



**Krannert Building
Rooms 480 and 491 Renovation – 2022
West Lafayette, Indiana
Purdue Project ID: WBSE: C.40.11555
Commission No. 453010.00**

Date: December 9, 2021

Volume 1 of 1

Architect:

Moake Park Group, Inc.

7223 Engle Road, Suite 200
Fort Wayne, IN 46804
Phone: 260.424.6516
www.moakepark.com

Mechanical/Electrical/Plumbing Engineer:

Primary Engineering, Inc.

2828 Lake Avenue
Fort Wayne, IN 46805
Phone: 260.424.0444
www.primary-eng.com

Owner:

Purdue University

610 Purdue Mall
West Lafayette, IN 47907
www.purdue.edu

SPECIFICATIONS
for
KRANNERT BUILDING ROOMS 480 AND 491 RENOVATION - 2022

Purdue University
West Lafayette, Indiana

WBSE: C.40.11555
Building Index No: K-1

December 9, 2021

KRANNERT BUILDING ROOMS 480 AND 491 RENOVATION - 2022

Purdue University
West Lafayette, Indiana

December 9, 2021

Architectural
Certified by:



Jeff E. Schroeder
Registered Architect #AR00910099



Electrical / Mechanical / Plumbing
Certified by:

Michael E. Lubbehusen
Professional Engineer # PE10302397

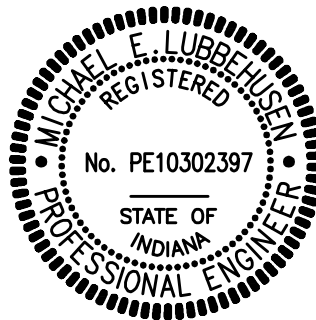


TABLE OF CONTENTS

KRANNERT BUILDING ROOMS 480 AND 491 RENOVATION - 2022

Purdue University, West Lafayette, Indiana

December 9, 2021

BIDDING DOCUMENTS (UNBOUND) Provided loose with this Specification

Bid Form - Form 96

Standard Questionnaire and Financial Statement for Bidders (Form 96A)

BIDDING DOCUMENTS TO BE PROVIDED HEREIN OR BY ADDENDUM

Advertisement for Bids A-1

BIDDING DOCUMENTS

Instructions to Bidders B-1

Supplementary Instructions to Bidders C-1

Check List and Assembly of Bid D-1

Bid Form Insert E-1

Principal Subcontractor Questionnaire F-1

Subcontractor and Material Questionnaire G-1

Alternate Proposals H-1

Unit Prices I-1

Minority Business Enterprise Program Form J-1

Combination Bid Bond & Bond for Construction K-1

CONTRACTS

AIA A101-2017 Standard Form of Agreement Between Owner and Contractor L-1

AIA A101-2017 Exhibit A Insurance and Bonds L-8

CONTRACT FORMS

Certificate of Insurance (Acord 25 Form) M-1

Contract Change Order (Purdue Form 85) N-1

Construction Invoice Voucher (Purdue Form CIV) O-1

Compliance Affidavit (Purdue Form 25) P-1

Breakdown of Application for Payment (Purdue Form 87) Q-1

Contractor's Affidavit, Waiver of Claim and Lien, Certification and Guarantee (Purdue Form 86) R-1

E-Verify Program Affidavit S-1

Contribution by Tier 1 Contractor Affidavit T-1

GENERAL CONDITIONS

General Conditions of the Contract GC-1

ADDITIONAL INFORMATION

Project Location Map PLM-1

TABLE OF CONTENTS

SPECIFICATIONS

Division 01 - General Requirements

Section 01 0100 - Project Requirements	01 0100 - 1
Section 01 2900 – Payment Procedures	01 2900 - 1
Section 01 3100 – Project Management and Coordination	01 3100 - 1
Section 01 3216 - Construction Progress Schedules	01 3216 - 1
Section 01 3523 – Owner Safety Requirements	01-3523 - 1
Section 01 5000 - Temporary Facilities and Controls	01 5000 - 1
Section 01 7700 – Contract Close-Out	01 7700 - 1

Division 02 – Existing Conditions

Section 02 4119 – Selective Demolition	02 4119 – 1
--	-------------

Division 05 – Metals

Section 05 5000 – Metal Fabrications	05 5000 – 1
--------------------------------------	-------------

Division 06 - Wood, Plstics, and Composites

Section 06 1053 – Miscelalaneous Rough Carpentry	06 1053 – 1
--	-------------

Division 07 – Thermal & Moisture Protection

Section 07 9200 – Joint Sealants	07 9200 – 1
----------------------------------	-------------

Division 08 – Openings

Section 08 1416 – Flush Wood Doors	08 1416 – 1
------------------------------------	-------------

Section 08 8000 - Glazing	08 8000 – 1
---------------------------	-------------

Division 09 – Finishes

Section 09 2216 – Non Structural Metal Framing	09 2216 – 1
--	-------------

Section 09 2900 – Gypsum Board	09 2900 – 1
--------------------------------	-------------

Section 09 6513 – Resilient Base & Accessories	09 6513 – 1
--	-------------

Section 09 6813 – Tile Carpeting	09 6813 – 1
----------------------------------	-------------

Section 09 9100 - Painting	09 9100 – 1
----------------------------	-------------

Division 12 – Furnishings

Section 12 3200 – Manufactured Wood Casework	12 3200 - 1
--	-------------

Section 12 3661 – Solid Surface Countertops	12 3661 – 1
---	-------------

Division 21 – Fire Suppression

Section 21 1313 – Wet-Pipe Sprinkler Systems	21 1313 – 1
--	-------------

Division 22 – Plumbing

Section 22 0100 – Plumbing Common Requirements	22 0100 – 1
--	-------------

Section 22 0518 – Escutcheons for Plumbing Piping	22 0518 – 1
---	-------------

Section 22 0523.12 – Ball Valves for Plumbing Piping	22 0523.12 – 1
Section 22 0719 – Plumbing Piping Insulation	22 0719 – 1
Section 22 1119 – Domestic Water Piping Specialties	22 1119 – 1
Section 22 1316 – Sanitary Waste and Vent Piping	22 1316 – 1
Section 22 1319 – Sanitary Waste Piping Specialties	22 1319 – 1
Section 22 1319.13 – Sanitary Drains	22 1319.13 – 1
Section 22 4216.16 – Commercial Sinks	22 4216.16 - 1
Division 23 – Heating, Ventilating, and Air Conditioning (HVAC)	
Section 23 3113 – Metal Ducts	23 3113 – 1
Section 23 3300 – Air Duct Accessories	23 3300 – 1
Section 23 3713.23 – Registers and Grilles	23 3713.23 – 1
Division 26 – Electrical	
Section 26 0100 – Electrical Common Requirements	26 0100 – 1
Section 26 0519 – Low Voltage Electrical Power Conductors and Cables	26 0519 – 1
Section 26 0526 – Grounding and Bonding for Electrical Systems	26 0526 – 1
Section 26 0529 – Hangers and Supports for Electrical Systems	26 0529 – 1
Section 26 0533 – Raceways and Boxes for Electrical Systems	26 0533 – 1
Section 26 0544 – Sleeves and Sleeve Seals for Electrical Raceways and Cabling	26 0544 – 1
Section 26 0553 – Identification for Electrical Systems	26 0553 – 1
Section 26 2726 – Wiring Devices	26 2726 – 1
Section 26 2816 – Enclosed Switches and Circuit Breakers	26 2816 – 1
Section 26 5119 – LED Interior Lighting	26 5119 – 1
Section 26 5213 – Emergency and Exit Lighting	26 5213 – 1
Division 27 – Communications	
Section 27 0100 – Communications Common Requirements	27 0100 – 1
Section 27 0528 – Pathways for Communicatoins Systems	27 0528 – 1
Section 27 0529 – Hangers and Supports for Communications Systems	27 0529 – 1
Section 27 0553 – Identification for Communications Systems	27 0553 – 1
Section 27 1513 – Communications Copper Horizontal Cabling	27 1513 – 1
Division 28 – Electronic Safety and Security	
Section 28 4621.11 – Addressable Fire-Alarm Systems	28 4621.11 – 1

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ADVERTISEMENT FOR BIDS

The Trustees of Purdue University will receive sealed bids for the following projects until 3:00 p.m. Eastern Standard Time (EST) on the 13th day of January 2022 in the offices of Capital Asset Management, 2550 Northwestern Avenue, Suite 1100, West Lafayette, IN 47906.

1. West Lafayette Campus – Krannert Building Rooms 480 and 491 Renovation – 2022
2. West Lafayette Campus – Materials and Electrical Engineering Room 289 Renovation - 2022
3. West Lafayette Campus – Multiple Buildings Address Pro Lighting Controls Replacement - 2022
4. West Lafayette Campus – Stone Hall Room G50 Lab Renovation - 2022
5. West Lafayette Campus – Utility Tunnel Security Phase I – 2022
6. West Lafayette Campus – Wade Utility Plant Security Installation Phase II - 2022

Bids will then be publicly opened and read aloud in the offices of Capital Asset Management, 2550 Northwestern Avenue, Suite 1100, West Lafayette, IN 47906.

Bids received after such time will be returned unopened. Bids may be withdrawn prior to such time, but no bids shall be withdrawn for a period of sixty (60) days thereafter.

The Principal Subcontractor Questionnaire listing the names of the bidder's principal subcontractors shall be submitted with the bid. The remainder of the Questionnaires and Material Lists shall be submitted prior to 3:00 p.m. (EST) on the 20th day of January 2022, to:

Capital Asset Management
2550 Northwestern Avenue, Suite 1100
West Lafayette, IN 47906
Phone (765) 494-0580

Bids shall be for complete construction only, properly executed and submitted on Form 96, accompanied by executed Form 96A (as prescribed by the State Board of Accounts) giving financial data as recent as possible, and a Non-Collusion Affidavit together with other documents as required by the Instructions to Bidders and addressed to The Trustees of Purdue University, clearly marked with the project and the bid opening date.

Each bid must be accompanied by the Contractor's written plan for a program to test the contractor's employees for drugs in accordance with IC 4-13-18.

Each bid must be accompanied by a Contractor's Combination Bid Bond and Bond for Construction in the form included in the specifications made payable to The Trustees of Purdue University in an amount equal to the maximum total of the base bid and any alternate bids, guaranteeing the execution and faithful performance of the contract for the work if awarded.

The Instructions to Bidders contained in the specifications for the projects are by this reference made a part hereof, and all bidders shall be deemed advised of the provisions thereof, and of the General Conditions of the contract, specifications, plans and drawings for the project.

A voluntary pre-bid meeting for Project No. 1 will be held on January 4, 2022 at 11:00 a.m. EST. The meeting will be held in Room 480 of Krannert Hall (KRAN), located at 402 W. State St., West Lafayette, IN.

A voluntary pre-bid meeting for Project No. 2 will be held on January 4, 2022 at 2:30 p.m. EST. The meeting will be held in Room 289 of Materials and Electrical Engineering (MSEE), located at 501 Northwestern Ave., West Lafayette, IN.

A voluntary pre-bid meeting for Project No. 3 will be held on January 4, 2022 at 11:00 a.m. EST. The meeting will be held in Room 1021 of Armstrong Hall (ARMS), located at 701 W. Stadium Ave., West Lafayette, IN.

A voluntary pre-bid meeting for Project No. 4 will be held on January 4, 2022 at 1:00 p.m. EST. The meeting will be held in Room G50 of Stone Hall (STON), located at 700 W. State St., West Lafayette, IN.

A voluntary pre-bid meeting for Project No. 5 will be held on January 3, 2022 at 1:00 p.m. EST. The meeting will be held in Room 102 of the Utility Plant Office Facility (UPOF), located at 419 S. Grant St., West Lafayette, IN. Following the meeting bidders will have an opportunity to visit the project site.

A voluntary pre-bid meeting for Project No. 6 will be held on January 4, 2022 at 10:00 a.m. EST. The meeting will be held in Room 102 of the Utility Plant Office Facility (UPOF), located at 419 S. Grant St., West Lafayette, IN. Following the meeting bidders will have an opportunity to visit the project site.

The architectural/engineering firms for these projects are:

- | | |
|--------------------|---|
| Project No. 1 | Moake Park Group, Inc.
7223 Engle Road, Suite 200
Fort Wayne, IN 46804
Phone (260) 424-6516 |
| Project Nos. 2 & 4 | MSKTD & Associates
1715 Magnavox Way
Fort Wayne, IN 46804
Phone (260) 432-9337
Fax (260) 436-2402 |
| Project No. 3 | Loftus Engineering, Inc.
201 South Capitol Ave, Suite 310
Indianapolis, IN 46225
Phone (317) 352-5822 |
| Project No. 5 | Applied Engineering Services
5975 Castle Creek Parkway, North Drive, Suite 300
Indianapolis, IN 46250
Phone (317) 810-4141 |
| Project No. 6 | Nova Engineering, PC
2338 S. Cline Ave.
Scherville, IN 46375
Phone (219) 865-3352
Fax (219) 865-3464 |

To view or obtain bid documents online:

Repro Graphix Inc.
437 N. Illinois St
Indianapolis, IN 46204

Web: PurduePlanroom.com
Phone: 1-800-718-0035
Email: Plans@Reprographix.com

A \$300 deposit will be required for each hardcopy set of bidding documents. One compact disk or download is available at no charge. Postage and handling fee may apply.

All orders must be placed online but bidders may choose to pick up orders at:

Purdue Print & Digital Services delivered by Xerox:
698 Ahlers Drive
West Lafayette, IN 47907
Phone: 765-494-2006


Bidding Documents are on file in the office of:

Senior Vice President for Administrative Operations
2550 Northwestern Avenue, Suite 1100
West Lafayette, IN 47906
Phone (765) 494-0580

The Board of Trustees of The Trustees of Purdue University reserves the right to reject any and all bids and to waive, to the extent permitted by law, any of the terms, conditions and provisions contained in this Advertisement for Bids or the Instructions to Bidders or any informality, irregularity or omission in any bid, provided that such waiver shall, in the discretion of the Board of Trustees, be to the advantage of The Trustees of Purdue University.

THE TRUSTEES OF PURDUE UNIVERSITY

By

DocuSigned by:

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James K. Keefe
Senior Director of Capital Asset Management

Date: 11/29/2021

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BIDDING DOCUMENTS

INSTRUCTIONS TO BIDDERS

IB1.01 GENERAL

These Instructions to Bidders are a part of the Advertisement for Bids for the complete construction of the project in strict accordance with the Specifications, Plans and Drawings.

IB1.02 BID INCLUDES ALL COSTS

The amount of each Bid shall be deemed to include the entire cost and expense of every item of labor and material necessary to complete the work bid upon, in full detail ready for use and occupancy; and the risk of all such costs and expenses shall be deemed assumed by the successful Bidder. Bidders will not be given extra payment for conditions which could have been determined by examining the site and Contract Documents.

IB1.03 INTERPRETATION OF DOCUMENTS

Bidders contemplating submitting a Bid for the proposed project who are in doubt as to the true meaning of any part of the Contract Documents shall submit to the Architect listed in the Advertisement for Bids, (Legal company name) at least 10 days prior to the date for opening Bids, a written request for an interpretation.

Requests for interpretation may include (but are not limited to) any ambiguity, inconsistency, discrepancy, error or omission which occurs in the Contract Documents or for materials, equipment, or methods which in the Bidder's opinion adversely affect the cost or quality of the project, or are unavailable.

A Bidder's failure to request a clarification, interpretation, or correction of any ambiguity, inconsistency or error will preclude that Bidder from thereafter claiming for any reason, including the withdrawal of the Bid or in connection with a claim for "extras", any ambiguity, inconsistency or error which was either discovered by the Bidder or which should have been discovered by a reasonably prudent Bidder.

Any interpretation of the Contract Documents and any modification of the Contract Documents will be made only by an Addendum duly issued. A copy of such Addendum will be mailed or delivered to each person receiving a set of the Contract Documents and to such other prospective Subcontractors and material suppliers as have requested that they be furnished with a copy of each Addendum.

IB1.04 QUANTITIES

Stated quantities, if any, in the Contract Documents are approximate only and each Bidder shall make its own estimate of quantities and calculate its Bid accordingly.

IB1.05 SITE CONDITIONS

Bidders shall inform themselves of all the conditions under which the work is to be performed, including the site of the proposed work, any obstacles which may be encountered thereon, and all other relevant matters concerning the proposed work. Each Bid shall be deemed to include all costs and expenses in connection with all such conditions, obstacles and matters.

INSTRUCTIONS TO BIDDERS

Bidders shall make arrangements with the Owner's Physical Facilities Office for site visit. The Bidder's attention is directed to the provisions of Article 10 of the General Conditions and the Supplementary Conditions, if any, relating to Hazardous Waste.

IB1.06 SUBMISSION OF BIDS AND QUESTIONNAIRES

The Bidder shall submit its Bid on Form 96 as required in the Advertisement for Bids. Alternate Proposals and Unit Prices (if included in the Specifications) and acknowledgment of each Addendum (including date of Addendum and signature) shall be entered on Bid Form 96.

- A. In order for a Bid to be considered, each Bid shall be accompanied by the following documents:
1. Non-collusion affidavit
 2. Form 96A (See Section IB1.06C)
 3. Combination Bid Bond and Bond for Construction, in the form as set forth in the Specifications. The successful Bidder's bonding company will be notified of a contract to a firm they are bonding. The Bidder will need to provide contact name, mailing address and phone number of the bonding company with the bid. Bonds of unsuccessful Bidders will only be returned on request.
 4. Principal Subcontractor Questionnaire (if included in the Specifications). Principal Subcontractors listed are not permitted to be changed without the permission and approval of the Architect/Engineer.
 5. Proof of status as licensed Plumbing Contractor (if required by IB1.11).
 6. Proof of minority business enterprises (MBE) participation in accordance with the requirements of IB1.12 MINORITY CONTRACTORS.
 7. Contractor's written plan for a program to test the Contractor's employees for drugs in accordance with IC 4-13-18 (see Section IB1.14).
- B. Bid and accompanying documents shall be enclosed in a sealed opaque envelope. Envelope shall be addressed to the Trustees of Purdue University and clearly labeled with the following information:
1. Contents
 2. Project Title
 3. Name and Address of the Bidder
 4. Date and Time of Bid Opening
- C. Financial Information Form 96A:
- The financial information required by Form 96A shall be furnished as of the most recent date for which such information is available, and in no event shall such date be more than 12 months prior to the date of the Bid; furthermore, if such date is more than 90 days prior to the date of the Bid, the Bidder shall also furnish a written statement to the effect that as of the date of the Bid there have not been any changes which have materially and adversely affected the financial condition as set forth in Form 96A.

INSTRUCTIONS TO BIDDERS

D. Subcontractor Lists and Material Lists:

The low Bidder (and the second and third Bidders, if requested) shall execute and submit to the Owner within seven (7) days after the date and time for receiving Bids, in the forms included in the Specifications, the SUBCONTRACTOR LIST and MATERIAL LIST stating the names of the Bidder's Subcontractors and the various materials and appliances proposed to be furnished for the Project.

1. On these lists the Bidder shall submit only the names of the Subcontractors and manufacturers (or fabricators) of materials, appliances and specialties that the Bidder can, if required, fully demonstrate or prove they are capable of meeting the requirements of the Drawings and Specifications in all respects.
2. In such cases, the Architect shall give careful consideration to all matters submitted to the Architect by the Bidder. If in the Architect's opinion there is just cause for rejection, the Bidder shall submit substitute names for consideration until approved. The Bidder shall not be entitled to extra compensation for any such required substitute. Upon approval, the name submitted may not be changed by the Bidder without the permission and approval of the Architect.
3. Contractor shall submit evidence of all required certifications and other qualifications as detailed in the project specifications with these lists.

OWNER RESERVES THE RIGHT TO REJECT BID IF BIDDER FAILS TO SUBMIT DOCUMENTS PURSUANT TO THE INSTRUCTIONS SET FORTH ABOVE.

In order to effectively implement the objectives of the foregoing provisions and to assure the timely receipt of accurate Bids, the Bidder is requested to urge all Subcontractors intending to submit a proposal for work involved in the project to submit to all Bidders to whom they intend to bid, a written proposal (or written abstract) with or without price, outlining in detail the specific sections of the Specifications to be included in their work as well as any exceptions or exclusions there from. It is suggested that such written proposal be submitted to the Bidder at least 48 hours in advance of the Bid Opening.

E. Bid Signatures

Bids which are not signed by individuals making them shall have attached thereto a power-of-attorney evidencing authority to sign the Bid in the name of the person for whom it is signed.

Bids which are signed for a partnership shall be signed by all of the partners or by an attorney-in-fact. If signed by an attorney-in-fact, there shall be attached to the Bid a power-of-attorney evidencing authority to sign the Bid, executed by the partners.

Bids which are signed for a corporation shall have the correct corporate name thereof and the signature of the president or other authorized officer of the corporation, manually written below the corporate name following the word "By". If such a Bid is manually signed by an official other than the president of the corporation a certified copy of a resolution of the Board of Directors evidencing the authority of such official to sign the Bid shall be attached to the Bid. Such Bid shall also bear the attesting signature of the secretary of the corporation and the impression of the corporate seal.

INSTRUCTIONS TO BIDDERS

F. Modification or Withdrawal of Bid:

Any Bidder may withdraw his Bid at any time prior to the scheduled time for the receipt of Bids.

Bids may be modified any time prior to the scheduled time for the receipt of Bids.

Any Bidder may modify its Bid by facsimile communication or by U.S. Mail at any time prior to the scheduled closing time for receipt of Bids, provided such communication is received by the Owner prior to the closing time, and provided further, the Owner is satisfied that a written confirmation of the telegraphic modification over the signature of the Bidder was mailed prior to the closing time. The modifying communication should not reveal the Bid price but should only provide the addition or subtraction or other modification(s) so that the final prices or terms will not be known by the Owner until the sealed Bid is opened.

If written confirmation of the facsimile communication is not received within two days after the closing time, no consideration will be given to facsimile communication.

IB1.07 TIME OF COMPLETION

The attention of each Bidder is directed to the provisions of § 8.3.3 of the General Conditions of the Contract and Division One pertaining to time of completion.

IB1.08 CONTRACT

The successful Bidder shall be required to execute and deliver two (2) original copies each of the Contract (and three (3) copies of the Escrow Agreement, if required) and to deliver the policies and/or Certificate of Insurance - all within 10 days after the Contract is awarded. The Contract shall be deemed awarded when written Notice of Award has been delivered to the successful Bidder by facsimile transmission, followed with the original delivered via U.S. Mail addressed to the address of the Bidder as shown on its Bid or accompanying documents.

IB1.09 FORM OF CONTRACT

The Contract to be executed by the successful Bidder shall be in the form entitled "The Standard Form of Agreement Between Owner and Contractor where the basis for payment is a Stipulated Sum" – published by the American Institute of Architects with such insertions, additions, and changes are required by the successful Bid and Specifications. (The Owner will provide form for execution.)

