembly. Provide field drilling, assembling, disassembling, reassembling, and wiring necessary to provide proper secure installation and positioning.
- D. Where fixtures are indicated to be installed in rows, carefully align them in both vertical and horizontal directions. Center on the beam flanges or webs lighting fixtures and outlet boxes which are mounted on building steel, except where deviations are required to avoid interference with piping or miscellaneous steel.
- E. Support fluorescent fixtures which are installed in suspended ceilings directly from the building structure and independent of the ceiling support system. For support use wire or chain having adequate tensile strength to support the fixture. Attach at least one support to each end of the fixture.
- F. Fixtures mounted on outlet boxes shall be secured to a fixture stud in the outlet box.
- G. Connect fixture wiring to branch circuit using not less than #16 AWG with insulation rated at 90°C or higher.

- H. Install lamps in all fixtures. Clean fixtures regularly to keep them free of dust, grease, and other contamination, and maintain fixtures and lamps during the remainder of the construction period and until date of Substantial Completion. Replace burned out lamps immediately.
- I. Suspended Lighting Fixture Support:
 - 1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
 - 2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
 - 3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.

3.02 FIELD QUALITY CONTROL

- A. Test all lighting circuits. Energize lighting circuits by closing the individual switching devices for each circuit, check for missing or inoperational lamps and/or ballasts.
- B. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

SECTION 28 05 00
COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The Drawings and General Provisions of the Contract, including General and Supplementary General Conditions, and Division 01 General Requirements, apply to work specified in this Section.

1.02 SUMMARY

- A. Section Includes:
 1. Electronic safety and security equipment coordination and installation.
 2. Sleeves for raceways and cables.
 3. Sleeve seals.
 4. Grout.
 5. Common electronic safety and security installation requirements.

1.03 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.04 SUBMITTALS

- A. Product Data: For sleeve seals.

1.05 COORDINATION

- A. Coordinate arrangement, mounting, and support of electronic safety and security equipment:
 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 3. To allow right of way for piping and conduit installed at required slope.
 4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- C. Coordinate location of access panels and doors for electronic safety and security items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."

- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

PART 2 - PRODUCTS

2.01 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.01 COMMON REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electronic safety and security equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.

3.02 SLEEVE INSTALLATION FOR ELECTRONIC SAFETY AND SECURITY PENETRATIONS

- A. Electronic safety and security penetrations occur when raceways, pathways, cables, wireways, or cable trays penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

- E. Cut sleeves to length for mounting flush with both surfaces of walls.
- F. Interior Penetrations of Non-Fire-Rated Walls and Floors: 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."
- G. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."
- H. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

3.03 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electronic safety and security installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION 28 05 00

SECTION 28 05 13
CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY

1.01 PROVISIONS INCLUDED

- A. The Drawings and General Provisions of the Contract, including General and Supplementary General Conditions, and Division 01 General Requirements, apply to work specified in this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. UTP cabling.
 - 2. Coaxial cabling.
 - 3. RS-232 cabling.
 - 4. RS-485 cabling.
 - 5. Low-voltage control cabling.
 - 6. Control-circuit conductors.
 - 7. Fire alarm wire and cable.
 - 8. Identification products.

1.03 DEFINITIONS

- A. Basket Cable Tray: A fabricated structure consisting of wire mesh bottom and side rails.
- B. BICSI: Building Industry Consulting Service International.
- C. Channel Cable Tray: A fabricated structure consisting of a one-piece, ventilated-bottom or solid-bottom channel section.
- D. EMI: Electromagnetic interference.
- E. IDC: Insulation displacement connector.
- F. Ladder Cable Tray: A fabricated structure consisting of two longitudinal side rails connected by individual transverse members (rungs).
- G. 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.
- H. Open Cabling: Passing telecommunications cabling through open space (e.g., between the studs of a wall cavity).
- I. RCDD: Registered Communications Distribution Designer.
- J. Solid-Bottom or Nonventilated Cable Tray: A fabricated structure consisting of integral or separate longitudinal side rails, and a bottom without ventilation openings.