IB1.10 SPECIAL PROVISIONS REGARDING RETAINAGE, BONDS AND PAYMENT OF CONTRACTORS AND SUBCONTRACTORS

The laws of the State of Indiana (IC 5-16-5.5-3 as amended) contain certain special provisions regarding retainage, bonds and payment of Contractors and Subcontractors. The contracts and subcontracts entered into between a Contractor and the Trustees of Purdue University in excess of \$200,000 will be governed by these provisions. The attention of the Bidder is called to the AIA A101 Exhibit A, Insurance and Bonds, regarding these provisions.

INSTRUCTIONS TO BIDDERS

IB1.11 LICENSED PLUMBING CONTRACTORS

To the extent that all or any portion of the work to be performed hereunder involves the installation of plumbing then each Bidder who submits a Bid must also submit, together with its Bid, evidence that the Bidder is a licensed Plumbing Contractor as defined in I.C. 25-28.5-1.

The following information will be acceptable as the required "evidence" (accompanying proof of license) for Complete Construction Bids.

Submit the proposed Subcontractor's License Number opposite the Subcontractor's Name on the PRINCIPAL SUBCONTRACTOR QUESTIONNAIRE.

At the time of submittal of the SUBCONTRACTOR LIST - MECHANICAL CONSTRUCTION include a photocopy of the Contractors License.

IB1.12 MINORITY CONTRACTORS

Bidders shall take all necessary and reasonable steps to ensure that minority business enterprises (MBE's) have the maximum opportunity to compete for and perform work included in the contract documents. For assistance in identifying MBE/WBE subcontractors and suppliers for your project, contact Purdue University's Office of Supplier Diversity Development at (765) 494-7270.

The award of the Contract will be made to the lowest and best Bidder when all other requirements have been met and good faith efforts have been taken towards meeting the stated MBE goal.

The Owner, at its discretion, may waive in part or in whole the minority business enterprise requirement if in the opinion of the Owner it would be impractical, or not in the best interest of the Owner.

MBE/WBE Program Forms:

A. With the Bid:

- 1. MBE/WBE Subcontractor Plan form** - Bidders shall indicate minority business enterprises accepted by completing this form and placing (MBE/WBE) after the name listed on the Principal Subcontractor Questionnaire submitted with the Bid.
- 2. MBE/WBE Program Documentation form** - Submit, on this form, an explanation of what positive efforts have been taken to achieve the stated MBE/WBE goal. Documentation of all outreach, contacts, and responses should be included. Reasons for acceptance or non- acceptance shall be so stated. Submission of incomplete explanations and documentation may result in the Bid being rejected.

INSTRUCTIONS TO BIDDERS

- B. By the date in the ADVERTISEMENT FOR BID (usually 7 days after bid opening):
1. **MBE/WBE Letter of Intent to Perform form** – The low Bidder, and the second and third, if requested, shall complete and submit as per the instructions on the form. The low Bidder, and the second and third, if requested, shall indicate MBE/WBE participation by Subcontractors and material suppliers by placing MBE/WBE after the names listed on the Subcontractor and Material Questionnaire submitted in accordance with the ADVERTISEMENT FOR BID.
 2. Bidders shall also submit proof of MBE/WBE certification for each MBE/WBE listed. Certification shall be by: State of Indiana Department of Administration Minority Business Development; Indiana Regional Minority Development Council; or Indiana Department of Transportation.
- C. During construction:
1. **Monthly MBE/WBE Utilization form** – On the larger projects (as determined by the Owner), the Contractor must submit this form monthly with their pay application as per its instructions and the provisions of § 13.8 of the General Conditions of the Contract.

IB1.13 ORGANIZATION OF SPECIFICATIONS AND DRAWINGS

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 the work to be performed by any trade.

IB1.14 DRUG TESTING OF EMPLOYEES OF PUBLIC WORKS CONTRACTORS

The laws of the State of Indiana (IC 4-13-18 as amended) contain special provisions regarding drug testing of employees of public works Contractors and Subcontractors. As determined by the Owner, projects estimated to be in excess of \$150,000.00 will be governed by these provisions. The attention of the Bidder is called to the General Conditions of the Contract, § 13.8, regarding these provisions.

IB1.15 SUBSTITUTIONS

- A. During Bidding, Architect will consider written requests from Prime Bidders for substitutions, received at least ten days prior to bid date; requests received after that time will not be considered.
- B. Submit two copies of request for substitution. Include in request:
1. Complete data substantiating compliance of proposed substitution with Contract Documents.
 2. Product Data:
 - a. Product identification, including manufacturer's name and address.
 - b. Manufacturer's literature:
 - i. Product description.
 - ii. Performance and test data.
 - iii. Reference standards.
 - c. Samples.

INSTRUCTIONS TO BIDDERS

- d. Name and address of similar projects on which product was used, and date of installation.
 3. Construction Methods:
 - a. Detailed description of proposed method.
 - b. Drawings illustrating methods.
 4. Itemized comparison of proposed substitution in comparison with product or method specified.
 5. Data relating to changes in construction schedule.
 6. Relation to other work.
 7. Accurate cost data on proposed substitution in comparison with product or method specified.
- C. In making request for substitution, Bidder/Contractor represents:
1. He has investigated proposed product or method, and determined that it is equal or superior in all respects to that specified.
 2. He will provide the same guarantee for substitution as for product or method specified.
 3. He will coordinate installation of accepted substitution into work, making such changes as may be required for work to be complete in all respects.
 4. He waives all claims for additional costs related to substitution which consequently become apparent.
 5. Cost data is complete and includes all related costs under this Contract.

IB1.16 (RESERVED)

IB1.17 OWNER SAFETY REQUIREMENTS

The Contractor performing work at the Project site shall, at no cost to the Owner, demonstrate commitment to workplace safety, safe work practices, and compliance with all applicable safety requirements. See Section 01 3523, Owner Safety Requirements.

The bidding contractor shall provide with the bid, their documentation in accordance with the requirements of Section 01 3523, unless the bidder is utilizing IOSHA's INSafe Program. If utilizing the INSafe Program, Contractor shall copy Purdue University with their request to INSafe for a consultation within 3 working days of being notified that they are the apparent low bidder.

IB1.18 CONTRACT AWARD AND SUBCONTRACTOR APPROVAL

Pursuant to I.C. 5-16-1-1.2 Purdue will award a contract for performance of the work to the "lowest and best bidder who submits a bid for the performance of the work." In determining the "lowest and best bidder" and the suitability of proposed subcontractors, Purdue reserves the right to consider all relevant factors including without limitation: ability and capacity, capital, character and reputation, competency and efficiency, energy, experience, facilities, faithfulness, fraud or unfairness in previous dealings, honesty, judgment, pending legal proceedings, promptness, quality of previous work, and suitability to the particular task. Information on pending litigation between Purdue and prospective bidders and subcontractors is available via the Court Records link at <http://www.tippecanoe.in.gov/>.

INSTRUCTIONS TO BIDDERS

IB1.19 CONTRACTOR PRE-QUALIFICATIONS

Pursuant to I.C. 5-16-13-10(c), bidders must be pre-qualified under I.C. 4-13.6-4 or I.C. 8-23-10. The attention of the Bidder is called to the General Conditions of the contract, § 13.15 regarding these provisions.

IB1.20 CONTRIBUTION BY TIER 1 CONTRACTOR

Pursuant to I.C. 5-16-13-9 The Tier 1 Contractor must contribute in work, material, services, or any combination thereof, at least fifteen percent (15%) of the awarded contract price. The Contractor shall execute and submit the Contribution by Tier 1 Contractor Affidavit to the Owner with its Waiver of Lien. The attention of the Bidder is called to the General Conditions of the Contract, § 13.13 regarding these provisions.

IB1.21 E-VERIFY PROGRAM

The laws of the State of Indiana (I.C. 5-16-13-11(1) and 22-5-1.7 as amended) contain special provisions regarding contractors enrolling and participating in the E-Verify program. The low Bidder (and the second and third Bidders, if requested), within seven (7) days after the date and time for receiving Bids, shall execute and submit the E-Verify Program Affidavit to the Owner. The attention of the Bidder is called to the General Conditions of the Contract, § 13.14 regarding these provisions.

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

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CHECK LIST AND ASSEMBLY OF BID

Complete and assemble bids as listed below:

I. Bid Form Insert

- a. Use Bid Form No. 96 as provided filling in all information applicable and required under PART I for a complete and correctly prepared Bid Submittal.
- b. Use the Bid Form Insert, succeeding page(s), as a supplement to Bid Form No. 96.
 - i. The Bid Form Insert as prepared for this Project has spaces for the Base Bid, Complete Construction amount, Alternate Bid Proposals requested, and Addendum acknowledgment.
- c. Attach this "Bid Form Insert" to the top of page 3 of Form No. 96 just above PART II.
- d. Do not use PART II of Bid Form 96. Use General Form No. 96A, Revised 1949, as issued with the Specifications to all Prime Bidders.

II. Bid Form No. 96

- a. The Non-collusion Affidavit located on the last page of the Bid Form No. 96, is to be signed by an officer of the company or corporation and notarized.
- b. The Bid Form No. 96 is to be signed on the lower half of the inside page, by an authorized individual or officer(s) of the company or corporation. If the Bid is signed by someone other than an officer of the company or corporation, a Board Resolution is to be submitted with the Bidding Documents giving said person signature authority.

III. Standard Questionnaire and Financial Statement for Bidders (Form 96A)

- a. Page 8 of the Form 96a is to be signed, dated and notarized.
- b. Page 9 of the Form 96a is to be dated. In no event shall the Financial Statement be dated more than 12 months prior to date of Bid. If the date is more than 90 days prior to the date of Bid, the Bidder shall submit a statement of their financial condition with their Bid as set forth in Section IB1.06(C) of the Instructions to Bidders.
- c. Statement of True Financial Condition section on page 15 of the Form 96a is to be signed and sealed as instructed.
- d. The appropriate Affidavit section on page 15 of the Form 96a is to be signed by an individual or officer of any company or corporation and notarized by a Notary Public.

IV. Combination Bid Bond & Bond for Construction

- a. The penal sum of the Contractor's Combination Bid Bond and Bond for Construction is to be for the maximum amount of the Bid. The maximum amount of the Bid is the total of the base bid plus all add alternates.
- b. The Combination Bid Bond and Bond for Construction as included in the Specifications is to be signed and dated on the second page by an officer of the company or corporation and the Bonding Company's representative. A copy of the power of attorney is to be attached to bond, authorizing said person to execute documents on behalf of the Bonding Company.

CHECK LIST AND ASSEMBLY OF BID

V. Principal Subcontractor Questionnaire

- a. If a Principal Subcontractor Questionnaire is included in the Specifications, it is to be filled out complete with one Subcontractor's name and address for each subcontract requested, and for any subcontract greater than \$150,000 (specifically requested or not) signed by an officer of the company or corporation, and submitted with the Bidding Documents.

VI. Minority Business Enterprise Program Forms

- a. Submit proof of minority business enterprises (MBE) participation in accordance with the requirements of IB1.12 MINORITY CONTRACTORS.

VII. Contractor's Written Drug Testing Program

- a. Submit contractor's written drug testing program in accordance with the requirements of IB1.14 DRUG TESTING OF EMPLOYEES OF PUBLIC WORKS CONTRACTORS. Requirement for the plan is determined by the owner's estimate of the project cost (for applicability, see Advertisement for Bid).

VIII. Compliance with Owner's Safety Requirements

- a. Submit documentation in accordance with the requirements of IB1.17 OWNER SAFETY REQUIREMENTS.

IX. Other Project Specific Documents

- a. If applicable, include any other remaining documentation required to be submitted with the bid.

BID FORM INSERT

KRANNERT BUILDING ROOMS 480 AND 491 RENOVATION - 2022

Purdue University, West Lafayette, Indiana

Following notices given and having carefully examined the Contract Documents as well as the premises and conditions affecting the work, the undersigned proposes to furnish all labor and materials, necessary tools, expendable equipment, and all utility and transportation services and to perform all work required by and in strict accordance with the above named documents, prepared by Moake Park Group, Inc., now on file in the office of the Vice President for Physical Facilities, Purdue University, West Lafayette, Indiana, and Moake Park Group, Inc. as stated below.

BID PROPOSALS

Bidder agrees to perform all items of work as shown on the Drawings and/or described in the Specifications or Addenda, for the amounts shown as follows:

(Amount for Bids shall be shown in both words and figures. In case of discrepancy, the amount shown in words will govern).

BASE BID: The complete construction as required by the Contract Documents for the sum of

_____ Dollars (\$ _____)

ADDENDA

The Bidder acknowledges receipt of the following Addenda:

ADDENDUM # _____ DATED _____

PRINCIPAL SUBCONTRACTOR QUESTIONNAIRE

KRANNERT BUILDING ROOMS 480 AND 491 RENOVATION - 2022

Purdue University, West Lafayette, Indiana

Principal Subcontractor Questionnaire

Submitted by _____

(To be submitted by each Bidder with his Bid)

Bidder to list subcontractors as requested below. **In addition to the requested subcontractors, Bidder to list all subcontractors that will have subcontracts greater than \$150,000.**

If awarded the complete construction contract, I/WE propose to have the following Subcontractors.

	<u>SUBCONTRACTOR - COMPLETE ADDRESS</u> (List the Subcontractor firms only)	Indicate if MBE/WBE/DBE
Mechanical Construction	_____ NAME	_____
	_____ ADDRESS	
Electrical Construction	_____ NAME	_____
	_____ ADDRESS	
Concrete	_____ NAME	_____
	_____ ADDRESS	

These Subcontractors have been advised of the applicable labor provisions as set forth in the Contract Documents and these labor provisions will be included in all Subcontracts.

PRINTED NAME & TITLE

SIGNATURE

DATE

SUBCONTRACTOR AND MATERIAL QUESTIONNAIRE

SUBMITTED BY: _____

KRANNERT BUILDING ROOMS 480 AND 491 RENOVATION - 2022

Each Bidder shall indicate under appropriate headings in the following form, the material, equipment, and specialties he proposes to incorporate in the work if awarded the Contract.

This form filled out in detail by the Bidder shall be submitted as required under "Instructions to Bidders".

The Bidder whose proposal is accepted will be required to furnish the materials, equipment and specialties he has listed herein unless such items do not, in the opinion of the Architect, comply with the requirements and intent of the Specifications and Plans. In the event that certain materials, equipment or specialties hereinafter listed by the successful Bidder do not, in the opinion of the Architect, comply with said requirements or intent, the successful Bidder will be required (as the Contractor) to furnish and substitute items which are in strict accordance with the Specifications and Plans and as approved by the Architect.

LIST OF SUBCONTRACTORS

If awarded the Construction Contract, I/We propose to employ the following listed Subcontractors:

<u>BRANCH OF WORK</u>	<u>NAME OF SUBCONTRACTOR</u>	Indicate if MBE/WBE
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

<u>MATERIALS, EQUIPMENT, & SPECIALTIES</u>	<u>MANUFACTURERS</u> (Not Subcontractors)
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

ALTERNATE PROPOSALS

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UNIT PRICES

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MINORITY BUSINESS ENTERPRISE PROGRAM FORM

MBE/WBE/VBE SUBCONTRACTOR PLAN

PROJECT TITLE KRANNERT BUILDING ROOMS 480 AND 491 RENOVATION - 2022

BIDDER _____ BID DATE _____

The following minority/women owned firms will be subcontracting on the project according to the following schedule:

Indicate MBE/WBE/VBE	MBE/WBE/VBE Firm	Trade	Amount	Contact Name	Phone

THIS DOCUMENT MUST BE INCLUDED IN YOUR SEALED BID PACKAGE

MINORITY BUSINESS ENTERPRISE PROGRAM FORM

DOCUMENTATION OF EFFORT TO MEET MBE/WBE/VBE PARTICIPATION GOAL

MBE/WBE Program Documentation is hereby submitted for the project listed below:

PROJECT TITLE KRANNERT BUILDING ROOMS 480 AND 491 RENOVATION - 2022

BIDDER _____ BID DATE _____

Describe the efforts made to achieve the minority/women’s business enterprises participation goal for this project. Attach a copy of all solicitation efforts, e.g., ads that were published or networking events, etc.

- Unable to locate MBE/WBE/VBE engaged in _____ (Trade)
- Unable to secure competitive price in _____ (Trade)
- Other (See attached description)

LIST BELOW THE MBE/WBE/VBE FIRMS CONTACTED INDIVIDUALLY FOR THIS PROJECT

Indicate MBE/WBE/VBE	MBE/WBE/VBE Firms Contacted (list company and commodity)	Type of Attempt	Date(s) Attempted	Quote Rec'd – Not Low	No Response

THIS DOCUMENT MUST BE INCLUDED IN YOUR SEALED BID PACKAGE

MINORITY BUSINESS ENTERPRISE PROGRAM FORM

KRANNERT BUILDING ROOMS 480 AND 491 RENOVATION - 2022

(project title)

MBE/WBE/VBE LETTER OF INTENT TO PERFORM

(To be completed by the MBE/WBE/VBE and submitted to pfpmc@purdue.edu by successful bidder prior to contract award.)

The MBE/WBE/VBE status of the undersigned must be confirmed prior to contract award. The undersigned intends to perform work in connection with the above

project as a: contractor subcontractor supplier joint venture

The undersigned has agreed to provide the following work, trades, services or supplies:

at the following price: \$ _____

The following commencement and completion dates for subcontracted work is:

Commencement Date: _____ Completion Date: _____

The undersigned will enter into formal contract or purchase order agreement with _____
_____ for the above work, trades, services or supplies contingent upon
prior execution of a contract between said company and
_____.

Name of Minority/Women/Veteran Contractor (please print)

Address

Phone No.

Company Office Name & Title (please print)

Signature

MINORITY BUSINESS ENTERPRISE PROGRAM FORM

CONTRACTOR'S COMBINATION BID BOND AND BOND FOR CONSTRUCTION

Having submitted a bid or proposal ("Bid") dated _____ to enter into a binding contract ("Contract") with The Trustees of Purdue University ("Purdue") for the construction or demolition of the project known as **KRANNERT BUILDING ROOMS 480 AND 491 RENOVATION - 2022** ("Project"), in West Lafayette, Indiana the bidder/proposer _____ ("Principal") and _____ ("Surety") represent, warrant and guarantee to Purdue that:

1. The Principal and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, trustees, successors and assigns to the Owner for the performance of the Contract, which is completely incorporated by reference herein, in the penal sum of _____ Dollars (\$ _____).
2. If Purdue awards the Contract to the Principal and the Principal: a) enters into the Contract; b) performs the work required by the Contract; and c) promptly makes payment of all sums due and owing to persons making claim pursuant to the applicable provisions of I.C. 5-16-5, I.C. 5-16-5.5 or the equivalent provisions of I.C. 5-30, or I.C. 5-32, as the case may be, and defends, indemnifies and holds harmless Purdue from such claims or suits seeking payment for labor, material or equipment furnished for use in the performance of the Contract, then the Principal and Surety shall have no further obligation under this Bond.
3. If Purdue awards the Contract to the Principal pursuant to I.C. 5-16 and the Principal refuses, without substantial equitable justification, to enter into the Contract then the Principal and Surety shall be jointly and severally liable to Purdue in an amount equal to the difference between the Principal's Bid and that of the successful bidder/proposer.
4. If the Principal enters into the Contract and the Principal fails to perform in accordance with the requirements of the Contract, including without limitation the plans and specifications and any other documents identified in the Contract which establish the work to be performed by the Principal, Purdue shall give such notice to the Principal and Surety as may be required by the Contract or applicable statute and may thereafter declare the Principal to be in default and terminate the Contract. The Principal and Surety shall then be jointly and severally liable to Purdue for all costs reasonably and necessarily incurred by Purdue in completing the Project. If the Surety does not proceed to promptly make arrangements satisfactory to Purdue for completion of the Project then the Surety shall be in default of its obligations under this Bond and seven days after receipt of an additional notice from Purdue to this effect Purdue shall be entitled to enforce any remedy available to it under law.

CONTRACTOR’S COMBINATION BID BOND AND BOND FOR CONSTRUCTION

5. The Principal and Surety acknowledge Principal’s obligations under the Contract and applicable statutes to make payment to subcontractors, laborers, material-men and those furnishing or supplying labor or material for and on account of the work called for by the Contract. This Bond shall inure directly to the benefit of all persons or entities entitled to make claim pursuant to I.C. 5-16-5, I.C. 5-16-5.5, or the equivalent provisions of I.C. 5-30 or I.C. 5-32 as the case may be.
6. If the Principal enters into the Contract and claims are made, or suits filed, by persons or entities against Purdue or Purdue’s property seeking payment for labor, material or equipment furnished for use in the performance of the Contract then the Principal and Surety shall, defend, indemnify and hold harmless Purdue from and against any such claims or suits.
7. Purdue shall give Principal and Surety all notices required by the Contract or applicable statute; however, the failure of Purdue to give such notice shall not affect or invalidate the rights of the person, firm, limited liability company, or corporation to whom money may be due on account of having performed labor or service or having furnished material and shall not operate as a defense for the Surety on this Bond.
8. The Surety hereby waives notice of any change, including changes of time, to the Contract, any documents constituting a part of said Contract, or related subcontracts, purchase orders and other obligations of the Principal. No irregularity or defect in the Contract or in the letting, awarding, or execution of it or in any of the proceedings preliminary thereto shall in any way operate to release or discharge the Surety, whether or not the Surety has notice of it.

IN WITNESS THEREOF, we have hereunto set our hands and seals this _____ day of _____, 20____.

SURETY

PRINCIPAL

	Company Name	
	Signature	
	Printed Name, Title	

Bonding Agency: _____
 Agent: _____
 Email Address: _____
 Address: _____
 Phone: _____

CONTRACTS



AIA® Document A101® – 2017

Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

AGREEMENT made as of _____.

BETWEEN the Owner:
(Name, legal status, address and other information)

The Trustees of Purdue University
2550 Northwestern Ave., Suite 1100
West Lafayette, IN 47906

and the Contractor:
(Name, legal status, address and other information)

for the following Project:
(Name, location and detailed description)

The Architect:
(Name, legal status, address and other information)

The Owner and Contractor agree as follows.

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.

The parties should complete A101@–2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201@–2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

Init.

TABLE OF ARTICLES

1	THE CONTRACT DOCUMENTS
2	THE WORK OF THIS CONTRACT
3	DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION
4	CONTRACT SUM
5	PAYMENTS
6	DISPUTE RESOLUTION
7	TERMINATION OR SUSPENSION
8	MISCELLANEOUS PROVISIONS
9	ENUMERATION OF CONTRACT DOCUMENTS

EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:

(Check one of the following boxes.)

- The date of this Agreement.
- A date set forth in a notice to proceed issued by the Owner.
- Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:

(Check one of the following boxes and complete the necessary information.)

- Not later than () calendar days from the date of commencement of the Work.

Init.

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[] By the following date:

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date
-----------------	-----------------------------

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor’s performance of the Contract. The Contract Sum shall be (\$), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	Price
------	-------

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement. *(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)*

Item	Price	Conditions for Acceptance
------	-------	---------------------------

§ 4.3 Allowances, if any, included in the Contract Sum: *(Identify each allowance.)*

Item	Price
------	-------

§ 4.4 Unit prices, if any: *(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)*

Item	Units and Limitations	Price per Unit (\$0.00)
------	-----------------------	-------------------------

§ 4.5 Liquidated damages, if any: *(Insert terms and conditions for liquidated damages, if any.)*

§ 4.6 Other: *(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)*

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

Init.

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§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month:

Not later than ten (10) days following the end of the period covered by the Application for Payment ninety-five percent (95%) of the portion of the Contract Sum properly allocable to labor, materials and equipment incorporated in the Work and ninety-five percent (95%) of the portion of the Contract Sum properly allocable to materials and equipment suitable stored at the site or at some other location agreed upon in writing, for the period covered by the Application for Payment, less the aggregate of previous payments made by the Owner; and upon Substantial Completion of the entire Work, a sum sufficient to increase the total payments to ninety-five percent (95%) of the Contract Sum, less such amounts as the Owner shall determine for all incomplete Work and unsettled claims as provided in the Contract Documents.

§ 5.1.3 Deleted

§ 5.1.4 Deleted

§ 5.1.5 Deleted

§ 5.1.6 Deleted

(Paragraphs deleted)

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

The Owner shall withhold five percent (5%) of the dollar value of all work satisfactorily completed until the public work is substantially complete.

§ 5.1.7.1.1 The following items are not subject to retainage:

(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

§ 5.1.7.2

(Paragraphs deleted)

Deleted

§ 5.1.7.3

(Paragraphs deleted)

Deleted

§ 5.1.8 Deleted

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of modified AIA Document A201-2017, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 such final payment shall be made by the Owner as follows:

Final payment by the Owner to the Contractor shall be made sixty-one (61) days after the established Substantial Completion Date, provided that all field work has been completed and all specified documents have been submitted and approved.

§ 5.2.2 Deleted

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

(Insert rate of interest agreed upon, if any.)

%

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of modified AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.

(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of modified AIA Document A201–2017, the method of binding dispute resolution shall be as follows:

(Check the appropriate box.)

- Arbitration pursuant to Section 15.4 of AIA Document A201–2017
- Litigation in a court of competent jurisdiction
- Other *(Specify)*

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of modified AIA Document A201–2017.

§ 7.1.1 If the Contract is terminated for the Owner’s convenience in accordance with Article 14 of modified AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:

(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner’s convenience.)

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of modified AIA Document A201–2017.

Init.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of modified AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner’s representative:
(Name, address, email address, and other information)

James K. Keefe, P.E.
Senior Director, Capital Asset Management
2550 Northwestern Ave., Suite 1100
West Lafayette, IN 47906

§ 8.3 The Contractor’s representative:
(Name, address, email address, and other information)

§ 8.4 Neither the Owner’s nor the Contractor’s representative shall be changed without ten days’ prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in modified AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in modified AIA Document A101™–2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of modified AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

§ 8.7 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

- .1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor, as modified
- .2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds, as modified
- .3 AIA Document A201™–2017, General Conditions of the Contract for Construction, as modified
- .4

(Paragraphs deleted)

- Deleted
- .5 Drawings

Init.

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Number	Title	Date
.6	Specifications	

Section	Title	Date	Pages
.7	Addenda, if any:		

Number	Date	Pages
--------	------	-------

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.8 Other Exhibits:
(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

The Sustainability Plan:

Title	Date	Pages
-------	------	-------

Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
----------	-------	------	-------

.9 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™–2017, as modified, provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor’s bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

This Agreement entered into as of the day and year first written above.

The Trustees of Purdue University

 OWNER (Signature)

 CONTRACTOR (Signature)

Init.

/

Jason S. Wasson
Associate Vice President, Physical Facilities

(Row deleted)



Init.

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AIA® Document A101® – 2017 Exhibit A

Insurance and Bonds

This Insurance and Bonds Exhibit is part of the Agreement, between the Owner and the Contractor, dated _____.

for the following **PROJECT**:
(Name and location or address)

THE OWNER:
(Name, legal status and address)

The Trustees of Purdue University
2550 Northwestern Ave., Suite 1100
West Lafayette, IN 47906

THE CONTRACTOR:
(Name, legal status and address)

TABLE OF ARTICLES

- A.1 GENERAL**
- A.2 OWNER’S INSURANCE**
- A.3 CONTRACTOR’S INSURANCE AND BONDS**
- A.4 SPECIAL TERMS AND CONDITIONS**

ARTICLE A.1 GENERAL

The Owner and Contractor shall purchase and maintain insurance, and provide bonds, as set forth in this Exhibit. As used in this Exhibit, the term General Conditions refers to modified AIA Document A201™–2017, General Conditions of the Contract for Construction.

ARTICLE A.2 OWNER’S INSURANCE

§ A.2.1 General

Prior to commencement of the Work, the Owner shall secure the insurance, and provide evidence of the coverage, required under this Article A.2 and, upon the Contractor’s request, provide a Certificate of Insurance evidencing coverage required under Article A.2.

§ A.2.2 Liability Insurance

The Owner shall be responsible for purchasing and maintaining the Owner’s usual general liability insurance.

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.

This document is intended to be used in conjunction with AIA Document A201®–2017, General Conditions of the Contract for Construction. Article 11 of A201®–2017 contains additional insurance provisions.

§ A.2.3 Required Property Insurance

§ A.2.3.1 Unless this obligation is placed on the Contractor pursuant to Section A.3.3.2.1, the Owner shall purchase and maintain, from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located, property insurance written on a builder's risk broad-risk or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis. The Owner's property insurance coverage shall be no less than the amount of the initial Contract Sum, plus the value of subsequent Modifications and labor performed and materials or equipment supplied by others. The property insurance shall be maintained until Substantial Completion and thereafter as provided in Section A.2.3.1.3, unless otherwise provided in the Contract Documents or otherwise agreed in writing by the parties to this Agreement. This insurance shall include the interests of the Owner, Contractor, Subcontractors, and Sub-subcontractors in the Project.

§ A.2.3.1.1 **Causes of Loss.** The insurance required by this Section A.2.3.1 shall provide coverage for direct physical loss or damage, and shall not exclude the risks of fire, explosion, theft, vandalism, malicious mischief, collapse, earthquake, flood, or windstorm.

(Paragraphs deleted)

(Table deleted)

§ A.2.3.1.2

(Paragraphs deleted)

Deleted

(Table deleted)

§ A.2.3.1.3 Unless the parties agree otherwise, upon Substantial Completion, the Owner shall continue the insurance required by Section A.2.3.1 or, if necessary, replace the insurance policy required under Section A.2.3.1 with property insurance written for the total value of the Project that shall remain in effect until expiration of the period for correction of the Work set forth in Section 12.2.2 of the General Conditions.

§ A.2.3.1.4 **Deductibles and Self-Insured Retentions.** Owner shall be responsible for all losses with the Owner's selected retention or deductible, excepting that the Contractor shall be responsible for the first \$25,000 of each and every property loss.

§ A.2.3.2 **Occupancy or Use Prior to Substantial Completion.** The Owner and the Contractor shall take no action with respect to partial occupancy or use that would cause cancellation, lapse, or reduction of insurance, unless they agree otherwise in writing.

§ A.2.3.3 Insurance for Existing Structures

If the Work involves remodeling an existing structure or constructing an addition to an existing structure, the Owner shall purchase and maintain, until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, broad-risk property insurance, on a replacement cost basis, protecting the existing structure against direct physical loss or damage from the causes of loss identified in Section A.2.3.1, notwithstanding the undertaking of the Work. The Owner shall be responsible for all co-insurance penalties.

§ A.2.4

(Paragraphs deleted)

Deleted

(Paragraphs deleted)

§ A.2.5 Deleted

(Paragraphs deleted)

ARTICLE A.3 CONTRACTOR'S INSURANCE AND BONDS

§ A.3.1 General

§ A.3.1.1 **Certificates of Insurance.** The Contractor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Article A.3 at the following times: (1) prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. An additional certificate evidencing continuation of commercial liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment and thereafter upon renewal or

Init.

replacement of such coverage until the expiration of the periods required by Section A.3.2.1 and Section A.3.3.1. The certificates will show the Owner as an additional insured on the Contractor's Commercial General Liability and excess or umbrella liability policy or policies.

§ A.3.1.2 Deductibles and Self-Insured Retentions. The Contractor shall disclose to the Owner any deductible or self-insured retentions applicable to any insurance required to be provided by the Contractor.

§ A.3.1.3 Additional Insured Obligations. To the fullest extent permitted by law, the Contractor shall cause the commercial general liability coverage 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 for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 07 04, CG 20 37 07 04, and, with respect to the Architect and the Architect's consultants, CG 20 32 07 04.

§ A.3.1.4 Owner shall not be liable to any person for the failure of Contractor or any Subcontractor to carry any insurance specified or to furnish proof of such coverage to Owner.

§ A.3.2 Contractor's Required Insurance Coverage

§ A.3.2.1 The Contractor shall purchase and maintain the following types and limits of insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:

(If the Contractor is required to maintain insurance for a duration other than the expiration of the period for correction of Work, state the duration.)

§ A.3.2.2 Commercial General Liability

§ A.3.2.2.1 Commercial General Liability insurance for the Project written on an occurrence form with policy limits as determined by Contract Sum:

Up to \$9,999,999

- Each Occurrence \$2,000,000 annual aggregate \$2,000,000
from \$10,000,000 to \$19,999,999

- Each Occurrence \$3,000,000 annual aggregate \$3,000,000
from \$20,000,000 to \$40,000,000

- Each Occurrence \$4,000,000 annual aggregate \$4,000,000
over \$40,000,000

- Each Occurrence \$10,000,000 annual aggregate \$10,000,000

for products-completed operations hazard, providing coverage for claims including

- .1 damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person;
- .2 personal injury and advertising injury;
- .3 damages because of physical damage to or destruction of tangible property, including the loss of use of such property;
- .4 bodily injury or property damage arising out of completed operations; and
- .5 the Contractor's indemnity obligations under Section 3.18 of the General Conditions.

§ A.3.2.2.2 The Contractor's Commercial General Liability policy under this Section A.3.2.2 shall not contain an exclusion or restriction of coverage for the following:

- .1 Claims by one insured against another insured, if the exclusion or restriction is based solely on the fact that the claimant is an insured, and there would otherwise be coverage for the claim.

Init.

- .2 Claims for property damage to the Contractor's Work arising out of the products-completed operations hazard where the damaged Work or the Work out of which the damage arises was performed by a Subcontractor.
- .3 Claims for bodily injury other than to employees of the insured.
- .4 Claims for indemnity under Section 3.18 of the General Conditions arising out of injury to employees of the insured.
- .5 Claims or loss excluded under a prior work endorsement or other similar exclusionary language.
- .6 Claims or loss due to physical damage under a prior injury endorsement or similar exclusionary language.
- .7 Claims related to residential, multi-family, or other habitational projects, if the Work is to be performed on such a project.
- .8 Claims related to roofing, if the Work involves roofing.
- .9 Claims related to exterior insulation finish systems (EIFS), synthetic stucco or similar exterior coatings or surfaces, if the Work involves such coatings or surfaces.
- .10 Claims related to earth subsidence or movement, where the Work involves such hazards.
- .11 Claims related to explosion, collapse and underground hazards, where the Work involves such hazards.

§ A.3.2.3 Automobile Liability covering vehicles owned, and non-owned vehicles used, by the Contractor, with policy limits of not less than One Million Dollars (\$1,000,000.00) per accident, for bodily injury, death of any person, and property damage arising out of the ownership, maintenance and use of those motor vehicles along with any other statutorily required automobile coverage.

§ A.3.2.4 The Contractor may achieve the required limits and coverage for Commercial General Liability and Automobile Liability through a combination of primary and excess or umbrella liability insurance, provided such primary and excess or umbrella insurance policies result in the same or greater coverage as the coverages required under Section A.3.2.2 and A.3.2.3, and in no event shall any excess or umbrella liability insurance provide narrower coverage than the primary policy. The excess policy shall not require the exhaustion of the underlying limits only through the actual payment by the underlying insurers.

§ A.3.2.5 Workers' Compensation at statutory limits.

§ A.3.2.6 Employers' Liability with policy limits not less than Five Hundred Thousand Dollars (\$500,000.00) each accident, Five Hundred Thousand Dollars (\$500,000.00) each employee, and Five Hundred Thousand Dollars (\$500,000.00) policy limit.

§ A.3.2.7 Deleted

§ A.3.2.8 If the Contractor is required to furnish professional services as part of the Work, the Contractor shall procure Professional Liability insurance covering performance of the professional services, with policy limits as determined by Contract Sum:

Up to \$9,999,999

- Each Occurrence \$2,000,000 annual aggregate \$2,000,000 from \$10,000,000 to \$19,999,999
- Each Occurrence \$3,000,000 annual aggregate \$3,000,000 from \$20,000,000 to \$40,000,000
- Each Occurrence \$4,000,000 annual aggregate \$4,000,000 over \$40,000,000
- Each Occurrence \$10,000,000 annual aggregate \$10,000,000

§ A.3.2.9 If the Work involves the transport, dissemination, use, or release of pollutants, the Contractor shall procure Pollution Liability insurance, with policy limits of not less than One Million Dollars (\$1,000,000.00) per claim and One Million Dollars (\$1,000,000.00) in the aggregate.

§ A.3.2.10 Coverage under Sections A.3.2.8 and A.3.2.9 may be procured through a Combined Professional Liability and Pollution Liability insurance policy, with combined policy limits of not less than One Million Dollars (\$1,000,000.00) per claim and One Million Dollars (\$1,000,000.00) in the aggregate.

Init.

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User Notes:

(1782082899)

§ A.3.2.11 Deleted

§ A.3.2.12 Deleted

§ A.3.3 Contractor's Other Insurance Coverage

§ A.3.3.1 Insurance selected and described in this Section A.3.3 shall be purchased from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located; having an A.M. Best rating of "A" VII or better; and acceptable to Owner. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:

(If the Contractor is required to maintain any of the types of insurance selected below for a duration other than the expiration of the period for correction of Work, state the duration.)

§ A.3.3.2 The Contractor shall purchase and maintain the following types and limits of insurance in accordance with Section A.3.3.1.

(Select the types of insurance the Contractor is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. Where policy limits are provided, include the policy limit in the appropriate fill point.)

§ A.3.3.2.1 Property insurance of the same type and scope satisfying the requirements identified in Section A.2.3.1, which, if selected in this section A.3.3.2.1, relieves the Owner of the responsibility to purchase and maintain such insurance except insurance required by Section A.2.3.1.3 and Section A.2.3.3. The Contractor shall comply with all obligations of the Owner under Section A.2.3.1 except to the extent provided below. Upon request, the Contractor shall provide the Owner with a copy of the property insurance policy or policies required. The Owner shall be listed as an additional loss payee on said property insurance policy and shall adjust and settle the loss with the insurer and be the trustee of the proceeds of the property insurance in accordance with Article 11 of the General Conditions unless otherwise set forth below:

(Where the Contractor's obligation to provide property insurance differs from the Owner's obligations as described under Section A.2.3, indicate such differences in the space below. Additionally, if a party other than the Owner will be responsible for adjusting and settling a loss with the insurer and acting as the trustee of the proceeds of property insurance in accordance with Article 11 of the General Conditions, indicate the responsible party below.)

§ A.3.3.2.2 **Railroad Protective Liability Insurance**, with policy limits of not less than (\$) per claim and (\$) in the aggregate, for Work within fifty (50) feet of railroad property.

§ A.3.3.2.3 **Asbestos Abatement Liability Insurance**, with policy limits of not less than (\$) per claim and (\$) in the aggregate, for liability arising from the encapsulation, removal, handling, storage, transportation, and disposal of asbestos-containing materials.

§ A.3.3.2.4 Insurance for physical damage to property while it is in storage and in transit to the construction site on a "broad-risks" form.

§ A.3.3.2.5 Property insurance on a "broad-risks" form, covering property owned by the Contractor and used on the Project, including scaffolding and other equipment.

§ A.3.3.2.6 **Other Insurance**
(List below any other insurance coverage to be provided by the Contractor and any applicable limits.)

§ A.3.4 Performance Bond and Payment Bond

The Contractor shall provide surety bonds, from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located, as follows:

§ A.3.4.1 The laws of the State of Indiana (IC § 5-16-5.5-1 et seq.) contain certain special provisions regarding retainage, bonds and payment of Contractors and Subcontractors. Contracts in excess of \$200,000 are governed by those provisions. For purposes of this Contract, the Owner has determined to withhold as statutory retainage no more than 5 percent of the dollar value of the work satisfactorily completed until the work is substantially completed.

§ A.3.4.2 The amounts retained by the Owner from the Contractor pursuant to retainage provisions shall be placed in an escrow account in accordance with a written escrow agreement with a bank or savings and loan institution as escrow agent, selected by mutual agreement between the Contractor and Owner. This escrow agreement shall have no application to payments withheld by the Owner pursuant to provisions of the Construction Contract intended to protect the Owner from loss on account of: Defective work not remedied; claims filed on reasonable evidence; failure of the Contractor to make payments when due to Subcontractors; or for material or labor; reasonable doubt that the Contract can be completed for the balance then unpaid; damage to another Contractor; failure or refusal of the Contractor to prosecute the work in strict compliance with the Contractor's construction schedule for the work; or similar provisions.

§ A.3.4.3 Contractor shall comply with all applicable provisions of I.C. § 5-16-5-1 with respect to its Subcontractors (as the term "Subcontractor" is defined therein).

(Table deleted)

§ A.3.4.4 Contractor shall furnish Owner with a performance bond and a payment bond in the form, manner and amount required by the Instructions to Bidders.

§ A.3.4.5 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 A.4 SPECIAL TERMS AND CONDITIONS

Special terms and conditions that modify this Insurance and Bonds Exhibit, if any, are as follows:

CONTRACT FORMS

CERTIFICATE OF INSURANCE

ACORDTM CERTIFICATE OF LIABILITY INSURANCE		DATE (MM/DD/YYYY)
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.	
INSURED	INSURERS AFFORDING COVERAGE	NAIC #
	INSURER A: Purdue University Insurance Services Enterprise	
	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	ADDL INSR	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"/> OBJECT <input type="checkbox"/> LOC				EACH OCCURRENCE \$ LIMITED TO RENTED PREMISES (Ea occurrence) \$ MEDICAL (Any one person) \$ PERSONAL & ADV INJURY \$ GENERAL AGGREGATE \$ PRODUCTS - COMPIOP 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				UNINSURED 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 AUTO ONLY: EAACC \$ AGG \$								
		EXCESS/UMBRELLA 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 ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? If yes, describe under SPECIAL PROVISIONS below				<table border="1" style="width: 100%; border-collapse: collapse; font-size: x-small;"> <tr> <td style="width: 50%;">WC STATUTORY LIMITS</td> <td style="width: 50%;">OTHER</td> </tr> <tr> <td>E.L. EACH ACCIDENT</td> <td>\$</td> </tr> <tr> <td>E.L. DISEASE - EA EMPLOYEE</td> <td>\$</td> </tr> <tr> <td>E.L. DISEASE - POLICY LIMIT</td> <td>\$</td> </tr> </table>	WC STATUTORY LIMITS	OTHER	E.L. EACH ACCIDENT	\$	E.L. DISEASE - EA EMPLOYEE	\$	E.L. DISEASE - POLICY LIMIT	\$
WC STATUTORY LIMITS	OTHER													
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														

REFERENCE COPY ONLY
 USE CURRENT EDITION

CERTIFICATE HOLDER 	CANCELLATION SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING INSURER WILL ENDEAVOR TO MAIL <u>30</u> 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
-----------------------------------	--

CONTRACT CHANGE ORDER

Purdue University

Physical Facilities Construction Department
401 S. Grant Street
West Lafayette, IN 47907-2024

Phone (765) 494-0580
Fax (765) 494-0918

TITLE: _____ **DATE:** _____
PROJECT: _____
TO: _____ **CONTRACT NO:** _____
WBSE: _____
FUND: _____
FUNDS COMMITMENT: _____

You are hereby requested to proceed with the following changes from the contract plans and specifications:

RE:

PP90/PCO #:

REFERENCE COPY ONLY

The Original Contract Sum was

Net Change by Previously Authorized Requests and Changes

The Contract Sum Will be Decreased

The Contract Time Will be Decreased

This document shall become an amendment to the contract and all provisions of the contract shall apply hereto. In consideration of the change order agreed to herein as complete equitable adjustment, the Contractor hereby releases the Owner of and from any and all cost, expenses, damages, or claims attributable in whole or in part to (1) the facts and circumstances giving rise to this change order and (2) the execution of this change order.

Recommended by: ARCHITECT/ENGINEERING FIRM	Approved by:	Executed by: THE TRUSTEES of PURDUE UNIVERSITY
_____ Signature	_____ Signature	_____ Signature - FOR THE TREASURER
_____ Printed Name	_____ Printed Name	_____ Printed Name
_____ Date	_____ Date	_____ Date

CONSTRUCTION INVOICE VOUCHER

Business Services Form: CIV		Construction Invoice Voucher			Purdue University	
Vendor Number (Firm)		Vendor Number (Escrow)		PU Order Number		
Vendor (Name and Address)				Date		
Name:				Invoice #		
Remit Address:				Amount to Vendor		
City, State, Zip:				Amount to Bank (for Escrow)		
Project Title:				<div style="border: 2px solid black; padding: 5px;"> <p style="font-weight: bold; font-size: 1.2em;">REFERENCE COPY ONLY</p> <p style="font-weight: bold; font-size: 1.2em;">ORIGINAL FORMS WILL BE SENT TO SUCCESSFUL BIDDERS</p> </div>		
Payment Request Number:						
Original Contract Sum _____		Total Installed To Date _____				
Change Orders Through No. _____		Materials Stored _____				
Total Additions _____		Total Installed and Stored _____				
Subtotal _____		Less _____% Retainage _____				
Total Deductions _____		Total Earned Less Retainage _____				
Total Contract Amount _____		Less Previous Payments _____				
		This Payment				
<p>"This is to certify that in the performance of this Contract, neither the undersigned contractor nor (so far as the undersigned has knowledge) any of his subcontractors has violated the provisions of 'Nondiscrimination Provisions' of General Conditions of the Contract".</p>						
Signed _____						
For Purdue University Use Only:						
G/L Account	Amount	Cost Center	Order	WBS Element	Fund	Earmarked Funds
Held Chk?	Contact for Held Check			Campus	Phone	Audit
Department Head				Date	Dept/Building	Document #/Date
Recommended				Date	Dept/Building	
APPROVED				Date	Dept/Building	

BREAKDOWN OF APPLICATION FOR PAYMENT

Physical Facilities
Form 87, Rev. 1-80

BREAKDOWN OF APPLICATION FOR PAYMENT

PROJECT TITLE :	
CONTRACTOR :	
DATE OF ESTIMATE :	ESTIMATE NO:
FOR PERIOD FROM :	TO:

Application is Made For Payment, As Hereinafter Shown, In Connection With The Subject Project.