- K. Trough or Ventilated Cable Tray: A fabricated structure consisting of integral or separate longitudinal rails and a bottom having openings sufficient for the passage of air and using 75 percent or less of the plan area of the surface to support cables.
- L. UTP: Unshielded twisted pair.

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. For coaxial cable, include the following installation data for each type used:
 - a. Nominal OD.
 - b. Minimum bending radius.
 - c. Maximum pulling tension.
- B. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.
- C. Source quality-control reports.
- D. Field quality-control reports.
- E. Maintenance Data: For wire and cable to include in maintenance manuals.

1.05 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.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site.

1.07 PROJECT CONDITIONS

- A. 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

2.01 PATHWAYS

- A. Support of Open Cabling: NRTL labeled for support of cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
 - 1. Support brackets with cable tie slots for fastening cable ties to brackets.
 - 2. Lacing bars, spools, J-hooks, and D-rings.
 - 3. Straps and other devices.

2.02 LOW-VOLTAGE CONTROL CABLE

- A. Paired Lock Cable: NFPA 70, Type CMG.
 - 1. 1 pair, twisted, No. 16 AWG, stranded (19x29) tinned copper conductors.
 - 2. PVC insulation.
 - 3. Unshielded.
 - 4. PVC jacket.
 - 5. Flame Resistance: Comply with UL 1581.
- B. Plenum-Rated, Paired Lock Cable: NFPA 70, Type CMP.
 - 1. 1 pair, twisted, No. 16 AWG, stranded (19x29) tinned copper conductors.
 - 2. PVC insulation.
 - 3. Unshielded.
 - 4. PVC jacket.
 - 5. Flame Resistance: Comply with NFPA 262.
- C. Paired Lock Cable: NFPA 70, Type CMG.
 - 1. 1 pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors.
 - 2. PVC insulation.
 - 3. Unshielded.
 - 4. PVC jacket.
 - 5. Flame Resistance: Comply with UL 1581.
- D. Plenum-Rated, Paired Lock Cable: NFPA 70, Type CMP.
 - 1. 1 pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors.
 - 2. Fluorinated ethylene propylene insulation.
 - 3. Unshielded.
 - 4. Plastic jacket.
 - 5. Flame Resistance: NFPA 262, Flame Test.

2.03 CONTROL-CIRCUIT CONDUCTORS

- A. Class 1 Control Circuits: Stranded copper, Type THHN-THWN, in raceway complying with UL 83.
- B. Class 2 Control Circuits: Stranded copper, Type THHN-THWN, in raceway complying with UL 83.
- C. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type TW or TF, complying with UL 83.

2.04 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 Corp.
 - 2. Draka USA.
 - 3. Genesis Cable Products; Honeywell International, Inc.
 - 4. Rockbestos-Suprenant Cable Corporation.
 - 5. West Penn Wire/CDT; a division of Cable Design Technologies.
- B. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.
- C. Signaling Line Circuits: Twisted, shielded pair, not less than. 14 AWG
 - 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.
- 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, steel armor with outer jacket 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.

2.05 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."

2.06 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test low voltage, control cable and fire alarm cables.
- C. Cable will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.01 INSTALLATION OF PATHWAYS

- A. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems." for installation of conduits and wireways.
- B. Install manufactured conduit sweeps and long-radius elbows whenever possible.

3.02 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. 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.

3.03 CONTROL-CIRCUIT CONDUCTORS

- A. 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.

3.04 CONNECTIONS

- A. Comply with requirements in Division 28 Section "Fire Detection and Alarm" for connecting, terminating, and identifying wires and cables.

3.05 FIRESTOPPING

- A. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.06 GROUNDING

- A. For low-voltage wiring and cabling, comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems."

3.07 IDENTIFICATION

- A. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.08 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. Visually inspect cable placement, cable termination, grounding and bonding, equipment and labeling of all components.
- C. Document data for each measurement. Print data for submittals in a summary report or transfer the data from the instrument to the computer, save as text files, print, and submit.
- D. End-to-end 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 12
EXISTING FIRE ALARM SYSTEM MODIFICATIONS

PART 1 – GENERAL

1.01 PROVISIONS INCLUDED

- A. The Drawings and General Provisions of the Contract, including General and Supplementary General Conditions, and Division 01 General Requirements, apply to work specified in this Section.