Item No.	Description of Work	Contract Amount	Materials Stored at Job Site*	Labor/Material Installed This Estimate	Labor/Material Installed To Date	%
<div style="border: 3px double black; padding: 20px; width: fit-content; margin: auto;"> <p style="font-size: 24px; font-weight: bold; text-align: center;">REFERENCE COPY ONLY</p> </div>						
Subtotal or Total						

*Submit Itemized List In Accordance With Project Specifications

CONTRACTOR'S AFFIDAVIT, WAIVER OF LIEN, CERTIFICATION AND GUARANTEE

Physical Facilities Form 86
July 22, 2014

CONTRACTOR'S AFFIDAVIT, WAIVER OF LIEN, AND GUARANTEE

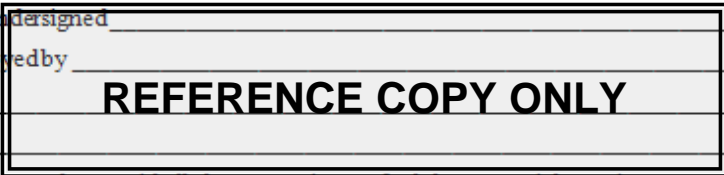
TO: _____

Job No: _____

Date: _____

TO WHOM IT MAY CONCERN:

We, the undersigned _____
having been employed by _____ to furnish and/or install



for the _____,
do hereby affirm that we have paid all charges against us for labor, materials, equipment, rentals and all other items
of expense under this contract, except as follows: (List all items of expense which you have not paid whether you
have received invoice or not.) _____

Also, we, the undersigned, for and in consideration of payments (\$ _____) made to
_____, the receipt whereof is hereby acknowledged, do
hereby waive and release any and every lien, or claim, or right of lien on said above described building and premises
on account of labor, skill, machinery, or materials, or all, furnished to

_____ by the undersigned for said building or premises.

The undersigned further guarantees that all work is executed in strict accordance with the specifications and
contract drawings, including any changes or alterations authorized in writing, and that should any defect appear
within the periods as specified due to faulty materials or workmanship furnished in the performance of the contract,
for which payment is herein acknowledged, that the said undersigned will, in accordance with the Specifications,
repair and remedy said defects without expense to the Owner or _____
_____ when notified to do so.

Given under our hand and seal this
_____ day of _____, 20 _____

BY: _____

TITLE: _____

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

State of _____ SS:

County of _____

My Commission Expires: _____

(Notary Public)

CONTRIBUTION BY TIER 1 CONTRACTOR AFFIDAVIT

CONTRIBUTION BY TIER 1 CONTRACTOR AFFIDAVIT

(Submit this affidavit, signed and notarized, with Contractor's Waiver of Lien)

Contractor: _____

Project Name: _____

Date: _____

REFERENCE COPY ONLY

This is to certify that in the performance of this contract, the tier 1 Contractor contributed in work, material, or services at least fifteen percent (15%) of the awarded contract price in accordance with IC 5-16-13-9.

Given under our hand and seal this
_____ day of _____, 20____.

By: _____

Title: _____

STATE OF _____)
COUNTY OF _____) SS:

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

(Notary Public)

COUNTY OF RESIDENCE

MY COMMISSION EXPIRES

GENERAL CONDITIONS



AIA® Document A201® – 2017

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)

THE OWNER:
(Name, legal status and address)

The Trustees of Purdue University
2550 Northwestern Ave., Suite 1100
West Lafayette, IN 47906

THE ARCHITECT:
(Name, legal status and address)

TABLE OF ARTICLES

- 1 GENERAL PROVISIONS
- 2 OWNER
- 3 CONTRACTOR
- 4 ARCHITECT
- 5 SUBCONTRACTORS
- 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
- 7 CHANGES IN THE WORK
- 8 TIME
- 9 PAYMENTS AND COMPLETION
- 10 PROTECTION OF PERSONS AND PROPERTY
- 11 INSURANCE AND BONDS
- 12 UNCOVERING AND CORRECTION OF WORK
- 13 MISCELLANEOUS PROVISIONS
- 14 TERMINATION OR SUSPENSION OF THE CONTRACT
- 15 CLAIMS AND DISPUTES

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.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

INDEX

(Topics and numbers in bold are Section headings.)

NOTICE: Substantive changes have been made to these A 201 General Conditions which are not reflected in the Index below.

Acceptance of Nonconforming Work

9.6.6, 9.9.3, **12.3**

Acceptance of Work

9.6.6, 9.8.2, 9.9.3, 9.10.1, 9.10.3, 12.3

Access to Work

3.16, 6.2.1, 12.1

Accident Prevention

10

Acts and Omissions

3.2, 3.3.2, 3.12.8, 3.18, 4.2.3, 8.3.1, 9.5.1, 10.2.5,

10.2.8, 13.3.2, 14.1, 15.1.2, 15.2

Addenda

1.1.1

Additional Costs, Claims for

3.7.4, 3.7.5, 10.3.2, 15.1.5

Additional Inspections and Testing

9.4.2, 9.8.3, 12.2.1, **13.4**

Additional Time, Claims for

3.2.4, 3.7.4, 3.7.5, 3.10.2, 8.3.2, **15.1.6**

Administration of the Contract

3.1.3, **4.2**, 9.4, 9.5

Advertisement or Invitation to Bid

1.1.1

Aesthetic Effect

4.2.13

Allowances

3.8

Applications for Payment

4.2.5, 7.3.9, 9.2, **9.3**, 9.4, 9.5.1, 9.5.4, 9.6.3, 9.7, 9.10

Approvals

2.1.1, 2.3.1, 2.5, 3.1.3, 3.10.2, 3.12.8, 3.12.9,

3.12.10.1, 4.2.7, 9.3.2, 13.4.1

Arbitration

8.3.1, 15.3.2, **15.4**

ARCHITECT

4

Architect, Definition of

4.1.1

Architect, Extent of Authority

2.5, 3.12.7, 4.1.2, 4.2, 5.2, 6.3, 7.1.2, 7.3.4, 7.4, 9.2,

9.3.1, 9.4, 9.5, 9.6.3, 9.8, 9.10.1, 9.10.3, 12.1, 12.2.1,

13.4.1, 13.4.2, 14.2.2, 14.2.4, 15.1.4, 15.2.1

Architect, Limitations of Authority and Responsibility

2.1.1, 3.12.4, 3.12.8, 3.12.10, 4.1.2, 4.2.1, 4.2.2, 4.2.3,

4.2.6, 4.2.7, 4.2.10, 4.2.12, 4.2.13, 5.2.1, 7.4, 9.4.2,

9.5.4, 9.6.4, 15.1.4, 15.2

Architect's Additional Services and Expenses

2.5, 12.2.1, 13.4.2, 13.4.3, 14.2.4

Architect's Administration of the Contract

3.1.3, 3.7.4, 15.2, 9.4.1, 9.5

Architect's Approvals

2.5, 3.1.3, 3.5, 3.10.2, 4.2.7

Architect's Authority to Reject Work

3.5, 4.2.6, 12.1.2, 12.2.1

Architect's Copyright

1.1.7, 1.5

Architect's Decisions

3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 4.2.14, 6.3,

7.3.4, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4.1, 9.5, 9.8.4, 9.9.1,

13.4.2, 15.2

Architect's Inspections

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 13.4

Architect's Instructions

3.2.4, 3.3.1, 4.2.6, 4.2.7, 13.4.2

Architect's Interpretations

4.2.11, 4.2.12

Architect's Project Representative

4.2.10

Architect's Relationship with Contractor

1.1.2, 1.5, 2.3.3, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2,

3.5, 3.7.4, 3.7.5, 3.9.2, 3.9.3, 3.10, 3.11, 3.12, 3.16,

3.18, 4.1.2, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5,

9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3, 12, 13.3.2, 13.4, 15.2

Architect's Relationship with Subcontractors

1.1.2, 4.2.3, 4.2.4, 4.2.6, 9.6.3, 9.6.4, 11.3

Architect's Representations

9.4.2, 9.5.1, 9.10.1

Architect's Site Visits

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.4

Asbestos

10.3.1

Attorneys' Fees

3.18.1, 9.6.8, 9.10.2, 10.3.3

Award of Separate Contracts

6.1.1, 6.1.2

Award of Subcontracts and Other Contracts for Portions of the Work

5.2

Basic Definitions

1.1

Bidding Requirements

1.1.1

Binding Dispute Resolution

8.3.1, 9.7, 11.5, 13.1, 15.1.2, 15.1.3, 15.2.1, 15.2.5,

15.2.6.1, 15.3.1, 15.3.2, 15.3.3, 15.4.1

Bonds, Lien

7.3.4.4, 9.6.8, 9.10.2, 9.10.3

Bonds, Performance, and Payment

7.3.4.4, 9.6.7, 9.10.3, **11.1.2**, 11.1.3, **11.5**

Building Information Models Use and Reliance

1.8

Init.

/

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Building Permit

3.7.1

Capitalization

1.3

Certificate of Substantial Completion

9.8.3, 9.8.4, 9.8.5

Certificates for Payment

4.2.1, 4.2.5, 4.2.9, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7,

9.10.1, 9.10.3, 14.1.1.3, 14.2.4, 15.1.4

Certificates of Inspection, Testing or Approval

13.4.4

Certificates of Insurance

9.10.2

Change Orders

1.1.1, 3.4.2, 3.7.4, 3.8.2.3, 3.11, 3.12.8, 4.2.8, 5.2.3,

7.1.2, 7.1.3, **7.2**, 7.3.2, 7.3.7, 7.3.9, 7.3.10, 8.3.1,

9.3.1.1, 9.10.3, 10.3.2, 11.2, 11.5, 12.1.2

Change Orders, Definition of

7.2.1

CHANGES IN THE WORK

2.2.2, 3.11, 4.2.8, 7, 7.2.1, 7.3.1, 7.4, 8.3.1, 9.3.1.1,
11.5

Claims, Definition of

15.1.1

Claims, Notice of

1.6.2, 15.1.3

CLAIMS AND DISPUTES

3.2.4, 6.1.1, 6.3, 7.3.9, 9.3.3, 9.10.4, 10.3.3, **15**, 15.4

Claims and Timely Assertion of Claims

15.4.1

Claims for Additional Cost

3.2.4, 3.3.1, 3.7.4, 7.3.9, 9.5.2, 10.2.5, 10.3.2, **15.1.5**

Claims for Additional Time

3.2.4, 3.3.1, 3.7.4, 6.1.1, 8.3.2, 9.5.2, 10.3.2, **15.1.6**

Concealed or Unknown Conditions, Claims for

3.7.4

Claims for Damages

3.2.4, 3.18, 8.3.3, 9.5.1, 9.6.7, 10.2.5, 10.3.3, 11.3,

11.3.2, 14.2.4, 15.1.7

Claims Subject to Arbitration

15.4.1

Cleaning Up

3.15, 6.3

Commencement of the Work, Conditions Relating to

2.2.1, 3.2.2, 3.4.1, 3.7.1, 3.10.1, 3.12.6, 5.2.1, 5.2.3,

6.2.2, 8.1.2, 8.2.2, 8.3.1, 11.1, 11.2, **15.1.5**

Commencement of the Work, Definition of

8.1.2

Communications

3.9.1, **4.2.4**

Completion, Conditions Relating to

3.4.1, 3.11, 3.15, 4.2.2, 4.2.9, 8.2, 9.4.2, 9.8, 9.9.1,

9.10, 12.2, 14.1.2, 15.1.2

COMPLETION, PAYMENTS AND

9

Completion, Substantial

3.10.1, 4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1,

9.10.3, 12.2, 15.1.2

Compliance with Laws

2.3.2, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 10.2.2, 13.1,

13.3, 13.4.1, 13.4.2, 13.5, 14.1.1, 14.2.1.3, 15.2.8,

15.4.2, 15.4.3

Concealed or Unknown Conditions

3.7.4, 4.2.8, 8.3.1, 10.3

Conditions of the Contract

1.1.1, 6.1.1, 6.1.4

Consent, Written

3.4.2, 3.14.2, 4.1.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3, 13.2,

15.4.4.2

Consolidation or Joinder

15.4.4

CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

1.1.4, 6

Construction Change Directive, Definition of

7.3.1

Construction Change Directives

1.1.1, 3.4.2, 3.11, 3.12.8, 4.2.8, 7.1.1, 7.1.2, 7.1.3, **7.3**,

9.3.1.1

Construction Schedules, Contractor's

3.10, 3.11, 3.12.1, 3.12.2, 6.1.3, 15.1.6.2

Contingent Assignment of Subcontracts

5.4, 14.2.2.2

Continuing Contract Performance

15.1.4

Contract, Definition of

1.1.2

CONTRACT, TERMINATION OR SUSPENSION OF THE

5.4.1.1, 5.4.2, 11.5, **14**

Contract Administration

3.1.3, 4, 9.4, 9.5

Contract Award and Execution, Conditions Relating to

3.7.1, 3.10, 5.2, 6.1

Contract Documents, Copies Furnished and Use of

1.5.2, 2.3.6, 5.3

Contract Documents, Definition of

1.1.1

Contract Sum

2.2.2, 2.2.4, 3.7.4, 3.7.5, 3.8, 3.10.2, 5.2.3, 7.3, 7.4,

9.1, 9.2, 9.4.2, 9.5.1.4, 9.6.7, 9.7, 10.3.2, 11.5, 12.1.2,

12.3, 14.2.4, 14.3.2, 15.1.4.2, **15.1.5**, **15.2.5**

Contract Sum, Definition of

9.1

Contract Time

1.1.4, 2.2.1, 2.2.2, 3.7.4, 3.7.5, 3.10.2, 5.2.3, 6.1.5,

7.2.1.3, 7.3.1, 7.3.5, 7.3.6, 7, 7, 7.3.10, 7.4, 8.1.1,

8.2.1, 8.2.3, 8.3.1, 9.5.1, 9.7, 10.3.2, 12.1.1, 12.1.2,

14.3.2, 15.1.4.2, 15.1.6.1, 15.2.5

Contract Time, Definition of

8.1.1

Init.

/

CONTRACTOR

3

Contractor, Definition of

3.1, 6.1.2

Contractor's Construction and Submittal Schedules

3.10, 3.12.1, 3.12.2, 4.2.3, 6.1.3, 15.1.6.2

Contractor's Employees

2.2.4, 3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3, 11.3, 14.1, 14.2.1.1

Contractor's Liability Insurance

11.1

Contractor's Relationship with Separate Contractors and Owner's Forces

3.12.5, 3.14.2, 4.2.4, 6, 11.3, 12.2.4

Contractor's Relationship with Subcontractors

1.2.2, 2.2.4, 3.3.2, 3.18.1, 3.18.2, 4.2.4, 5, 9.6.2, 9.6.7, 9.10.2, 11.2, 11.3, 11.4

Contractor's Relationship with the Architect

1.1.2, 1.5, 2.3.3, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2, 3.5.1, 3.7.4, 3.10, 3.11, 3.12, 3.16, 3.18, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3, 12, 13.4, 15.1.3, 15.2.1

Contractor's Representations

3.2.1, 3.2.2, 3.5, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.8.2

Contractor's Responsibility for Those Performing the Work

3.3.2, 3.18, 5.3, 6.1.3, 6.2, 9.5.1, 10.2.8

Contractor's Review of Contract Documents

3.2

Contractor's Right to Stop the Work

2.2.2, 9.7

Contractor's Right to Terminate the Contract

14.1

Contractor's Submittals

3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 9.2, 9.3, 9.8.2, 9.8.3, 9.9.1, 9.10.2, 9.10.3

Contractor's Superintendent

3.9, 10.2.6

Contractor's Supervision and Construction

Procedures

1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3, 7.3.4, 7.3.6, 8.2, 10, 12, 14, 15.1.4

Coordination and Correlation

1.2, 3.2.1, 3.3.1, 3.10, 3.12.6, 6.1.3, 6.2.1

Copies Furnished of Drawings and Specifications

1.5, 2.3.6, 3.11

Copyrights

1.5, 3.17

Correction of Work

2.5, 3.7.3, 9.4.2, 9.8.2, 9.8.3, 9.9.1, 12.1.2, 12.2, 12.3, 15.1.3.1, 15.1.3.2, 15.2.1

Correlation and Intent of the Contract Documents

1.2

Cost, Definition of

7.3.4

Costs

2.5, 3.2.4, 3.7.3, 3.8.2, 3.15.2, 5.4.2, 6.1.1, 6.2.3, 7.3.3.3, 7.3.4, 7.3.8, 7.3.9, 9.10.2, 10.3.2, 10.3.6, 11.2, 12.1.2, 12.2.1, 12.2.4, 13.4, 14

Cutting and Patching

3.14, 6.2.5

Damage to Construction of Owner or Separate Contractors

3.14.2, 6.2.4, 10.2.1.2, 10.2.5, 10.4, 12.2.4

Damage to the Work

3.14.2, 9.9.1, 10.2.1.2, 10.2.5, 10.4, 12.2.4

Damages, Claims for

3.2.4, 3.18, 6.1.1, 8.3.3, 9.5.1, 9.6.7, 10.3.3, 11.3.2, 11.3, 14.2.4, 15.1.7

Damages for Delay

6.2.3, 8.3.3, 9.5.1.6, 9.7, 10.3.2, 14.3.2

Date of Commencement of the Work, Definition of

8.1.2

Date of Substantial Completion, Definition of

8.1.3

Day, Definition of

8.1.4

Decisions of the Architect

3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 6.3, 7.3.4, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4, 9.5.1, 9.8.4, 9.9.1, 13.4.2, 14.2.2, 14.2.4, 15.1, 15.2

Decisions to Withhold Certification

9.4.1, 9.5, 9.7, 14.1.1.3

Defective or Nonconforming Work, Acceptance, Rejection and Correction of

2.5, 3.5, 4.2.6, 6.2.3, 9.5.1, 9.5.3, 9.6.6, 9.8.2, 9.9.3, 9.10.4, 12.2.1

Definitions

1.1, 2.1.1, 3.1.1, 3.5, 3.12.1, 3.12.2, 3.12.3, 4.1.1, 5.1, 6.1.2, 7.2.1, 7.3.1, 8.1, 9.1, 9.8.1, 15.1.1

Delays and Extensions of Time

3.2, 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4, 8.3, 9.5.1, 9.7, 10.3.2, 10.4, 14.3.2, 15.1.6, 15.2.5

Digital Data Use and Transmission

1.7

Disputes

6.3, 7.3.9, 15.1, 15.2

Documents and Samples at the Site

3.11

Drawings, Definition of

1.1.5

Drawings and Specifications, Use and Ownership of

3.11

Effective Date of Insurance

8.2.2

Emergencies

10.4, 14.1.1.2, 15.1.5

Employees, Contractor's

3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3.3, 11.3, 14.1, 14.2.1.1

Equipment, Labor, or Materials
1.1.3, 1.1.6, 3.4, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1,
4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3,
9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2
Execution and Progress of the Work
1.1.3, 1.2.1, 1.2.2, 2.3.4, 2.3.6, 3.1, 3.3.1, 3.4.1, 3.7.1,
3.10.1, 3.12, 3.14, 4.2, 6.2.2, 7.1.3, 7.3.6, 8.2, 9.5.1,
9.9.1, 10.2, 10.3, 12.1, 12.2, 14.2, 14.3.1, 15.1.4
Extensions of Time
3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3, 7.4, 9.5.1, 9.7, 10.3.2,
10.4, 14.3, 15.1.6, **15.2.5**

Failure of Payment

9.5.1.3, **9.7**, 9.10.2, 13.5, 14.1.1.3, 14.2.1.2

Faulty Work

(See Defective or Nonconforming Work)

Final Completion and Final Payment

4.2.1, 4.2.9, 9.8.2, **9.10**, 12.3, 14.2.4, 14.4.3

Financial Arrangements, Owner's

2.2.1, 13.2.2, 14.1.1.4

GENERAL PROVISIONS

1

Governing Law

13.1

Guarantees (See Warranty)

Hazardous Materials and Substances

10.2.4, 10.3

Identification of Subcontractors and Suppliers

5.2.1

Indemnification

3.17, **3.18**, 9.6.8, 9.10.2, 10.3.3, 11.3

Information and Services Required of the Owner

2.1.2, **2.2**, 2.3, 3.2.2, 3.12.10.1, 6.1.3, 6.1.4, 6.2.5,

9.6.1, 9.9.2, 9.10.3, 10.3.3, 11.2, 13.4.1, 13.4.2,

14.1.1.4, 14.1.4, 15.1.4

Initial Decision

15.2

Initial Decision Maker, Definition of

1.1.8

Initial Decision Maker, Decisions

14.2.4, 15.1.4.2, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5

Initial Decision Maker, Extent of Authority

14.2.4, 15.1.4.2, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5

Injury or Damage to Person or Property

10.2.8, 10.4

Inspections

3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3,

9.9.2, 9.10.1, 12.2.1, 13.4

Instructions to Bidders

1.1.1

Instructions to the Contractor

3.2.4, 3.3.1, 3.8.1, 5.2.1, 7, 8.2.2, 12, 13.4.2

Instruments of Service, Definition of

1.1.7

Insurance

6.1.1, 7.3.4, 8.2.2, 9.3.2, 9.8.4, 9.9.1, 9.10.2, 10.2.5, **11**

Insurance, Notice of Cancellation or Expiration

11.1.4, 11.2.3

Insurance, Contractor's Liability

11.1

Insurance, Effective Date of

8.2.2, 14.4.2

Insurance, Owner's Liability

11.2

Insurance, Property

10.2.5, 11.2, 11.4, 11.5

Insurance, Stored Materials

9.3.2

INSURANCE AND BONDS

11

Insurance Companies, Consent to Partial Occupancy

9.9.1

Insured loss, Adjustment and Settlement of

11.5

Intent of the Contract Documents

1.2.1, 4.2.7, 4.2.12, 4.2.13

Interest

13.5

Interpretation

1.1.8, 1.2.3, **1.4**, 4.1.1, 5.1, 6.1.2, 15.1.1

Interpretations, Written

4.2.11, 4.2.12

Judgment on Final Award

15.4.2

Labor and Materials, Equipment

1.1.3, 1.1.6, **3.4**, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1,

5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1,

10.2.4, 14.2.1.1, 14.2.1.2

Labor Disputes

8.3.1

Laws and Regulations

1.5, 2.3.2, 3.2.3, 3.2.4, 3.6, 3.7, 3.12.10, 3.13, 9.6.4,

9.9.1, 10.2.2, 13.1, 13.3.1, 13.4.2, 13.5, 14, 15.2.8,

15.4

Liens

2.1.2, 9.3.1, 9.3.3, 9.6.8, 9.10.2, 9.10.4, 15.2.8

Limitations, Statutes of

12.2.5, 15.1.2, 15.4.1.1

Limitations of Liability

3.2.2, 3.5, 3.12.10, 3.12.10.1, 3.17, 3.18.1, 4.2.6,

4.2.7, 6.2.2, 9.4.2, 9.6.4, 9.6.7, 9.6.8, 10.2.5, 10.3.3,

11.3, 12.2.5, 13.3.1

Limitations of Time

2.1.2, 2.2, 2.5, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2.7,

5.2, 5.3, 5.4.1, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3,

9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 12.2, 13.4, 14, 15,

15.1.2, 15.1.3, 15.1.5

Materials, Hazardous

10.2.4, 10.3

Materials, Labor, Equipment and

1.1.3, 1.1.6, 3.4.1, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1,

5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2,

10.2.1.2, 10.2.4, 14.2.1.1, 14.2.1.2

Means, Methods, Techniques, Sequences and Procedures of Construction

3.3.1, 3.12.10, 4.2.2, 4.2.7, 9.4.2

Mechanic's Lien

2.1.2, 9.3.1, 9.3.3, 9.6.8, 9.10.2, 9.10.4, 15.2.8

Mediation

8.3.1, 15.1.3.2, 15.2.1, 15.2.5, 15.2.6, **15.3**, 15.4.1, 15.4.1.1

Minor Changes in the Work

1.1.1, 3.4.2, 3.12.8, 4.2.8, 7.1, **7.4**

MISCELLANEOUS PROVISIONS

13

Modifications, Definition of

1.1.1

Modifications to the Contract

1.1.1, 1.1.2, 2.5, 3.11, 4.1.2, 4.2.1, 5.2.3, 7, 8.3.1, 9.7, 10.3.2

Mutual Responsibility

6.2

Nonconforming Work, Acceptance of

9.6.6, 9.9.3, **12.3**

Nonconforming Work, Rejection and Correction of
2.4, 2.5, 3.5, 4.2.6, 6.2.4, 9.5.1, 9.8.2, 9.9.3, 9.10.4, 12.2

Notice

1.6, 1.6.1, 1.6.2, 2.1.2, 2.2.2., 2.2.3, 2.2.4, 2.5, 3.2.4, 3.3.1, 3.7.4, 3.7.5, 3.9.2, 3.12.9, 3.12.10, 5.2.1, 7.4, 8.2.2, 9.6.8, 9.7, 9.10.1, 10.2.8, 10.3.2, 11.5, 12.2.2.1, 13.4.1, 13.4.2, 14.1, 14.2.2, 14.4.2, 15.1.3, 15.1.5, 15.1.6, 15.4.1

Notice of Cancellation or Expiration of Insurance

11.1.4, 11.2.3

Notice of Claims

1.6.2, 2.1.2, 3.7.4, 9.6.8, 10.2.8, **15.1.3**, 15.1.5, 15.1.6, 15.2.8, 15.3.2, 15.4.1

Notice of Testing and Inspections

13.4.1, 13.4.2

Observations, Contractor's

3.2, 3.7.4

Occupancy

2.3.1, 9.6.6, 9.8

Orders, Written

1.1.1, 2.4, 3.9.2, 7, 8.2.2, 11.5, 12.1, 12.2.2.1, 13.4.2, 14.3.1

OWNER

2

Owner, Definition of

2.1.1

Owner, Evidence of Financial Arrangements

2.2, 13.2.2, 14.1.1.4

Owner, Information and Services Required of the

2.1.2, **2.2**, 2.3, 3.2.2, 3.12.10, 6.1.3, 6.1.4, 6.2.5, 9.3.2, 9.6.1, 9.6.4, 9.9.2, 9.10.3, 10.3.3, 11.2, 13.4.1, 13.4.2, 14.1.1.4, 14.1.4, 15.1.4

Owner's Authority

1.5, 2.1.1, 2.3.32.4, 2.5, 3.4.2, 3.8.1, 3.12.10, 3.14.2, 4.1.2, 4.2.4, 4.2.9, 5.2.1, 5.2.4, 5.4.1, 6.1, 6.3, 7.2.1,

7.3.1, 8.2.2, 8.3.1, 9.3.2, 9.5.1, 9.6.4, 9.9.1, 9.10.2, 10.3.2, 11.4, 11.5, 12.2.2, 12.3, 13.2.2, 14.3, 14.4, 15.2.7

Owner's Insurance

11.2

Owner's Relationship with Subcontractors

1.1.2, 5.2, 5.3, 5.4, 9.6.4, 9.10.2, 14.2.2

Owner's Right to Carry Out the Work

2.5, 14.2.2

Owner's Right to Clean Up

6.3

Owner's Right to Perform Construction and to Award Separate Contracts

6.1

Owner's Right to Stop the Work

2.4

Owner's Right to Suspend the Work

14.3

Owner's Right to Terminate the Contract

14.2, 14.4

Ownership and Use of Drawings, Specifications and Other Instruments of Service

1.1.1, 1.1.6, 1.1.7, **1.5**, 2.3.6, 3.2.2, 3.11, 3.17, 4.2.12, 5.3

Partial Occupancy or Use

9.6.6, **9.9**

Patching, Cutting and

3.14, 6.2.5

Patents

3.17

Payment, Applications for

4.2.5, 7.3.9, 9.2, **9.3**, 9.4, 9.5, 9.6.3, 9.7, 9.8.5, 9.10.1, 14.2.3, 14.2.4, 14.4.3

Payment, Certificates for

4.2.5, 4.2.9, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 14.1.1.3, 14.2.4

Payment, Failure of

9.5.1.3, **9.7**, 9.10.2, 13.5, 14.1.1.3, 14.2.1.2

Payment, Final

4.2.1, 4.2.9, **9.10**, 12.3, 14.2.4, 14.4.3

Payment Bond, Performance Bond and

7.3.4.4, 9.6.7, 9.10.3, **11.1.2**

Payments, Progress

9.3, **9.6**, 9.8.5, 9.10.3, 14.2.3, 15.1.4

PAYMENTS AND COMPLETION

9

Payments to Subcontractors

5.4.2, 9.5.1.3, 9.6.2, 9.6.3, 9.6.4, 9.6.7, 14.2.1.2

PCB

10.3.1

Performance Bond and Payment Bond

7.3.4.4, 9.6.7, 9.10.3, **11.1.2**

Permits, Fees, Notices and Compliance with Laws

2.3.1, **3.7**, 3.13, 7.3.4.4, 10.2.2

PERSONS AND PROPERTY, PROTECTION OF

10

Init.

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Polychlorinated Biphenyl
10.3.1
Product Data, Definition of
3.12.2
Product Data and Samples, Shop Drawings
3.11, **3.12**, 4.2.7
Progress and Completion
4.2.2, **8.2**, 9.8, 9.9.1, 14.1.4, 15.1.4
Progress Payments
9.3, **9.6**, 9.8.5, 9.10.3, 14.2.3, 15.1.4
Project, Definition of
1.1.4
Project Representatives
4.2.10
Property Insurance
10.2.5, **11.2**
Proposal Requirements
1.1.1
PROTECTION OF PERSONS AND PROPERTY
10
Regulations and Laws
1.5, 2.3.2, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 9.9.1,
10.2.2, 13.1, 13.3, 13.4.1, 13.4.2, 13.5, 14, 15.2.8, 15.4
Rejection of Work
4.2.6, 12.2.1
Releases and Waivers of Liens
9.3.1, 9.10.2
Representations
3.2.1, 3.5, 3.12.6, 8.2.1, 9.3.3, 9.4.2, 9.5.1, 9.10.1
Representatives
2.1.1, 3.1.1, 3.9, 4.1.1, 4.2.10, 13.2.1
Responsibility for Those Performing the Work
3.3.2, 3.18, 4.2.2, 4.2.3, 5.3, 6.1.3, 6.2, 6.3, 9.5.1, 10
Retainage
9.3.1, 9.6.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3
Review of Contract Documents and Field
Conditions by Contractor
3.2, 3.12.7, 6.1.3
Review of Contractor's Submittals by Owner and
Architect
3.10.1, 3.10.2, 3.11, 3.12, 4.2, 5.2, 6.1.3, 9.2, 9.8.2
Review of Shop Drawings, Product Data and Samples
by Contractor
3.12
Rights and Remedies
1.1.2, 2.4, 2.5, 3.5, 3.7.4, 3.15.2, 4.2.6, 5.3, 5.4, 6.1,
6.3, 7.3.1, 8.3, 9.5.1, 9.7, 10.2.5, 10.3, 12.2.1, 12.2.2,
12.2.4, **13.3**, 14, 15.4
Royalties, Patents and Copyrights
3.17
Rules and Notices for Arbitration
15.4.1
Safety of Persons and Property
10.2, 10.4
Safety Precautions and Programs
3.3.1, 4.2.2, 4.2.7, 5.3, **10.1**, 10.2, 10.4

Samples, Definition of
3.12.3
Samples, Shop Drawings, Product Data and
3.11, **3.12**, 4.2.7
Samples at the Site, Documents and
3.11
Schedule of Values
9.2, 9.3.1
Schedules, Construction
3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.6.2
Separate Contracts and Contractors
1.1.4, 3.12.5, 3.14.2, 4.2.4, 4.2.7, 6, 8.3.1, 12.1.2
Separate Contractors, Definition of
6.1.1
Shop Drawings, Definition of
3.12.1
Shop Drawings, Product Data and Samples
3.11, **3.12**, 4.2.7
Site, Use of
3.13, 6.1.1, 6.2.1
Site Inspections
3.2.2, 3.3.3, 3.7.1, 3.7.4, 4.2, 9.9.2, 9.4.2, 9.10.1, 13.4
Site Visits, Architect's
3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.4
Special Inspections and Testing
4.2.6, 12.2.1, 13.4
Specifications, Definition of
1.1.6
Specifications
1.1.1, **1.1.6**, 1.2.2, 1.5, 3.12.10, 3.17, 4.2.14
Statute of Limitations
15.1.2, 15.4.1.1
Stopping the Work
2.2.2, 2.4, 9.7, 10.3, 14.1
Stored Materials
6.2.1, 9.3.2, 10.2.1.2, 10.2.4
Subcontractor, Definition of
5.1.1
SUBCONTRACTORS
5
Subcontractors, Work by
1.2.2, 3.3.2, 3.12.1, 3.18, 4.2.3, 5.2.3, 5.3, 5.4, 9.3.1.2,
9.6.7
Subcontractual Relations
5.3, 5.4, 9.3.1.2, 9.6, 9.10, 10.2.1, 14.1, 14.2.1
Submittals
3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 7.3.4, 9.2, 9.3, 9.8,
9.9.1, 9.10.2, 9.10.3
Submittal Schedule
3.10.2, 3.12.5, 4.2.7
Subrogation, Waivers of
6.1.1, **11.3**
Substances, Hazardous
10.3
Substantial Completion
4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, **9.8**, 9.9.1, 9.10.3, 12.2,
15.1.2

Substantial Completion, Definition of

9.8.1

Substitution of Subcontractors

5.2.3, 5.2.4

Substitution of Architect

2.3.3

Substitutions of Materials

3.4.2, 3.5, 7.3.8

Sub-subcontractor, Definition of

5.1.2

Subsurface Conditions

3.7.4

Successors and Assigns

13.2

Superintendent

3.9, 10.2.6

Supervision and Construction Procedures

1.2.2, **3.3**, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3,

7.3.4, 8.2, 8.3.1, 9.4.2, 10, 12, 14, 15.1.4

Suppliers

1.5, 3.12.1, 4.2.4, 4.2.6, 5.2.1, 9.3, 9.4.2, 9.5.4, 9.6,

9.10.5, 14.2.1

Surety

5.4.1.2, 9.6.8, 9.8.5, 9.10.2, 9.10.3, 11.1.2, 14.2.2,

15.2.7

Surety, Consent of

9.8.5, 9.10.2, 9.10.3

Surveys

1.1.7, 2.3.4

Suspension by the Owner for Convenience

14.3

Suspension of the Work

3.7.5, 5.4.2, 14.3

Suspension or Termination of the Contract

5.4.1.1, 14

Taxes

3.6, 3.8.2.1, 7.3.4.4

Termination by the Contractor

14.1, 15.1.7

Termination by the Owner for Cause

5.4.1.1, **14.2**, 15.1.7

Termination by the Owner for Convenience

14.4

Termination of the Architect

2.3.3

Termination of the Contractor Employment

14.2.2

TERMINATION OR SUSPENSION OF THE CONTRACT

14

Tests and Inspections

3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3,

9.9.2, 9.10.1, 10.3.2, 12.2.1, **13.4**

TIME

8

Time, Delays and Extensions of

3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4, **8.3**, 9.5.1, 9.7,

10.3.2, 10.4, 14.3.2, 15.1.6, 15.2.5

Time Limits

2.1.2, 2.2, 2.5, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2,

5.2, 5.3, 5.4, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1,

9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 12.2, 13.4, 14, 15.1.2,

15.1.3, 15.4

Time Limits on Claims

3.7.4, 10.2.8, 15.1.2, 15.1.3

Title to Work

9.3.2, 9.3.3

UNCOVERING AND CORRECTION OF WORK

12

Uncovering of Work

12.1

Unforeseen Conditions, Concealed or Unknown

3.7.4, 8.3.1, 10.3

Unit Prices

7.3.3.2, 9.1.2

Use of Documents

1.1.1, 1.5, 2.3.6, 3.12.6, 5.3

Use of Site

3.13, 6.1.1, 6.2.1

Values, Schedule of

9.2, 9.3.1

Waiver of Claims by the Architect

13.3.2

Waiver of Claims by the Contractor

9.10.5, 13.3.2, **15.1.7**

Waiver of Claims by the Owner

9.9.3, 9.10.3, 9.10.4, 12.2.2.1, 13.3.2, 14.2.4, **15.1.7**

Waiver of Consequential Damages

14.2.4, 15.1.7

Waiver of Liens

9.3, 9.10.2, 9.10.4

Waivers of Subrogation

6.1.1, **11.3**

Warranty

3.5, 4.2.9, 9.3.3, 9.8.4, 9.9.1, 9.10.2, 9.10.4, 12.2.2,

15.1.2

Weather Delays

8.3, 15.1.6.2

Work, Definition of

1.1.3

Written Consent

1.5.2, 3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.10.3,

13.2, 13.3.2, 15.4.4.2

Written Interpretations

4.2.11, 4.2.12

Written Orders

1.1.1, 2.4, 3.9, 7, 8.2.2, 12.1, 12.2, 13.4.2, 14.3.1

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 or proposal 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. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.1.9 Written Notice

Written notice shall mean a written instrument and 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.

Written Notice to the Owner shall be directed to the Project Manager identified in Division 1 of the Specifications.

Written Notice to the Contractor shall be directed to the Contractor's Project Manager.

Written Notice to the Architect shall be directed to the individual identified at the pre-construction meeting.

§ 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. In the case of an inconsistency between Drawings and Specifications and within either Contract Document not clarified by Addendum, the better quality or greater quantity of Work shall be provided in accordance with the Architect's/Engineer's interpretation.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 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 except as may otherwise be provided in the Agreement between Owner and Architect will retain all common law, statutory, and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and 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 the Project is not to be construed as publication in derogation of the Owner's, Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, 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 suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

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§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

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.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

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 Deleted

§ 2.2 Deleted

(Paragraphs deleted)

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 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.

§ 2.3.2 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.

§ 2.3.3 Deleted

§ 2.3.4 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.

§ 2.3.5 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.

§ 2.3.6 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.

§ 2.4 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

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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.

§ 2.5 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 five-day period after receipt of 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. 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 its 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 2.3.4, 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 submit 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. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be 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 notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

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

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

§ 3.4 Labor and Materials

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

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 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. The Owner reserves the right to require the Contractor to remove from the Project any employee of the Contractor (including the General Superintendent), any Subcontractor or employee of any Subcontractor if the Owner deems such person to be unfit or otherwise unsatisfactory.

§ 3.5 Warranty

§ 3.5.1 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.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 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.

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§ 3.6.1 The labor and materials furnished under this Contract will be used, when the Project is completed, by the Owner for its tax exempt purposes. Accordingly, the Indiana Gross Retail and Use Tax (sales and use tax) will not apply to the purchase of materials under this Contract by the Owner from the Contractor. The Owner will issue an appropriate exemption certificate to the Contractor to that 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 any permits, fees, licenses, and inspections by government agencies necessary for the means and methods employed by Contractor to complete the Work that are customarily secured after execution of the Contract.

§ 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 regardless of whether they are specifically identified in the Contract Documents. Contractor shall furnish Architect and Owner with copies of all notices given.

§ 3.7.3 If the Contractor performs Work knowing or suspecting it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume full responsibility for such Work and shall bear all 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 14 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 that an equitable adjustment be made 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, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

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

§ 3.8 Allowances

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- .1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

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

§ 3.9 Superintendent

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

§ 3.9.2 Within seven days after Contractor's bid is received and opened the Contractor 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. Once approved, the Contractor's superintendent may not be changed without the written permission of the Owner, which shall not be unreasonably withheld.

§ 3.9.4 Contractor's superintendent shall devote his full attention to the Project and shall not superintend any other projects for the Contractor without the written consent of the Owner, which shall not be unreasonably withheld.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, immediately 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 in accordance with the requirements of Division One of the Specifications. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at monthly intervals or more often as required by the Owner, 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, immediately 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, or fails to provide submittals in accordance with the approved 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. Contractor's failure to submit satisfactory information required by this § 3.10 shall be grounds for delaying or withholding payment to Contractor.

§ 3.10.4 The Contractor shall not interrupt, disrupt or in any way interfere with utility service to the Owner's existing buildings and structures unless required in order to properly perform the Work. Any necessary interruption, disruption or interference shall be specifically identified in Contractor's construction schedule for the Work and shall be closely coordinated with the Owner so as to minimize the impact to Owner's operations.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

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

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

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

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how 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.

§ 3.12.5.1 Each Shop Drawing, Product Data, Sample or similar submittal shall bear the following wording typed or stamped thereon: "APPROVED TO BE IN ACCORDANCE WITH THE CONTRACT DOCUMENTS EXCEPT AS NOTED."

SIGNED: _____ DATED: _____

Any Shop Drawing, Product Data, Sample, or similar submittal submitted without the above wording shall be returned without review for resubmittal.

§ 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. Any work performed by the Contractor in violation of this section shall be at Contractor's sole risk.

§ 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 the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect 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 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.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 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, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment. Contractor's use of the site shall be limited to performance of the Work.

§ 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, or patching shall be restored to the condition existing prior to the cutting, fitting, or 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 construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall at all times keep the premises and surrounding area free from accumulation of waste materials and 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 and leave the Work "broom clean" and ready for use.

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

§ 3.15.3 The Contractor shall keep all public and Owner-owned drives and streets cleaned of spilled or tracked materials from trucking operations.

§ 3.16 Access to Work

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

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§ 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 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 an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall defend, indemnify and hold harmless the Owner, its related and affiliated foundations and entities, individually or collectively, and their respective consultants, agents and employees from and against any and all 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 the injury to or destruction of tangible property (other than the Work itself), including any loss of use therefrom. Contractor's obligation to defend, indemnify and hold harmless shall apply regardless of whether it is alleged that any person or entity to be indemnified hereunder, or their respective consultants, agents or employees contributed in any way to the alleged wrongdoing or are otherwise liable on account of the alleged breach of a non-delegable duty.

§ 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 Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 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.

§ 4.2 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.

§ 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 promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) 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.

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§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that materially affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 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 13.4.2 and 13.4.3, whether or not the 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, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect 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 order 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 Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 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.

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§ 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 the 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 notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice 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.

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

§ 5.3 Subcontractual Relations

By appropriate written agreement, 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 that the Contractor, by these Contract 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.

§ 5.3.1 Contractor shall comply with all statutory provisions regarding the payment of Subcontractors, including but not limited to I.C. §5-16-5.5-6 or its equivalent.

§ 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; 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 assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 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 any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its 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 or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has 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 notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work 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. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 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 that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

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

§ 6.3 Owner's Right to Clean Up

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

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

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

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

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work. Except as permitted in Section 7.3, a change in the Contract Sum or the Contract Time shall be accomplished only by Change Order. Accordingly, no course of conduct or dealing between the parties, nor express or implied acceptance of alterations or addition to the Work, and no claim that the Owner has been unjustly enriched by any alteration of or addition to the Work, shall be the basis of any claim to an increase in any amounts due under the Contract Documents or a change in any time period provided for in the Contract Documents.

§ 7.1.4 A change in the Contract Sum or the Contract Time may only be accomplished through a Change Order or a Construction Change Directive. No course of dealing, express or implied acceptance of alterations or additions to the Work, or claim that the Owner has been unjustly enriched by an alteration or addition to the Work shall entitle the Contractor to an increase in the Contract Sum or the Contract Time.

§ 7.1.5 If the Contractor claims that any instructions, by drawings or otherwise, involve extra cost under this Contract, Contractor shall provide the Architect and Owner with Written Notice in accordance with the requirements of Article 15 before proceeding to execute the work. The timely giving of such Written Notice shall constitute a condition precedent to the Contractor's entitlement to compensation for such extra costs. Failure of the Contractor to give such Written Notice shall also constitute a waiver of any such claim for extra compensation.

§ 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.

§ 7.2.2 An executed Change Order shall become an amendment to the Contract Documents and all provisions of the Contract Documents shall apply thereto. In consideration of the Change Order as a complete equitable adjustment, the Contractor releases the Owner of and from any and all costs, expenses, damages or claims attributable in whole or in part to:

- .1 The facts and circumstances giving rise to the Change Order; and
- .2 The execution of the Change Order.

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§ 7.2.3 For any adjustments in the Contract Sum, the Contractor overhead and profit shall be calculated as follows:

- .1 Cost of labor payroll, not to exceed the actual wages paid on this project, plus applicable payroll taxes and insurance, plus 10%; Costs of the material, including rentals, plus 10%.
- .2 For work by Subcontractors, or a lower tier Contractor, the Contractor performing the Work shall be permitted to mark up its costs in accordance with Section 7.2.3.1, and each succeeding Contractor, including the Prime Contractor, shall add 10%.

§ 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 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

- .1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- .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, directly related to the change; and
- .5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 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.

§ 7.3.7 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.

§ 7.3.8 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 Deleted

§ 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 may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

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, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 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 not caused by wrongful or unlawful acts of Contractor, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control ("Excusable Delay"), then the Contract Time shall be extended by Change Order for a period of time equal to the duration of the Excusable Delay.

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

§ 8.3.3 Except as provided in Sections 3.7.4 and 10.3.3, an extension of time for Excusable Delay, as defined above, shall be the Contractor's exclusive remedy in the event of such a delay, no matter how or by whom caused.

Contractor further specifically acknowledges that it shall have no claim for increase in the Contract Sum or damages of any kind because of any delays whatsoever to all or any part of the Work whether foreseen or unforeseen, and whether caused by any person's hindrance or active interference.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 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.

§ 9.1.2 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. Unit prices include Contractor's overhead and profit.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent 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. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 Deleted

§ 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 supplier, unless such Work has been performed by others whom the Contractor intends to pay.

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

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

§ 9.3.4 The Contractor's final Application for Payment shall contain evidence satisfactory to the Architect and the Owner that all payrolls, material bills, and other indebtedness connected with the Work has been paid. The final Application for Payment shall be accompanied by the Contractor's Compliance Affidavit, Contractor's Affidavit,

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Waiver of Claims and Liens, and Guarantee in the form included in the Specifications properly completed and executed by the Contractor, each of the Contractor's Subcontractors, and by each of Contractor's major material suppliers.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole 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 in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. 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. 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 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.

§ 9.4.3 Upon receipt of Architect's Certificate for Payment the Owner will, within 14 days, either issue payment to the Contractor in the amount of the Certification or make such payment as is undisputed and offer explanation of the disputed items. When the reasons for withholding are removed, payment will be made for amounts withheld.

§ 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 suppliers 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;
- .7 repeated failure to carry out the Work in accordance with the Contract Documents; or
- .8 failure to defend, indemnify or hold harmless the Owner and other required indemnitees as required by the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

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

§ 9.5.4 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 supplier 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 Contractor shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

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

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

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

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and 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 and suppliers 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 or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to 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 Deleted

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

§ 9.7.1 A final Certificate for Payment shall not be issued until all labor and materials required in the Contract Documents have been furnished, installed and completed, all claims have been disposed of and all claims for extra work materials and allowances for omissions have been rendered, considered and, if agreed to, made a part of such Certificate of Payment.