1.02 SUMMARY

- A. Work includes: Modify existing building fire-alarm system, including power supply, modules, control equipment, alarm initiating devices, audible and visual alarm indicating appliances as appropriate, conduit, wiring, fittings, and all other accessories necessary to provide a complete and operable system to comply with Local Fire Department Ordinance.
 - 1. Furnishing, installation and wiring of new initiating devices such as manual stations and smoke detectors.
 - 2. Furnishing, installation and wiring of new alarm audible/visual devices.
 - 3. Relocation and re-wiring of the existing audible/visual alarm devices.
 - 4. System control panel modification and programming to accommodate system expansion.
 - 5. Complete system acceptance testing to the satisfaction of the Local Fire Department.
- B. Work also includes wiring for the following devices which are furnished and installed under other sections:
 - 1. Elevator recall control circuits. Provide wiring from the fire alarm control panel to elevator control panels to activate elevator recall. Coordinate wiring requirements and location of the elevator control panels with Elevator Contractor.
 - 2. Water-flow, pressure and tamper switches under " Fire Suppression Sprinkler System Section 13935". Provide wiring to the building fire alarm system under this Section.

1.03 REFERENCED STANDARDS

- A. National Fire Protection Association (NFPA).
 - 1. NFPA-70.
 - 2. NFPA No. 72.
 - 3. NFPA No. 90A.
 - 4. NFPA No. 101.

1.04 SUBMITTALS

- A. Product data for system components.
- B. 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 performance parameters and installation details for each detector, verifying that each detector is listed for the complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
 - 3. Addresses for all field devices on the floor plans and key lists.
- C. Calculations: Standby Battery Calculations
- D. Include floor plans to indicate final outlet locations showing zone designation of each device.
- E. System operation description including method of operation and supervision of each type of circuit and sequence of operations for all manually and automatically initiated system inputs and outputs. Manufacturer's standard descriptions for generic systems are not acceptable.
- F. Quality Assurance Submittals: Product certification signed by the manufacturer of the fire alarm system components certifying that their products comply with indicated requirements.
- G. Submission to Authority Having Jurisdiction: In addition to routine submission of the items listed above, make an identical submission to the authority having jurisdiction. Include copies of annotated Contract Drawings as required to depict component locations to facilitate review. Upon receipt of comments from the Authority, submit them for review. Make resubmissions if required to make clarifications or revisions to obtain approval.
- H. Record of field tests of system.
- I. Closeout Submittals:
 - 1. Operation and maintenance data for inclusion in Operating and Maintenance Manual specified in Division 1. Include data for each type product, including all features and operating sequences, both automatic and manual. Include recommendations for spare parts to be stocked at the site.

1.05 QUALITY ASSURANCE

- A. All equipment shall be UL listed and shall match existing system devices.
- B. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.
- C. 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.

1.06 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:
- B. Notify Owner no fewer than two days in advance of proposed interruption of fire-alarm service. Do not proceed with interruption of fire-alarm service without the Owner's written permission.

1.07 SYSTEM OPERATION

- A. Manual station alarm operation initiates a general alarm.
- B. Water-flow alarm switch operation:
 - 1. Initiates a general alarm.
 - 2. Causes flashing of the device location indicating lamp of the device that has operated.
- C. Smoke detection initiates a general alarm.
- D. Smoke detection with alarm verification causes the following:
 - 1. Audible and visible indication of an "alarm verification" signal at the FACP.
 - 2. Activation of a listed and approved "alarm verification" sequence at the FACP and the detector.
 - 3. General alarm initiation if the alarm is verified.
 - 4. FACP indication cancellation and system reset if the alarm is not verified.
- E. Duct type smoke detection operation:
 - 1. Initiates a general alarm.
 - 2. Indicates alarm at the FACP and annunciator
 - 3. Provides closure of the contact for a fan shutdown.
- F. Sprinkler valve tamper switch operation causes or initiates a supervisory audible and visible "valve tamper" signal indication at FACP and annunciator.
- G. Activation of any smoke detector in the elevator lobbies, machine room or heat detector at the top of hoistway shall:
 - 1. Initiate elevator recall sequence in accordance with the latest edition of ANSI/ASME A17.1, Section 211.
 - 2. Close a "dry contact" of the fire alarm system dedicated for operation of the elevator hoistway motorized damper.