§ 9.7.2 If, pursuant to the Contract Documents, the Owner is entitled to any reimbursement or payment from the Contractor, Contractor shall make such payment within 14 days of demand by the Owner. Notwithstanding anything in the Contract Documents to the contrary, if Contractor fails to make any payment due the Owner, or if the Owner incurs any costs and expenses to cure any default of Contractor or to correct defective Work, the Owner shall have the right to either (1) deduct an amount equal to that which the Owner is entitled from any payment then or thereafter due Contractor from the Owner, or (2) issue a written notice to the Contractor reducing the Contract Sum by an amount equal to that which the Owner is entitled.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when:

- .1 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; and
- .2 The Owner has received from any governmental authority having jurisdictional authority thereof all certificates of occupancy and all other permits, approvals, licenses or other documents necessary for the beneficial occupancy of the Project.

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

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and 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 the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the 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. 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, 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 or a waiver of any right under the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's 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. 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 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 to final payment (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, and (6) all "As Built" drawings, complete operating instructions for equipment and accessories, maintenance manuals, documentation of any special warranties, such as manufacturers' warranties or specific subcontractor warranties, and bonds, certificates and guarantees required by the Contract Documents.

§ 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, corrected, 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 the 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;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a 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.

§ 10.1.1 The Contractor shall administer and comply with all the rules, standards, and regulations of the Construction Safety Act (40 U.S.C. 333) and the Williams-Stieger Occupational Safety and Health Act (OSHA) of 1970 (29 U.S.C. 650 et seq.) as administered and enforced by the Occupational Safety and Health Administration, Department of Labor. The Contractor shall further administer and comply with all the provisions, standards, rules and regulations of the Indiana Occupational Health and Safety Act (OSHA) of 1971 (I.C. § 22-8-1.1-1, et seq) including, but not limited to, 29 C.F.R. 1926, Subpart P (trench safety systems).

The Contractor shall not require or permit any laborer or mechanic, including apprentices and trainees, employed in the performance of this Contract to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to health as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation (29 CFR Part 1926, 36 FR 7340, April 17, 1971) pursuant to Section 107 of the Contract Work Hours and Safety Standards Act.

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COMPLIANCE AFFIDAVIT

Each application for payment shall be accompanied by an affidavit, dated and signed by the Contractor, substantially as follows:

This is to certify that in the performance of this Contract, neither the undersigned Contractor nor (so far as the undersigned has knowledge) any of its Subcontractors, has violated the "Occupational Safety and Health Act" provisions of the General Conditions of the Contract.

§ 10.1.2 Contractor shall establish a program to coordinate the exchange of material safety data sheets or other hazard communication required to be made available to or exchanged between or among employers at the site in accordance with applicable laws or regulations. At all times during performance of the work, Contractor shall be responsible for administering the hazard communication program and coordinating the hazard communication. Contractor shall provide Superintendent with copies of all material safety data sheets or other hazard communication exchanged among or made available to employers at the site.

COMPLIANCE AFFIDAVIT

Each application for payment shall be accompanied by an affidavit, dated and signed by the Contractor, substantially as follows:

This is to certify that in the performance of this Contract, neither the undersigned Contractor, nor (so far as the undersigned has knowledge) any of its Subcontractors, has violated the "Hazard Communication" provision of the General Conditions 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, a Subcontractor, or a Sub-subcontractor; 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 implement, 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 the owners and users of adjacent sites and utilities of the safeguards.

§ 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 3.1.8.

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§ 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, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 48 hours after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials.

§ 10.3.2 Owner shall be responsible for any hazardous materials, including asbestos, polychlorinated biphenyl ("PCBs"), petroleum (for example, oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene and oil mixed with other non-hazardous materials), Hazardous Waste (as defined in Section 1004 of the Solid Waste Disposal Act [42 U.S.C. Section 6903] as amended from time to time) or Radioactive Material (including source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 [52 U.S.C. Section 2011 et seq.] as amended from time to time) which are uncovered or revealed at the site and which were not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work and which may present a substantial danger to persons or property exposed thereto in connection with the work at the site.

§ 10.3.3 To the extent that Hazardous Materials are shown or indicated in Drawings or Specifications or identified in the Contract Documents, but are not made the subject of supplementary conditions, then Contractor shall be responsible for the Hazardous Materials so shown, identified or indicated. In no event shall Owner be responsible for any Hazardous Materials brought to the site by Contractor, Subcontractors, Suppliers or anyone else for whom Contractor is responsible.

§ 10.3.4 To the extent that Contractor discovers Hazardous Materials (as described above) or that Contractor discovers materials which it either believes, or has reason to believe, may constitute Hazardous Materials, and which were not shown or indicated in the Drawings or Specifications or not identified in the Contract Documents then the Contractor shall:

- .1 immediately report the same to the Owner by the most expedient means available and confirm the report in writing; and
- .2 immediately cease all work in the vicinity of the materials believed to be hazardous.

The Owner shall then take measures, reasonable and appropriate under the circumstances, to ascertain the true character of the materials believed to be hazardous and the measures, if any, necessary to make the job site reasonably safe for the Contractor's completion of the work. Upon receiving notice from the Owner (which shall be confirmed in writing) to complete performance of the Work, Contractor shall immediately resume performance of the Work.

§ 10.3.5 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.

§ 10.3.6 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 sole fault or negligence.

§ 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 Insurance and Bonds

§ 11.1.1 Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 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.

§ 11.1.4 **Notice of Cancellation or Expiration of Contractor's Required Insurance.** Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.2.2 **Failure to Purchase Required Property Insurance.** If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the owner, the Contractor may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub Subcontractors in the Work. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Deleted

§ 11.3 Waivers of Subrogation

§ 11.3.1 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; (2) the Architect and Architect's consultants; and (3) Separate Contractors, 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 those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification,

contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 Deleted

(Paragraphs deleted)

§ 11.4 Deleted

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by this Agreement shall be adjusted by the Owner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 5 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

§11.6 Refer to AIA Document A101™ - 2017 Exhibit A, as modified, for insurance requirements.

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, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before 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 any 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 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. 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 2.5.

§ 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.

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§ 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 of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

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

§ 12.3 Acceptance of Nonconforming Work

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the State of Indiana. Any action by Contractor or Owner to enforce rights or obligations, or to assert Claims arising out of this Agreement (including cross-claims and third-party claims) shall be brought and maintained only in a court of competent jurisdiction in Tippecanoe County, Indiana.

§ 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 an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract. Contractor shall not assign, or permit the assignment of, any Claim arising out of this Agreement.

§ 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 the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 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.

§ 13.3.2 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 thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 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 retained by the Owner. The Contractor shall give the Architect and the Owner timely notice of when and where tests and inspections are to be made so that the Architect and Owner may be present for such procedures.

§ 13.4.2 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 13.4.1, 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 retained by the Owner, and the Contractor shall give timely notice to the Architect and Owner of when and where tests and inspections are to be made so that the Architect and Owner may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 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 and Contractor.

§ 13.4.5 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.

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

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties 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.

§ 13.6 Drug Testing Program

The laws of the State of Indiana (IC 4-13-18 as amended) contain certain special provisions regarding drug testing of employees of public works Contractors and Subcontractors. As determined by the Owner, projects estimated to be in excess of \$150,000.00 will be governed by these provisions. These provisions require, among other things, that the Contractor submit with the bid a written plan for a program to test the Contractor's employees for drugs. In addition, each successful Bidder will be required to comply with all applicable provisions of the statute referred to above with respect to each Bidder's Subcontractors, as the term "Subcontractor" is defined in the statute referred to above.

COMPLIANCE AFFIDAVIT

Each application for payment shall be accompanied by an affidavit, dated and signed by the Contractor, substantially as follows:

This is to certify that in the performance of this Contract, neither the undersigned Contractor, nor (so far as the undersigned has knowledge) any of its Subcontractors, has violated the "Drug Testing Program" provision of the General Conditions of the Contract.

§ 13.7 Background Checks and Security Clearance

Contractor shall perform security clearance background checks on all of its officers, agents, employees assigned to have access to Purdue's facilities to identify whether any such individual is a registered sex offender pursuant to Zachary's Law, Ind. Code § 11-8-8 et. seq. or the equivalent law of the individual's state of residence. Contractor shall either perform such checks on the officers, agents or employees of subcontractors of any tier or shall require that such subcontractors certify to the Contractor and the Owner that such checks have been performed. Neither Contractor nor any subcontractor (of any tier) shall assign an individual identified as a registered sex offender to perform work or services at Purdue's facilities. Purdue reserves the right to immediately remove any individuals identified as registered sex offenders from Purdue's facilities. Purdue reserves the right to require additional background checks be made on any of Contractor's and its subcontractor(s)'s officers, agents, employees or volunteers assigned to have access to Purdue's premises. Contractor shall indemnify Purdue and hold it harmless from and against all liability, losses,

damages, claims, liens, and expense (including reasonable legal fees) arising out of or connected with Contractor's failure to comply with the requirements of this Article of the General Conditions.

COMPLIANCE AFFIDAVIT

Each application for payment shall be accompanied by an affidavit, dated and signed by the Contractor, substantially as follows:

This is to certify that in the performance of this Contract, neither the undersigned Contractor, nor (so far as the undersigned has knowledge) any of its Subcontractors, has violated the "Background Checks and Security Clearance" provision of the General Conditions of the Contract.

§ 13.8 Subcontractor Spend Data

Contractor shall monitor its payments to its subcontractors and material suppliers and report, on a monthly basis, its disbursement of each Project payment received from the Owner.

COMPLIANCE AFFIDAVIT

Each pay application for payment shall be accompanied by an affidavit dated and signed by the Contractor, substantially as follows:

This is to certify that the Contractor has received the Owner's payment of its prior application for payment, subject to any disputed items, and has disbursed payment to its subcontractors and material suppliers as set forth below:

Subcontractor	Amount	Date
_____	_____	_____

§ 13.9 Nondiscrimination

§ 13.9.1 The Contractor shall perform, observe and comply with all applicable State, Municipal and Federal laws, rules, regulations and Executive Orders pertaining to nondiscrimination against employees or applicants for employment because of race, color, religion, sex, handicap, disability, national origin or ancestry. During the performance of this Contract, the Contractor agrees to comply with all applicable requirements of the Americans with Disabilities Act of 1990 and the regulations promulgated thereunder. When required by such laws, rules, regulations and Executive Orders, the Contractor shall include nondiscrimination provisions in all contracts and purchase orders.

§ 13.9.2 The Contractor agrees that:

- .1 In the hiring of employees for the performance of work under this Contract or any subcontract hereunder, neither the Contractor, any Subcontractor, nor any person acting on behalf of the Contractor or Subcontractor, shall, by reason of race, religion, color, sex, national origin or ancestry or handicap, discriminate against any citizen of the State of Indiana who is qualified and available to perform the work to which the employment relates;
- .2 Neither the Contractor, Subcontractor, nor any person on their behalf shall, in any manner, discriminate against or intimidate any employee hired for the performance of work under this Contract on account of race, religion, color, sex, national origin or ancestry, or handicap;
- .3 There may be deducted from the amount payable to the Contractor by the Owner, under this Contract, a penalty of five dollars (\$5.00) for each person for each calendar day during which such person was discriminated against or intimidated in violation of these nondiscrimination provisions; and
- .4 This Contract may be canceled or terminated by the Owner, and all money due or to become due hereunder may be forfeited, for a second or any subsequent violation of the terms or conditions of these nondiscrimination provisions.

§ 13.9.3 By the act of submitting a Bid, each Bidder shall be deemed to have certified to the Owner that it has at all times complied with the nondiscrimination provisions of Senate Enrolled Act No. 484 - Section 4 enacted by the First

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Regular Session 99th General Assembly 1975, unless such Bidder states otherwise in a written statement submitted with the Bid. The Owner will refrain from entering into any contract with any Bidder who states that it has failed to comply with said nondiscrimination provisions of said Senate Enrolled Act. No. 484 - Section 4. The applicable portion of Senate Enrolled Act No. 484 - Section 4 is as follows:

"SECTION 4. IC1971, 22 0-10, as amended by Acts 1971, P.L. 347, SECTION 7, is amended to read as follows: Sec. 10. Every contract to which the state or any of its political or civil subdivisions is a party, including franchises granted to public utilities, shall contain a provision requiring the Contractor and his Subcontractors not to discriminate against any employee or applicant for employment, to be employed in the performance of such contract, with respect to his hire, tenure, terms, conditions or privileges of employment or any matter directly or indirectly related to employment, because of his race, religion, color, sex, handicap, national origin or ancestry. Breach of this covenant may be regarded as a material breach of the contract.

Each application for payment shall be accompanied by a nondiscrimination certificate.

COMPLIANCE AFFIDAVIT

Each application for payment shall be accompanied by a certificate, dated and signed by the Contractor, substantially as follows:

"This is to certify that in the performance of this Contract, neither the undersigned Contractor nor (so far as the undersigned has knowledge) any of its Subcontractors has violated the provisions of 'Nondiscrimination Provisions' of these General Conditions".

§ 13.10 American Steel

To the extent that the Contractor's performance of the Work entails the use of purchase of steel products (as defined in I.C. 5-16-8-1, as amended from time to time), then Contractor warrants that only steel products made in the United States shall be used and supplied in the performance of the Contract and in the performance of any subcontracts.

§ 13.11 Open Competition

Where in the Specifications one or more certain materials, trade names, or articles of certain manufacture are mentioned, it is done for the express purpose of establishing a basis of durability and efficiency and not for the purpose of limiting competition. Other names or materials can be used, if in the opinion of the Architect they are equal in durability and efficiency to those mentioned and of a design in harmony within the work as outlined and the Architect gives written approval of a substitution before the articles and material are ordered by the Contractor.

§ 13.12 Parking Regulations

The contractor and its employees are to conform to the University's Motor Vehicle and Traffic Regulations. See Division 1 of the Specifications.

§ 13.13 Contribution by Tier 1 Contractor

The laws of the State of Indiana (IC 5-16-13-9 as amended) contain certain special provisions regarding contribution by the Tier 1 Contractor on public works projects. The Tier 1 Contractor must contribute in work, material, services, or any combination thereof, at least fifteen percent (15%) of the awarded contract price.

COMPLIANCE AFFIDAVIT

Each application for payment shall be accompanied by an affidavit, dated and signed by the Contractor, substantially as follows:

This is to certify that in the performance of this Contract the undersigned Contractor has not violated the "Contribution by Tier 1 Contractor" provision of the General Conditions of the Contract.

§ 13.14 E-Verify Program

The laws of the State of Indiana (I.C. 22-5-1.7-11.1 as amended) contain certain special provisions regarding

enrollment and participation in the E-Verify program by public works Contractors and Subcontractors. These provisions require, among other things, that the Contractor signs an affidavit affirming that the contractor does not knowingly employ an unauthorized alien. In addition, each successful Bidder will be required to comply with all applicable provisions of the statute referred to above with respect to each Bidder's Subcontractors, as the term "Subcontractor" is defined in the statute referred to above. A Contractor is not required to verify the work eligibility status of all newly hired employees of the contractor through the E-verify program if E-verify no longer exists.

COMPLIANCE AFFIDAVIT

Each application for payment shall be accompanied by an affidavit, dated and signed by the Contractor, substantially as follows:

This is to certify that in the performance of this Contract, neither the undersigned Contractor, nor (so far as the undersigned has knowledge) any of its Subcontractors, has violated the "E-Verify Program" provision of the General Conditions of the Contract.

§ 13.15 Contractor Pre-Qualifications

The laws of the State of Indiana (I.C. 5-16-13-10(c) as amended) contain certain special provisions regarding pre-qualification of contractors on public works projects. Contractors must be pre-qualified under I.C. 4-13.6-4 or I.C. 8-23-10.

COMPLIANCE AFFIDAVIT

Each application for payment shall be accompanied by an affidavit, dated and signed by the Contractor, substantially as follows:

This is to certify that in the performance of this Contract the undersigned Contractor and its Subcontractors are in compliance with the "Contractor Pre-Qualifications" requirements set forth in I.C. 5-16-13-10(c).

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, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, 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

(Paragraph deleted)

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, 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' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents

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with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- .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 described in Section 14.2.1 exist, the Owner 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' 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 under 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 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 properly executed and costs actually and reasonably incurred by reason of such termination.

§ 14.4.4 When the Owner terminates the Contractor's services pursuant to this Section, the termination shall not affect the rights or remedies of the Owner against the Contractor then existing or which may thereafter accrue.

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, a change in the Contract Time, 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. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

Any litigation filed by the Contractor or its Subcontractors asserting any right, claim or cause of action against the Owner arising out of or related in any way to the Contract or Contractor's performance of the Work must be commenced within one year of Substantial Completion. The Owner shall be entitled to the immediate dismissal of any such litigation brought more than one year after Substantial Completion. Any such right, claim or cause of action asserted by the Contractor or its Subcontractors against the Owner more than one year after Substantial Completion is waived by the Contractor.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor where the condition giving rise to the Claim is first discovered prior to the expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by 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 the specific time period required by the Contract Documents and in the absence of a specific time period then no later than 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. The timely giving of Notice shall be a condition precedent to any entitlement to adjustment in the Contract Time or the Contract Sum. The failure to provide timely Notice of a Claim constitutes an irremovable waiver of such Claim.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 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.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 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. In the case of a continuing delay occurring on consecutive days, only one Claim is necessary; provided, however, that within ten days after the cessation of the cause of the continuing delay, the Contractor shall notify the Owner and Architect in writing that the cause of the delay has ceased. The failure to give timely notice of the cessation of the cause of the continuing delay will constitute an irrevocable waiver of any Claim based on the continuing delay.

Init.

§ 15.1.6.2 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. Notwithstanding any other provision of the Contract Documents to the contrary, the Contract Time will not be adjusted on account of the impact of any normal adverse weather on any of the Work or on account of the impact of any abnormal adverse weather on non-critical elements of the Work. The support for and evaluation of all adverse weather Claims shall be based upon average weather conditions during the 10 years immediately preceding the dates at issue in the Claim as such weather conditions were recorded at the government controlled weather-recording facility nearest to the project.

(Paragraphs deleted)

§ 15.1.7 Deleted

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, 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. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

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

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

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the 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.

§ 15.2.6.1 Deleted

§ 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.

Init.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien or verified claim, 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, and 9.10.5, 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. 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.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 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 Deleted

(Paragraphs deleted)