- H. Signal Transmission: Multiplex signal transmission dedicated to fire alarm service only. System connections for alarm-initiation and alarm-indicating circuits: Class A wiring to match existing..

1.08 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, remove existing disconnected fire-alarm equipment and wiring.

PART 2 - MATERIALS

2.01 MANUFACTURERS

- A. New fire alarm initiating and indicating devices and fire alarm control panel components shall match existing. The existing system is Notifier / Norris.

2.02 SYSTEMS OPERATIONAL DESCRIPTION

- A. Alarm Indication: By horns (sound) and lights (visual).
 - 1. Signal Initiation: The manual or automatic operation of an alarm-initiating or supervisory-operating device causes the FACP to transmit an appropriate signal including:
 - a. General alarm.
 - c. System trouble.
 - 2. Transmission to a local Fire Department: Automatically, using the existing exterior fire alarm master box.
 - 3. Loss of primary power at the FACP sounds trouble signal.
 - 4. Manual station alarm operation initiates a general alarm.
 - 5. Smoke detection with alarm verification causes the following:
 - a. Audible and visible indication of an "alarm verification" signal at the FACP.
 - b. Activation of a listed and approved "alarm verification" sequence at the FACP and the detector.
 - c. General alarm initiation if the alarm is verified.
 - d. FACP indication cancellation and system reset if the alarm is not verified.
 - 6. Elevator lobbies and machine room smoke detection, and/or top of hoistway heat detector on alarm shall:
 - 1. Initiate elevator recall sequence in accordance with the latest edition of ANSI/ASME A17.1, Section 211.

2.03 MANUAL PULL STATIONS

- A. Description: Double-action type, fabricated of metal or plastic, and finished in red with molded, raised-letter operating instructions of contrasting color.
- B. Station Reset: Key- or wrench-operated, double-pole, double-throw, switch-rated for the voltage and current at which it operates. Stations have screw terminals for connections.
- C. Pull stations shall be compatible with the existing FACP and fire alarm system.

2.04 SMOKE DETECTORS

- A. General: Comply with UL 268, "Smoke Detectors for Fire Protective Signaling Systems." Include the following features:
 - 1. Factory Nameplate: Serial number and type identification.
 - 2. Operating Voltage: Compatible with existing FACP.
 - 3. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
 - 4. Plug-In Arrangement: Detector and associated encapsulated electronic components are mounted in a module that connects to a fixed base with a twist-locking plug connection. The plug connection requires no springs for secure mounting and contact maintenance. Terminals in the fixed base accept building wiring.
 - 5. Visual Indicator: Connected to indicate detector has operated.
- B. Photoelectric Smoke Detectors: Include the following features and characteristics:
 - 1. Detector Sensitivity: Between 0.67- and 3.77-percent-per-foot smoke obscuration when tested according to UL 268.

2.05 OTHER DETECTORS

- A. Thermal Detector: Rate-compensated/fixed-temperature type with plug-in base and alarm indication lamp. Detectors have a communication transmitter and receiver with unique identification and capability for status-reporting to the FACP.
- B. Duct Smoke Detector: Photoelectric-type, with sampling tube of design and dimensions as recommended by the manufacturer for the specific duct size and installation conditions where applied. Detector includes relay as required for fan shutdown. Provide auxiliary contacts. Provide remote key-operated test/alarm station for each detector.

2.06 ALARM-INDICATING DEVICES

- A. General: Equip alarm-indicating devices for mounting as indicated. Provide terminal blocks for system connections.