ADDITIONAL INFORMATION

AACC	Asian American and Asian Resource and Cultural Center F6	LAMB	Lambert (Ward L.) Fieldhouse and Gymnasium G4	VA2	Veterinary Animal Isolation Building 2 G10
ACPF	Ag Alumni Seed Controlled Environmental Phenotyping Facility F8	LCC	Latino Cultural Center F6	VCPR	Veterinary Center for Paralysis Research G10
ABE	Agricultural and Biological Engineering F9	LG	Lambert Green G4	VLAB	Veterinary Laboratory Animal Building G10
ADDL	Animal Disease Diagnostic Laboratory G10	■	Library, Main (see HIKS) H8	VMIF	Veterinary Medicine Isolation Facility G10
ADM	ADM Agricultural Innovation Center E11	LILY	Lilly Hall of Life Sciences F8	VOIN	Voinoff (Samuel) Golf Pavilion C1
ADPA-C	Aspire at Discovery Park D8	LMSB	Laboratory Materials Storage Building H11	VPRB	Veterinary Pathobiology Research Building F9, 10
AERO	Aerospace Science Laboratory C11	LMST	Laboratory Materials Storage Trailer H11	VPTH	Veterinary Pathology Building G9
AGAD	Agricultural Administration Building G8	LOLC	Land O'Lakes Center for Experiential Learning and Purina Pavilion F9	WADE	Wade (Walter W.) Utility Plant H11
AHF	Animal Holding Facility G10	LSA	Life Science Animal Building F8	WALC	Thomas S. and Harvey D. Wilmeth Active Learning Center G6
AQUA	Morgan J. Burke Boilermaker Aquatic Center D6	LSPS	Life Science Plant and Soils Laboratory F8	WANG	Wang (Seng-Liang) Hall H5
AR	Armory F6	LSR	Life Science Ranges (Greenhouse and Service Building) F8	■	Welcome Center (see STEW) H7
ARMS	Armstrong (Neil) Hall of Engineering G5	LWSN	Lawson (Richard and Patricia) Computer Science Building F6	WEST	Westwood (President's Home) A5, 6
ASB	Airport Service Building (Shop Services) A11-12	LYLE	Lyles-Porter Hall F9	WGLR	Women's Golf Locker Room D1
BALY	Bailey (Ralph and Bettye) Hall H6-7	LYNN	Lynn (Charles J.) Hall of Veterinary Medicine G10	WSLR	Whistler (Roy L.) Hall of Agricultural Research G8
BCC	Black Cultural Center F6	MACK	Mackey (Guy J.) Arena F, G4	WTHR	Wetherill (Richard Benbridge) Laboratory of Chemistry G7
BCHM	Biochemistry Building F8	MANN	Mann (Gerald D. and Edna E.) Hall D8	YOUNG	Young (Ernest C.) Hall H8
BIDC	Bechtel Innovation Design Center F6	MATH	Mathematical Sciences Building G7	† ZL1	Combustion Research Laboratory
BIND	Bindley Bioscience Center D8	ME	Mechanical Engineering Building H6	† ZL2	Gas Dynamics Research Laboratory
BOWN	Robert L. & Terry L. Bowen Laboratory H12 (Inset)	MJIS	Jischke (Martin C.) Hall of Biomedical Engineering E9	† ZL3	High Pressure Research Laboratory
BRES	Brees (Drew and Brittany) Student-Athlete Academic Center F3	MMDC	Materials Management and Distribution Center F11	† ZL4	Propulsion Research Laboratory
BRK	Birck Nanotechnology Center D8	MMS1	Materials Management Storage Building 1 F12	† ZL5	Turbomachinery Fluid Dynamics Laboratory
BRNG	Beering (Steven C.) Hall of Liberal Arts and Education G7	MOLL	Mollenkopf Athletic Center F3	† ZL8	High Pressure Combustion Laboratory
BRWN	Brown (Herbert C.) Laboratory of Chemistry H7	MGRN	Morgan (Burton D.) Center for Entrepreneurship D8		
BTV	Boiler Television Building E3	MRRT	Marriott Hall F7,8		
■	Car/Van Rentals and Charter Bus (MMDC) F11	MSEI	Materials and Electrical Engineering Building H5		
† CHAF	Chaffee Hall A9	MTHW	Matthews Hall F8		
CHAS	Chaney-Hale Hall of Science G6	NACC	Native American Educational and Cultural Center F6		
CL50	Class of 1950 Lecture Hall G7	NISW	Niswonger Aviation Technology Building B11		
COMP	Composites Laboratory C11	NLSN	Nelson (Philip E.) Hall of Food Science G9		
CONV	Convergence C8	OLMN	Ollman (Melvin L.) Golfcart Barn C1		
CREC	Córdova (France A.) Recreational Sports Center E6	PAGE	Thomas A. Page Pavilion H12 (Inset)		
CRTN	Hobart and Russell Creighton Hall of Animal Sciences F9	■	Parking Facilities (MMDC) F11		
‡ DANL	Daniel (William H.) Turfgrass Research Center B1	PAO	Pao (Yue-Kong) Hall of Visual and Performing Arts H8		
DAUC	Dauch (Dick and Sandy) Alumni Center H9	PFEN	Pfendler (David C.) Hall of Agriculture G8		
DLR	Hall for Discovery and Learning Research E9	PFSB	Physical Facilities Service Building F12		
DMNT	DeMent (Clayton W.) Fire Station D6	PGSC	Purdue Graduate Student Center H5		
DOYL	Doyle (Leo Philip) Laboratory G10	■	Pharmacy (Purdue University Retail Pharmacy - RHPH) G5		
DRUG	Drug Discovery F9	PHYS	Physics Building G5		
DYE	Pete Dye Clubhouse C1	PJIS	Jischke (Patty) Early Care and Education Center C8		
ECEC	Purdue University Early Care and Education Center A7	PMRI	Purdue Magnetic Resonance Imaging Facility G9		
EE	Electrical Engineering Building H6	PMU	Purdue Memorial Union H7		
EEL	Entomology Environmental Laboratory G8	PMUC	Purdue Memorial Union Club H7		
EHSA	Equine Health Sciences Annex G10	POTR	Potter (A.A.) Engineering Center H6		
EHSB	Equine Health Sciences Building G10	PRCE	Peirce Hall G7		
ELLT	Elliott (Edward C.) Hall of Music G6	PRSV	Printing Services Facility F11		
FLEX	Flex Lab D9	PSYC	Psychological Sciences Building G6, 7		
FOPN	Flight Operations Building B11	PTCA	Purdue Technology Center Aerospace A8 (West Campus inset)		
FORS	Forestry Building G8	PUSH	Purdue University Student Health Center F, G5		
FPRD	Forest Products Building G8	PVAB	Purdue Village Administration Building D9		
FRNY	Forney Hall of Chemical Engineering G5	PVCC	Purdue Village Community Center C8		
FWLR	Fowler (Harriet O. and James M., Jr.) Memorial House E7	RAIL	American Railway Building H6		
GCMB	Golf Course Maintenance Barn C2	RAWL	Rawls (Jerry S.) Hall H8		
GMF	Grounds Maintenance Facility F11	REC	Recitation Building G7		
■	The Graduate School (Young Hall - first floor) H8	RHPH	Heine (Robert E.) Pharmacy Building G5		
■	Grand Prix Track (see Northwest Athletic Complex Inset)	SC	Stanley Coulter Hall G7		
GRIS	Grisson Hall H7	SCHL	Schleman (Helen B.) Hall of Student Services G6		
GRS	Grounds Service Building E8	SCHO	Global Policy Research Institute (Schowe House) F1		
GSMB	Golf Storage Maintenance Building C2	SCPA	Slayter Center of Performing Arts E4		
HAAS	Haas (Felix) Hall G7	SIML	Holleman-Niswonger Simulator Center A11		
HAMP	Hampton (Delon and Elizabeth) Hall of Civil Engineering G5	SMLY	Smalley (John C.) Center for Housing and Food Services Administration D6		
HANS	Hansen (Arthur G.) Life Sciences Research Building F9	SMTH	Smith Hall F8		
HEAV	Heavilon Hall H7	SOIL	Soil Erosion Laboratory, National E9		
HERL	Herrick Acoustics E8	SPUR	Spurgeon (Tom) Golf Training Center C1		
HGR4-7	Hangars, Numbers 4 through 7 A11,12	STDM	Ross-Ade Stadium (includes Ross-Ade Pavilion (RAP)) F3		
HGRH	Horticultural Greenhouse G9	STEM	See CHAS G6		
HIKS	Hicks (John W.) Undergraduate Library H8	STEW	Stewart Center (includes Welcome Center) H7		
HLAB	Herrick Laboratories E8	STON	Stone (Winthrop E.) Hall G8		
HMMT	Hazardous Materials Management Trailer H11	■	Student Health Center (see PUSH) G5		
HNLY	Hanley (Bill and Sally) Hall E7	TEL	Telecommunications Building F7		
HOCK	Hockmeyer (Wayne T. and Mary T.) Hall of Structural Biology E9	TERM	Terminal Building B11		
HORT	Horticulture Building G9	TERY	Terry (Oliver P.) House E8, 9		
HOVD	Hovde (Frederick L.) Hall of Administration G6	TREC	Turf Recreation Exercise Center D6		
JNSN	Johnson (Helen R.) Hall of Nursing G6	TSWF	Transportation Service Wash Facility G12		
KCTR	Krannert Center for Executive Education and Research H8	UNIV	University Hall G7		
KFPC	Kozuch Football Performance Complex F3	UPOB	Utility Plant Office Building H11		
KNOY	Knoy (Maurice G.) Hall of Technology H6	UPOF	Utility Plant Office Facility H10		
KRAN	Krannert Building H8	UPSB	Utility Plant Storage Building G11		
KRCH	Krach Leadership Center E6	VA1	Veterinary Animal Isolation Building 1 G10		

Residence & Dining Facilities

CARY	Cary (Franklin Levering) Quadrangle F4
* DUHM	Duhme (Ophelia) Residence Hall E7
ERHT	Earhart (Amelia) Residence Hall D7
FORD	Ford (Fred and Mary) Dining Court E4
FST	First Street Towers D7
GRFN	Griffin Residence Hall North E6
GRFS	Griffin Residence Hall South (Formerly Third Street Suites) E6
HARR	Harrison (Benjamin) Residence Hall C7
HAWK	Hawkins (George A.) Hall H8
HCNR	Honors College and Residences North E7
HCRS	Honors College and Residences South E7
HILL	Hillenbrand Residence Hall C7
HLTP	Hilltop Apartments E3
MCUT	McCutcheon (John T.) Residence Hall C7
MRDH	Meredith (Virginia C.) Residence Hall D7
MRDS	Meredith (Virginia C.) Residence Hall South D7
OWEN	Owen (Richard) Residence Hall E4
PVAB	Purdue Village Administration Building D9
PVCC	Purdue Village Community Center C8
PVIL	Purdue Village B, C, DB, 9, 10
PVP	Purdue Village Preschool C9
* SHLY	Shealy (Frances M.) Residence Hall E7
SHRV	Shreve (Eleanor B.) Residence Hall D7
SMLY	Smalley (John C.) Center for Housing and Food Services Administration D6
TARK	Tarkington (Newton Booth) Residence Hall E5
* VAWT	Vawter (Everett B.) Residence Hall E6
* WARN	Warren (Martha E. and Eugene K.) Residence Hall E7
WDCT	Wiley Dining Court E6
WILY	Wiley (Harvey W.) Residence Hall E6
* WOOD	Wood (Elizabeth G. and William R.) Residence Hall E7

Northwest Athletic Complex (C2-3 inset)

BBCH	Purdue Baseball Clubhouse
BBPB	Purdue Baseball Press Box
SBCH	Purdue Softball Clubhouse
SBPB	Purdue Softball Press Box
SCHW	Schwartz (Dennis J. and Mary Lou) Tennis Center
SOCC	Purdue Women's Soccer Building

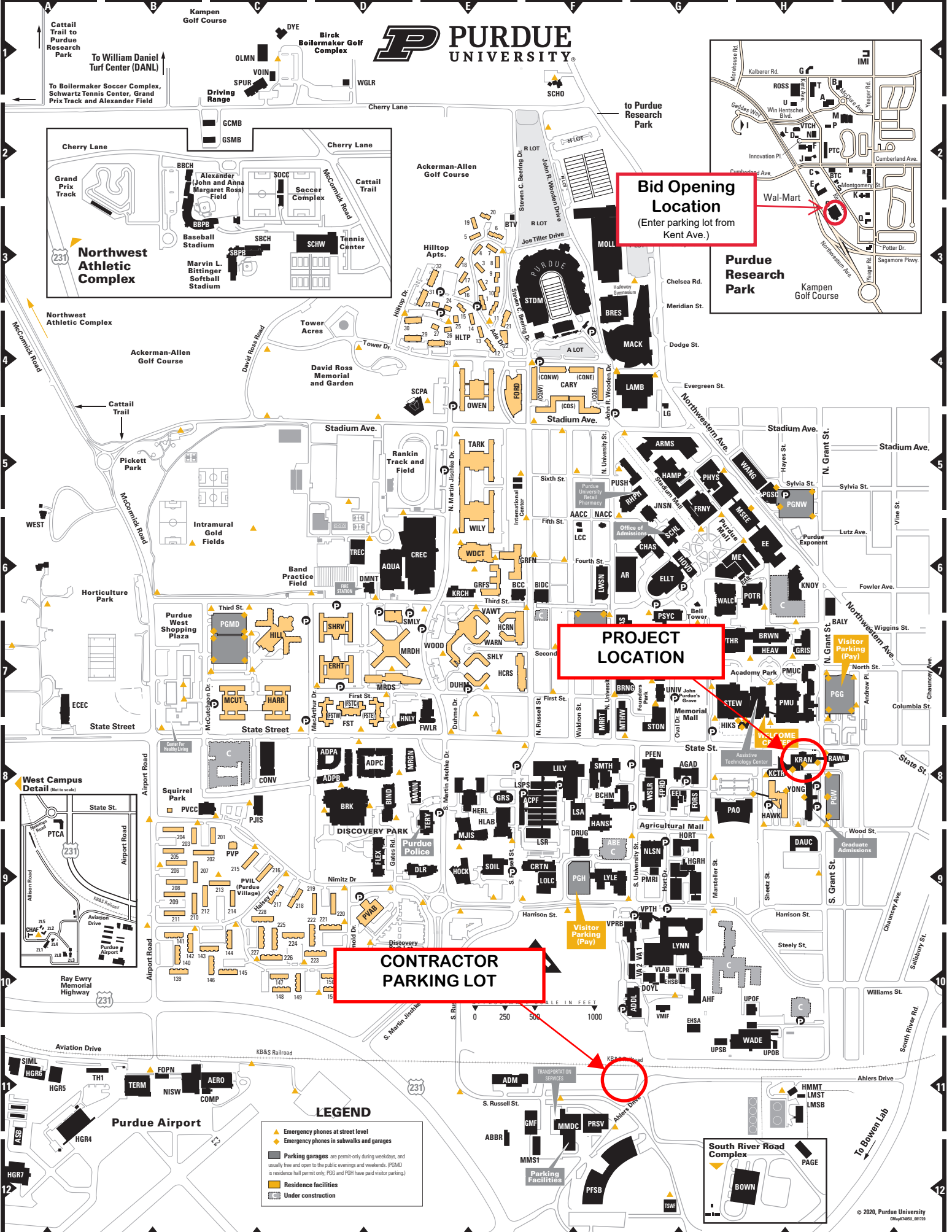
Parking Garages

Parking garages are for permitted parking during weekdays. Parking becomes free and open to the public on most nights and weekends. The Grant Street garage (PGG) has paid visitor parking at all times. **Visitors may purchase day parking passes in advance at purdue.edu/parking. Visitor passes are not valid in the Grant Street garage.**

PGG	Parking Garage, Grant Street I7
PGH	Parking Garage, Harrison Street F9
PGMD	Parking Garage, McCutcheon Drive C7 (residence hall permit required)
PGNW	Parking Garage, Northwestern Avenue H5
PGU	Parking Garage, University Street F7
PGW	Parking Garage, Wood Street H8

* Windsor Residence Halls

† Part of Maurice J. Zucrow Laboratories



Bid Opening Location
(Enter parking lot from Kent Ave.)

PROJECT LOCATION

CONTRACTOR PARKING LOT

LEGEND

- ▲ Emergency phones at street level
- ▲ Emergency phones in subwalks and garages
- Parking garages are permit-only during weekdays, and usually free and open to the public evenings and weekends. (PGMD is residence hall permit only; PGG and PGH have paid visitor parking)
- Residence facilities
- Under construction

DIVISION 01

SECTION 01 0100 - PROJECT REQUIREMENTS

SECTION 01 0100 - PROJECT REQUIREMENTS

PART 1: GENERAL

1.01 SCOPE OF PROJECT

- A. The Scope of this Project includes a full renovation of Rooms 480 and 491 on the Fourth Floor of the Krannert Building.
- B. Contract: Construction work under unified fixed price contract.

1.02 PROJECT MANAGER

- A. Project Manager for this project is Kristi Brown, Physical Facilities, Purdue University, (765) 586-0430, FAX (765) 496-1579.

1.03 COMMENCEMENT AND COMPLETION OF THE WORK

- A. Refer to the General Conditions of the Contract, Article 8.
- B. Except as otherwise provided in the General Conditions of the Contract, all of the work to be performed under the Contract Documents shall be started on 03/14/2022 and completed on or before 05/27/2022.
- C. Prior to the Owner's preparation of a Project Punch List, the Contractor shall prepare his own punch list and submit to the Owner.

1.04 JOBSITE VISITS

- A. Any Bidder wishing to make on-site job visits to inspect and verify conditions shall contact Kristi Brown, Senior Project Manager, (765) 586-0430, to make arrangements.
- B. All questions about the Contract Documents shall be directed to the Architect of Record.

1.05 PAYMENT

- A. See General Conditions of the Contract, Article 9.

1.06 CONTRACTOR'S USE OF PREMISES

- A. Contractor(s) shall confine his use of premises to the limits of construction shown on the Drawings or as directed by the Owner's Project Manager.

SECTION 01 0100 - PROJECT REQUIREMENTS

1. Use of premises for work and storage shall be limited to allow for Owner's occupancy.
 2. Access to the project area shall be coordinated with the Owner's Project Manager.
- B. Assume full responsibility for protection and safe keeping of products stored on premises.
- C. See Section "Temporary Facilities and Controls" for storage within existing buildings.

1.07 CONTRACTOR PARKING

- A. Contractor shall purchase needed contractor parking permits through Purdue University Parking Facilities office. See www.purdue.edu/parking for details.
1. Parking at the Project Site: 2 spaces will be available within the proximity of the Project Site. These parking spaces require green "Contractor Parking" permits and a location to be determined by the Purdue Project Manager. These permits shall be requested by the Contractor through the Purdue Project Manager. Contractor shall submit the approved request form to Parking Facilities to purchase the permit.
 2. Contractor Personnel Parking: Contractor personnel shall park in the Contractor Parking Lot located east of the airport (see map). An orange "Contractor Personnel" parking permit is required for this lot. These permits may be purchased by the Contractor without Purdue Project Manager involvement.

1.08 OWNER'S OCCUPANCY

- A. It shall be understood that all occupied buildings in the project area shall operate in a normal manner, without disruption of essential services to the satisfaction of the Owner during construction operations.
- B. Suitable means of ingress and egress shall be maintained to these areas at all times.
- C. Cooperate with Owner in all construction operations to minimize conflict and to facilitate Owner's usage.
- D. If a dispute over time of use or interruption of use of the facilities develop, the Owner's requirements shall take precedence.

1.09 PROTECTION

- A. Existing Property:
1. Protect existing property from damage during the work required by these Contract Documents. Any damage done to existing property shall be repaired satisfactorily to the approval of the Owner.

SECTION 01 0100 - PROJECT REQUIREMENTS

2. Existing property includes, but shall not be limited to, buildings, sidewalks, curbs, lawns, grass and shrubs.

B. Work in Progress:

1. In the event of temporary suspension of work for inclement weather or for any other reasons, the Contractor shall protect all work and materials against damage or injury. If damage or injury results from failure to protect, such work and materials shall be removed and replaced at no additional cost to the Owner.

C. Utilities:

1. All existing water and gas pipe, sewers, drains, electrical ducts and other duly authorized structures shall be properly supported and protected by and at the expense of the Contractor during the construction of work under or near them and so as not to interfere with their use. They shall be left in as good condition on completion of the work as when found by the Contractor.

1.10 ASBESTOS AFFIDAVIT

- A. As a part of the project close-out documentation, the Contractor, each of his Subcontractors and each of the material suppliers shall sign an affidavit stating that no materials containing asbestos have been used and/or installed on this project.

1.11 SMOKE-FREE CAMPUS POLICY

- A. As per Purdue University's Smoke-Free Campus Policy effective July 1, 2010, smoking is prohibited on campus except in designated smoking areas. Construction job sites must comply with this policy.
- B. A map of the designated smoking areas on campus may be requested at the pre-construction meeting.
- C. Smoking is only permitted in the designated areas or inside privately owned, closed vehicles.

1.12 UTILITY TUNNELS AND BUILDING LATERALS

- A. The utility tunnels and building laterals are classified as a confined space (not a permit required confined space) under normal operating conditions. Prior to commencing its work, Contractor shall determine whether the area should be reclassified to a permit required confined space due to the Contractor's performance of hot work, painting or any other action. Contractor shall communicate any such determination in writing to the Project Manager and take all action necessary to ensure worker health and safety including compliance with any applicable safety regulation and the Contractor's own safety guidelines.

SECTION 01 0100 - PROJECT REQUIREMENTS

END OF SECTION 01 0100

SECTION 01 2900 – PAYMENT PROCEDURES

SECTION 01 2900 – 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 1 Specification Sections, apply to this Section.

1.02 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section
 - 1. Breakdown shall include separate line items for material and labor for Divisions 2 through 48.
 - 2. Round amounts to nearest whole dollar.
 - 3. O&M and As Built Drawings shall be listed as a separate item in the Schedule of Values with a value of 3% of the contract sum but not less than \$1,000 or more than \$250,000.
 - 4. Provide a separate line item in the Schedule of Values for each Allowance, if applicable.

1.03 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified and paid for by Owner.
- B. Pencil copies of Application for Payment shall be submitted to the Owner's Representative and Purdue Project Manager for approval (5) days prior to formal submission.
- C. Payment Application Forms: use forms provided by Owner for Applications for Payment.
 - 1. Include amounts of Change Orders approved before last day of construction period covered by application.
- D. Transmittal: Submit a signed and notarized original copy of each Application for Payment to Purdue University. Include all required attachments described or prescribed elsewhere in the Contract Documents.
- E. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

SECTION 01 2900 – PAYMENT PROCEDURES

1. Schedule of Subcontractors, Manufacturers and Products.
 2. Schedule of Values
 3. Contractor's Construction Schedule.
 4. Submittal Schedule.
 5. List of Contractor's staff and principal assignments.
 6. Copies of building permits and other authorizations for performance of the Work.
 7. Certificates of insurance and insurance policies.
 8. Certified Schedule of Wages or Certified Payroll, if required.
- F. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- G. 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.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Final statement, accounting for final changes to the Contract Sum.
 4. Contractor's Affidavit, Waiver of Lien, and Guarantee.
 5. Evidence that claims have been settled.
 6. Final, liquidated damages settlement statement.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION 01 2900

SECTION 01 3100 – PROJECT MANAGEMENT AND COORDINATION

SECTION 01 3100 – 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 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project.

1.03 COORDINATION

- A. Coordination: Coordinate construction operations included in various 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. The layout of fire protection, plumbing, mechanical, and electrical systems, equipment, fixtures, piping, ductwork, conduit, specialty items, accessories shown on the drawings and in diagrammatic form, and all variations in alignment, elevation and details required to avoid interferences and satisfy all architectural and structural limitations are not necessarily shown.
 - 2. Actual layout of the Work shall be carried out without affecting the architectural or structural integrity and limitations of the Work and shall be performed in such sequence and manner as to avoid conflicts, provide clear access to all control points, including valves, strainers, control devices and specialty items of every nature related to such systems and equipment, obtain maximum headroom, and provide clearances as required for operation and maintenance.
- B. 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. Pre-installation conferences.
 - 7. Project closeout activities.

SECTION 01 3100 – PROJECT MANAGEMENT AND COORDINATION

- C. 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. Construction Schedule: Submit a comprehensive, horizontal bar chart or CPM construction schedule within 10 days of the Notice to Proceed.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

1.05 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
 - 1. Attendees: Inform participants and others whose presence is required, of date and time of each meeting. Notify Owner and Architect of dates and times.
 - 2. Minutes: Record and distribute the meeting minutes to everyone concerned within five days of the meeting.
- B. Preconstruction Conference: A/E will schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, at Project site or another convenient location.
 - 1. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing/Critical work sequencing.
 - c. Designation of responsible personnel.
 - d. Procedures for processing field decisions and Change Orders.
 - e. Procedures for processing Applications for Payment.
 - f. Submittal procedures.
 - g. Preparation of Record Documents.
 - h. Use of the premises.
 - i. Responsibility for temporary facilities and controls.
 - j. Parking availability.
 - k. Office, work, and storage areas.
 - l. Equipment deliveries and priorities.
 - m. Security.
 - n. Progress cleaning.
 - o. Working hours.
- C. Pre-installation Conferences: Conduct a pre-installation conference at Project site before each construction activity that requires coordination with other construction.

SECTION 01 3100 – PROJECT MANAGEMENT AND COORDINATION

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.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Deliveries.
 - b. Submittals and mockups.
 - c. Possible conflicts, substrate acceptability and compatibility problems.
 - d. Time and weather limitations.
 - e. Manufacturer's written recommendations.
 - f. Warranty requirements.
 - g. Space and access limitations.
 - h. Regulations of authorities having jurisdiction.
 - i. Testing and inspecting requirements and required performance results.
 3. Record significant conference discussions, agreements, and disagreements.
 4. 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. Progress Meetings: Contractor will conduct progress meetings at bi-weekly intervals.
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. Review the present and future needs of each entity present, including such items as:
 - 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.
 - b. Interface requirements
 - c. Time and sequences
 - d. Access and Site utilization
 - e. RFI's, Submittals, Change Orders
 - f. Off-site fabrication problems
 - g. Housekeeping
 - h. Quality and Work Standards

SECTION 01 3100 – PROJECT MANAGEMENT AND COORDINATION

- i. Documentation of information for payment requests
 - j. Hours of work
 - k. Schedule Updating: Contractor shall revise its Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule at the next meeting. The schedule baseline shall be maintained throughout the life of the project and used to compare against the actual progress of the work.
- E. Contractor Coordination Meetings: Conduct Project coordination meetings at weekly intervals and as needed for the resolution of unanticipated issues. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and pre-installation conferences.
- 1. Reporting: Record meeting results and distribute copies to everyone in attendance, Owner and Architect, and others affected by decisions or actions resulting from each meeting.

PART 2: PRODUCTS (Not Used)

PART 3: EXECUTION (Not Used)

END OF SECTION 01 3100

SECTION 01 3216 – CONSTRUCTION PROGRESS SCHEDULES

SECTION 01 3216 – CONSTRUCTION PROGRESS SCHEDULES

PART 1: GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. The contractor will create a construction schedule of the Critical Path Method (CPM) type to monitor the project. The contractor will be responsible for providing all information concerning the sequencing and durations of all activities as well as providing the initial CPM logic diagram. Once the initial logic diagram is accepted by Purdue University, the contractor will be responsible for maintaining and providing periodic updates.
- B. If the scope is on multiple levels of a building, each level will be broken out. The electrical, mechanical and general scope will be detailed separately.
- C. This schedule shall be the Contractor's working schedule and used to plan, organize and execute the work, record and report actual performance and progress and outlines how the Contractor plans to complete all remaining work.