- B. Combination Audio Visual Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated and with screw terminals for system connections.
- 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: Semirecessed
 - 5. Matching Transformers: Tap range matched to acoustical environment of speaker location.
- D. Visible Notification Appliances: Xenon strobe lights comply with UL 1971, with clear or nominal white polycarbonate lens mounted on a faceplate. The word "FIRE" is engraved on the lens.
 - 1. Synchronization: Provide visual synchronization of the strobes in the areas where two or more visual devices are installed.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION

- A. Install the fire alarm and detection system in conformance with local and NFPA codes and standards and in accordance with these specifications and the drawings.
- B. Erect, align, set and support, and/or grout all equipment in accordance with the contract drawings and specifications.

3.02 EQUIPMENT INSTALLATION

- A. Manual Pull Stations: Mount semi-flush in recessed back boxes with bottom of station 48 inches above finished floor or as indicated.
- B. Smoke Detectors: Install ceiling-mounted detectors not less than 4 inches from a side wall to the near edge. Install detectors located on the wall at least 4 inches but not more than 12 inches below the ceiling. For exposed solid joist construction, mount detectors on the bottoms of the joists. On smooth ceilings, install detectors not over 30 feet apart in any direction. Install detectors no closer than 5 feet from air registers.
- C. Audible Alarm-Indicating Devices: Install not less than 90 inches above the finished floor nor less than 6 inches below the ceiling. Install bells and horns on flush-mounted back boxes with the device- operating mechanism concealed behind a grille or as indicated. Combine audible and visual alarms at the same location into a single unit.
- D. Visual Alarm-Indicating Devices: Unless shown otherwise, install 80 inches (to a bottom of the lens) above the finished floor and at least 6 inches below the ceiling.
- E. Device Location-Indicating Lights: Locate in the public space immediately adjacent to the device they monitor..

3.03 WIRING INSTALLATION

- A. Wiring Method: Where concealed in stud walls and above access ceilings provide UL listed fire-rated MC cabling. All cabling run exposed in utility closets, electrical rooms, mechanical rooms, and unfinished spaces shall be in EMT. Conceal raceway except in unfinished spaces and as indicated.
- B. Wiring Within Enclosures: Install conductors parallel with or at right angles to the sides and back of the enclosure. Bundle, lace, and train the 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 wiring diagrams of the system. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.
- C. Cable Taps: Use numbered terminal strips in junction, pull or outlet boxes, cabinets, or equipment enclosures where any circuit tap is made.
- D. System Wiring: For the low-voltage portion of the fire alarm system, install No. 16 AWG conductors and 75-deg C insulation in wet, damp, or dry locations. For line-voltage wiring, install No. 12 AWG size with insulation rated 75 deg C minimum.
- E. Color Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color code for alarm circuits wiring and a different color code for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visual alarm-indicating devices. Paint fire alarm system junction boxes, junction box covers, and all conduit couplings red.

3.04 TESTING AND INSPECTIONS

- A. Inspection and testing of system shall be done for demolition, new installations, and alterations to existing systems.
- B. Provide the services of an authorized technical representative of the manufacturer of the equipment to supervise the installation, adjustment and all testing of the system required to assure a complete and fully operative facility in accordance with this Specification and all fire department regulations. A signed test report substantiating this shall be submitted by the manufacturer. Personnel designated by the Owner shall be instructed in the operation, adjustment, testing and maintenance of the system by the manufacturer's representative/.
- C. The system shall be inspected by the electrical inspector for compliance with the referenced Electrical Code.
- D. Testing shall be witnessed, and final acceptance shall be made, by the Architect/Engineer.
- E. After the system has been inspected and approved, a copy of the form shall be sent to the Architect/Engineer.
- F. Upon completion of any rework necessary to correct deficiencies or problems, the system will be reinspected and approved in accordance with the above test and inspection procedure.

3.03 LABELING

- A. The Contractor shall install and label in accordance with manufacturer's instructions, current editions of the applicable NFPA and state codes.

3.04 CLEANING

- A. Fire alarm system devices, panels, etc., shall be completely cleaned prior to energizing.