1.03 SUBMITTALS

- A. Within ten (10) days after notice of award of contract, the Contractor shall submit for review and approval a framework schedule, along with a work breakdown structure and activity code breakdown structure, and a 60 day detailed schedule. The schedule will be reviewed by Purdue University and returned to the Contractor within fourteen (14) days. Receipt and review of the schedule is a requirement for issuance of the first progress payment.
- B. Within forty-five (45) days after notice of award of the contract, the Contractor shall submit for review and approval the completed schedule, incorporating the 60 day schedule. Progress payments are contingent upon approval of the completed schedule.
- C. Updates of the schedule and the Excel spreadsheet will be sent to Purdue University on the last Friday of every month. Once Red-Zone is reached, updates become required every Friday. Updates are to be delivered in electronic format. Updates are required in electronic schedule software format.

SECTION 01 3216 – CONSTRUCTION PROGRESS SCHEDULES

PART 2: PRODUCTS

2.01 SOFTWARE

- A. The following software packages are acceptable:
 - 1. Primavera Project Planner (P6 XER format)
 - 2. Primavera Suretrack
 - 3. Microsoft Project
- B. Owner supported activities shall be updated in Microsoft Excel format matching the spreadsheet format given to the Contractor.

PART 3: EXECUTION

3.01 NETWORK DETAILS

- A. Detailed Network Diagram: The detailed network diagram shall show all activities required to complete the project and their dependency relationships. Include intermediate milestones as necessary to track important events such as phased completion dates, permanent power, outages, owner furnished equipment delivery, etc., and all items specified in the "Other Conditions" of the contract. Each activity should have an associated activity identification, activity description, duration, early and late start and finish dates, and total float. Logic relationships may include start-to-start, start-to-finish, and finish-to-finish with lags times as required. Finish-to-start lags are not allowed. Start-to-start lags shall be no longer than ten (10) days. Each activity shall have at least one precedent and/or successor activity.
- B. Calendar: List all non-work days to include weekends and holidays. Include other days that university personnel will not be available (refer to current University Academic calendar).
- C. Required Activities: Activities to be included in the network shall be: construction activities; submittal/shop drawing preparation activities; submittal/shop drawing review activities; purchase, manufacture/fabricate, and delivery for major equipment and materials activities; critical inspection activities; utility shutdown activities; and close-out activities.
 - 1. The Contractor will be given a disk with a Microsoft Excel file containing a list of the required milestones. This list of the required milestones is attached in this Specification Section as Attachment "A". The Contractor may add to this list, but may not delete any milestones from it.

SECTION 01 3216 – CONSTRUCTION PROGRESS SCHEDULES

D. Activity Detail: The activities shall meet the following criteria:

1. Unique numbering system to include project number and CSI coding. Include coding for building, phase, area, sub-area, floor, contractor, subcontractor as applicable. Coordinate coding with schedule of values.
2. Whole day units.
3. Construction activities shall have a maximum duration of 15 days.
4. Resource loading in man-hours for each activity. Include proposed resource flow of subcontractors through the building.

3.02 UPDATING

A. The updates will cover the project schedule and the milestones. Update will be compared to the baseline schedule (or accepted revised baseline schedule). Previous months' schedule update will not be used. Update shall include as a minimum the following:

1. Actual start/finish dates
2. Projected remaining durations for activities in progress
3. Logic changes to correct out-of-sequence progress only
4. Narrative to include: reasons for changes and associated impact, progress on the critical path and critical path shifting, total float usage, average number of days activities started early/late, activities which did not start but should have, added/deleted activities.
5. If schedule has slipped, a recovery schedule indicating the logic changes and duration changes required to recover the schedule.

3.03 CHANGE ORDERS

F. If a change in scope influences the project schedule, then a revised project schedule will be submitted with the request for change in contract amount. This revised project schedule will show the change or delay on the current contract schedule completion date. This revised project schedule shall be submitted by the Contractor for review by Purdue University.

END OF SECTION 01 3216

SECTION 01 3216 – CONSTRUCTION PROGRESS SCHEDULES

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SECTION 01 3523 – OWNER SAFETY REQUIREMENTS

SECTION 01 3523 – OWNER SAFETY REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Contractor performing work at the Project site shall demonstrate commitment to workplace safety, safe work practices, and compliance with all applicable safety requirements by one or more of the following methods while working on this project and shall be participating members in one of the following programs:
 - 1. Engaged in an active consultation with IOSHA's INSafe Program for this Project;
 - 2. Establish and maintain a level of "participating" or better in the Coalition for Construction Safety (CCS) Certification Program; or
 - 3. Establish and maintain a "participating" membership status in IDOL/ICA's or IDOL/ABC's Safety Partnership Program.

1.02 SUBMITTALS

- A. Contractor will provide documentation of participation to owner prior to award of contract.
- B. Documentation of participation in a safety program shall be in such form as follows for each program:
 - 1. INSafe Program – employer's INSafe consultation confirmation for the project specifically stated in this contract. Contractor shall provide a copy of the confirmation from INSafe that a consultation has been requested, copies of the confirmation of the visit, and any findings by INSafe.
 - 2. Coalition for Construction Safety (CCS) – participating level will be obtained from the CCS database.
 - 3. IDOL Safety Partnership Programs – letter from the Directors of ICA/ABC attesting to the contractor's participation in the IDOL Safety Partnership Program.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION 01 3523

SECTION 01 3523 – OWNER SAFETY REQUIREMENTS

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SECTION 01 5000 – TEMPORARY FACILITIES AND CONTROLS

SECTION 01 5000 – TEMPORARY FACILITIES AND CONTROLS

PART 1: GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities as may be indicated on the Drawings and as specified herein.

1.03 DESCRIPTION

- A. Temporary Electrical Power:
 - 1. Obtain from Owner's existing service.
 - 2. Furnish, install and maintain a temporary wiring system for construction power and light for all trades.
- B. Temporary Heat and Ventilation:
 - 1. Protect work and products against dampness and cold.
 - 2. Provide suitable ambient temperatures for installation and curing of materials.
 - 3. Provide adequate ventilation for safe working environment health regulations.
- C. Temporary Water:
 - 1. Owner's existing service.
 - 2. Coordinate with Owner's Project Manager for point of source.
 - 3. Provide testable, reduced pressure type backflow preventers.
 - a. Owner will test the backflow preventers before they are connected to a potable water source to ensure correct type, lead-free, and correct installation.
 - b. Contractor shall retest backflow preventers after any relocation. Testing reports shall be submitted to Project Manager.
- D. Temporary Telephone:
 - 1. General Contractor provides service of desired.
 - 2. Subcontractors provide service they require.
 - 3. Owner's telephone shall not be available for use, except for emergencies.
- E. Sanitary Facilities:
 - 1. Owner's existing restroom facilities are available for use. If the facilities become abused the contractor will be asked to provide their own portable facilities.

SECTION 01 5000 – TEMPORARY FACILITIES AND CONTROLS

1.04 COSTS OF TEMPORARY UTILITIES

- A. Temporary Electrical Power:
 - 1. Make all necessary arrangements.
 - 2. Pay for setting, distributing, maintaining, and removing temporary facilities.
 - 3. Owner will furnish and pay cost of power.

- B. Temporary Heat and Ventilation:
 - 1. Pay costs of installation, operation, maintenance, and removal.
 - 2. Pay costs of filter replacement.
 - 3. Contractor shall furnish and pay cost of fuels.

- C. Temporary Water:
 - 1. Pay costs for installing, maintaining, and removing pipe and equipment.
 - 2. Water will be supplied by the Owner.
 - 3. Owner will pay cost of initial testing of backflow preventers.
 - 4. Pay costs for retesting of relocated backflow preventers.

- D. Temporary Telephone:
 - 1. Pay costs of installation, maintaining, and removing temporary service.
 - 2. Pay for local telephone service.
 - 3. Persons making toll calls pay charges.

1.05 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.

1.06 GENERAL PROVISIONS

- A. Furnish and maintain during the construction period temporary requirements and facilities and perform temporary Work as required in the performance of this Contract. Upon completion of the Work, all temporary facilities shall be removed and the premises left clean.

- B. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used. Provide materials suitable for use intended.

SECTION 01 5000 – TEMPORARY FACILITIES AND CONTROLS

- C. Ingress and Egress:
1. Ingress and egress to the Project construction areas shall be determined by the Owner's Project Manager.
 2. Contractors shall not damage any drives, curbs, sidewalks and other site improvements that remain in place.
 - a. Materials and items which are not designated to be removed and are damaged shall be removed and replaced with new materials which match existing.
 3. Such means of ingress and egress must take into account that the entrances to existing and adjacent buildings and related access ways must remain open, in operation, unobstructed and available for normal daily operations (and possible emergency exit).
 4. Obtain permission from the Owner's Project Manager where necessary to drive a vehicle of any sort over a curb and gutter and onto a sidewalk and on or across a utility tunnel. Such permission will only be granted after an inspection of the areas involved is made. Any damages resulting from passage of vehicles of any sort over curbs, gutters and sidewalks shall be repaired by the contractor at his own expense. Driving of any vehicle over curbs and gutters onto sidewalks without permission will be considered to have been the cause of any flaws found and the contractor shall repair them at his expense.
- D. Access to Existing Adjacent Buildings:
1. The Contractor shall caution all workmen regarding blocking of roadways, illegal parking, blocking of loading docks and blocking of existing facilities from buildings.
 2. Throughout the construction period, emergency vehicles routes and access to service entrances of adjacent buildings must be maintained.
 3. Coordinate any temporary shutdown of drives or entrances with the Owner.
- E. Maintaining the Use of Existing Adjacent Buildings:
1. It shall be understood that all existing adjacent buildings shall operate in a normal manner, without disruption of essential services to the satisfaction of the Owner during construction operations.
- F. Maintaining Existing Building Security
1. Secure the Project against the entrance of unauthorized persons through construction areas.
 2. Maintain proper closures at any openings required in the present exterior walls accommodate construction operations and the sequence of work.
- G. Protecting Existing Materials, Finishes and Mechanical and Electrical
1. All existing materials and finishes designated to remain shall be protected from damage by construction operations and from the elements during the entire period of construction operations. Any existing materials, finishes, mechanical and electrical installations damaged by construction operations or by the elements shall be repaired or replaced as necessary, at no cost to the Owner and to the approval of the Owner's Project Manager.

SECTION 01 5000 – TEMPORARY FACILITIES AND CONTROLS

- H. Storage of Materials:
 - 1. The Contractor shall confine storage of materials within the contract work area as directed by the Owner's Project Manager.
 - 2. Contractor shall be responsible for assigning locations and space for each subcontractor's storage and staging area.
 - 3. Make arrangements for use of all storage areas with Owner's Project Manager.
- I. Signs: The use of signs on the project shall be as approved by the Owner's Project Manager.
- J. Demolition Dust Control: The Contractor shall utilize appropriate dust containment and barriers during demolition activities. The Contractor will provide negative air unit(s) for the Contractor's use during demolition to meet the project requirements.
- K. Chain-Link Fencing: Minimum 2-inch 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts. (Plastic fence is prohibited from being used on campus.)
- L. Tarpaulins: Fire-resistive labeled with flame-spread rating of 15 or less.
- M. Water: Potable

PART 2: PRODUCTS

2.01 EQUIPMENT

- A. Fire Extinguishers: Hand carried, portable, UL rated. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.
- B. Drinking-Water Fixtures: Containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.
- C. Heating Equipment: Unless Owner authorizes use of permanent heating system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - 2. Heating Units: Listed and labeled, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use for type of fuel being consumed.
- D. 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.

SECTION 01 5000 – TEMPORARY FACILITIES AND CONTROLS

- E. 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.
- F. Roof Harness and Tie-Off Line: Provide harness and tie-off line in accordance with Contractor's sole responsibility for conformance with OSHA requirements for construction.

2.02 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.
- B. Site Enclosure Fence: Before construction operations begin, install chain-link enclosure fence with lockable entrance gates. Locate where indicated, or if not indicated, enclose entire Project site or portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering site except by entrance gates.
 - 1. Set fence posts in compacted mixture of gravel and earth.
- C. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft and similar violations of security.
- D. Barricades, Warning Signs and Lights: 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. Where appropriate and needed, provide lighting, including flashing red or amber lights.
- E. Fire Protection: Until fire protection is supplied by permanent facilities, the Contractor shall install and maintain temporary fire protection to types needed to protect against predictable and controllable fire losses.
- F. Rodent and Pest Control: Retain an exterminator or pest control company to perform extermination and control procedures so the project will be free of pests at Substantial Completion. Perform operations in a lawful manner using environmentally safe materials.

PART 3: EXECUTION

3.01 INSTALLATION, GENERAL

- A. Install work in neat orderly manner, structurally sound.
- B. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

SECTION 01 5000 – TEMPORARY FACILITIES AND CONTROLS

- C. 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.
- D. 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 weather tight enclosure for building exterior.
- E. Temporary Partitions: Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.
 - 1. Construction dustproof partitions of not less than nominal 4-inch studs, 2 layers of 3-mil polyethylene sheets, inside and outside temporary enclosure and sealed to floor with tape. Overlap and tape full length of joints.
 - a. Construct a vestibule and airlock at each entrance to temporary enclosure with not less than 48 inches between doors. Maintain water-dampened foot mats in vestibule.
- F. Burning of trash on the site is prohibited.

3.02 TEMPORARY UTILITY INSTALLATION

- A. General: Engage appropriate local utility company to install temporary service or connect to existing service. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company recommendations.
- B. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
 - 1. Provide adequate capacity at each stage of construction. Before temporary utility is available, provide trucked-in services.
 - 2. Obtain easements to bring temporary utilities to Project site where Owner's easements cannot be used for that purpose.
- C. Sewers and Drainage: If sewers are available, provide temporary connections to remove effluent that can be discharged lawfully. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds, and similar facilities. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off-site in a lawful manner.
 - 1. Filter out excessive soil, construction debris, chemicals, oils, and similar contaminants that might clog sewers or pollute waterways before discharge.
 - 2. Connect temporary sewers to municipal or private system designated by Owner as directed by sewer department officials.
 - 3. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. After heavy use, restore normal conditions promptly.
 - 4. Provide temporary filter beds, settlement tanks, separators, and similar devices to purify effluent to levels acceptable to authorities having jurisdiction.

SECTION 01 5000 – TEMPORARY FACILITIES AND CONTROLS

5. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction until permanent water service is in use. Sterilize temporary water piping before use.
 6. Provide rubber hoses as necessary to serve Project site.
 7. As soon as water is required at each level, extend service to form a temporary water- and fire-protection standpipe. Comply with Owner's requirements, if any, for spacing and characteristics of standpipes. Provide distribution piping. Space outlets so water can be reached with a 100-foot hose.
 8. Where installations below or adjacent to an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.
 9. Provide pumps to supply a minimum of 30-psi static pressure at highest point. Equip pumps with surge and storage tanks and automatic controls to supply water uniformly at reasonable pressures.
- D. Sanitary Facilities: When required by the Contract Documents provide temporary toilets, wash facilities, 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 and maintain toilet tissue, paper towels, paper cups, and similar disposable materials for each facility.
 2. Toilets: Install self-contained toilet units.
 3. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel who handle materials that require wash up. Dispose of drainage properly. Supply cleaning compounds appropriate for each type of material handled.
 4. Drinking-Water Facilities: Provide bottled-water, drinking-water units.
- E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity.
1. Maintain a minimum temperature of 50 deg F in permanently enclosed portions of building for normal construction activities, and 65 deg F for finishing activities and areas where finished Work has been installed.
- F. 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.
- G. Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnecting means, automatic ground-fault interrupters, and main distribution switchgear.

SECTION 01 5000 – TEMPORARY FACILITIES AND CONTROLS

- H. Electric Distribution: Provide receptacle outlets adequate for connection of power tools and equipment.
 - 1. Provide metal conduit, tubing, or metallic cable for wiring exposed to possible damage. Provide rigid steel conduits for wiring exposed on grades, floors, decks, or other traffic areas.
 - 2. Provide metal conduit enclosures or boxes for wiring devices.
 - 3. Provide 4-gang outlets, spaced so 100-foot extension cord can reach each area for power hand tools and task lighting. Provide a separate 125-V ac, 20-A circuit for each outlet.

- I. 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.

- J. Telephone Service: Provide temporary telephone service throughout construction period for common-use facilities used by all personnel engaged in construction activities.

3.03 SUPPORT FACILITIES INSTALLATION

- A. Traffic Controls: Provide temporary traffic controls at junction of temporary roads with public roads. Include warning signs for public traffic and "STOP" signs for entrance onto public roads. Comply with requirements of authorities having jurisdiction.

- B. Street Cleaning: Provide regular street cleaning during course of construction for public streets subject to construction dirt and debris.

- C. Dewatering Facilities and Drains: Comply with requirements in applicable Division 2 Sections for temporary drainage and dewatering facilities and operations not directly associated with construction activities included in individual Sections. Where feasible, use same facilities. Maintain Project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining property nor endanger permanent Work or temporary facilities.
 - 2. Before connection and operation of permanent drainage piping system, provide temporary drainage where roofing or similar waterproof deck construction is completed.
 - 3. Remove snow and ice as required to minimize accumulations.

- D. 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.
 - 1. If required by authorities having jurisdiction, provide separate containers, clearly labeled, for each type of waste material to be deposited.

- E. Janitorial Services: Provide janitorial services on a daily basis for temporary offices, first-aid stations, toilets, wash facilities, lunchrooms, and similar areas.

SECTION 01 5000 – TEMPORARY FACILITIES AND CONTROLS

- F. Common-Use Field Office: Provide an insulated, weather tight, air-conditioned field office for use as a common facility by all personnel engaged in construction activities; of sufficient size to accommodate required office personnel and meetings of 10 persons at Project site. Keep office clean and orderly.
- G. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility services. Sheds may be open shelters or fully enclosed spaces within building or elsewhere on-site.
- H. 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.
- I. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate. Cover finished permanent stairs with protective covering of plywood or similar material so finishes will be undamaged at time of acceptance.
- J. Site Enclosure Fence: Before construction operations begin, install chain-link enclosure fence with lockable entrance gates. Locate where indicated, or if not indicated, enclose entire Project site or portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering site except by entrance gates.
 - 1. Set fence posts in compacted mixture of gravel and earth.
- K. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
- L. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, 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, installed on walls on mounting brackets, visible and accessible from space being served, with sign mounted above.
 - a. Field Offices: Class A stored-pressure water-type extinguishers.
 - b. Other Locations: Class ABC dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for exposures.
 - c. Locate fire extinguishers where convenient and effective for their intended purpose; provide not less than one extinguisher on each floor at or near each usable stairwell.
 - 2. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.04 OPERATION, TERMINATION, AND REMOVAL

- A. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.

SECTION 01 5000 – TEMPORARY FACILITIES AND CONTROLS

- B. Operation: Enforce strict discipline in use of temporary facilities. Limit availability to intended use to minimize abuse. Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and the elements.
- C. Temporary Facility Changeover: Except for using permanent fire protection as soon as available, do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion without written consent of Owner.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility.
 - 1. Materials and facilities that constitute temporary facilities are the property of Contractor except for Project identification signs.
 - 2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 - 3. At Substantial Completion, clean and renovate permanent facilities used during construction period.

3.05 REPAIR OF DAMAGED AREAS

- A. All landscaping, driveways and parking lot areas, etc., which have been occupied and/or damaged by construction operations or material storage, shall be repaired and restored to their original condition to the approval of the Owner's Project Manager before Substantial Completion will be issued.

END OF SECTION 01 5000

SECTION 01 7700 – CONTRACT CLOSE-OUT

SECTION 01 7700 - CONTRACT CLOSE-OUT

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:
 - 1. Inspection procedures for Substantial Completion and Final Completion.
 - 2. Project record document submittal.
 - 3. Operating and maintenance manual submittal.
 - 4. Submittal of warranties.
 - 5. Final cleaning.
 - 6. Post Construction Review Meeting.

- B. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions 2 through 45.

1.02 SUBSTANTIAL COMPLETION:

- A. Preliminary Procedures: Before requesting an inspection for certification of Substantial Completion (for either entire Work or portions thereof), complete the following. List exceptions in the request.
 - 1. Submit written notice that the project is substantially complete to the Architect and Owner. Provide a list of items not yet in conformance with the contract documents which require attention.
 - 2. Submit one (1) electronic copy of the Operation and Maintenance Manuals to the Architect through Procore.
 - 3. Submit Record Drawings to the Architect through Procore. If only a portion of the work is substantially complete, submit a copy of the Record Drawings covering the completed work.
 - 4. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents to the Architect.
 - 5. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities; operating certificates, and similar releases.
 - 6. Deliver tools, spare parts, extra stock, and similar items with appropriate transmittal to the Owner.
 - 7. Complete start-up testing of systems, and instruction of the Owner's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tolls, mock-ups, and similar elements.
 - 8. Complete final clean up requirements, including touch-up painting.

SECTION 01 7700 – CONTRACT CLOSE-OUT

- B. Inspection Procedures: Upon receipt of a request for inspection, the Architect will either proceed with inspection or advise the Contractor on unfilled requirements. Following inspection, the Architect will advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
1. The Architect will repeat inspection when requested and assured that the Work has been substantially completed.
 2. Results of the completed inspection will form the basis of requirements for final completion.
- C. Issuance of Certificate:
1. Upon a satisfactory inspection and Contractor completion of the items of substantial completion, the Architect will issue Certificate of Substantial Completion and forward to Contractor.

1.03 FINAL COMPLETION:

- A. Preliminary Procedures: Before requesting final inspection for the certification of final Completion and final billing, complete the following. List exceptions in the request.
1. Submit "Consent of Surety to Final Payment." This consent shall be completed by the Surety and mailed to the University.
 2. Submit final billing request with final releases and supporting documentation not previously submitted or accepted to Owner.
 3. Submit a signed copy of the Architect's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for completion to the Architect.
 4. Deliver tools, spare parts, extra stock of materials, and similar physical items to the Owner.
 5. Return loaned construction keys to Purdue University Lock Shop, and advise Owner's personnel of change-over in security provisions.
 6. Complete start-up testing of systems, and instruction of Owner's Operating/maintenance personnel. Discontinue or change-over and remove from project site temporary facilities and services, along with construction tools and facilities, mock-ups, and similar elements.
 7. Complete final cleaning requirements, including touch-up of marred surfaces. Touch-up, repair, and restore marred exposed finishes.
- B. Reinspection Procedure: The Architect will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the Architect.
1. Upon completion of reinspection, the Architect will prepare a certificate of final completion, or advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final completion.
 2. If necessary, reinspection will be repeated.

SECTION 01 7700 – CONTRACT CLOSE-OUT

1.04 REINSPECTION FEES

- A. Should the Architect be required to perform reinspections due to failure of the work to comply with the status of completion claimed by the Contractor, Owner will:
 - 1. compensate the Architect for such additional or "extra" services; and
 - 2. deduct the amount of such compensation from the final payment to the Contractor.

1.05 RECORD DOCUMENT SUBMITTALS:

- A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure location; provide access to record documents for the Architect's reference during normal working hours.
- B. The Contractor shall update the Record Documents regularly, and in no event less than once per week. As part of the weekly project meeting, the Contractor shall inform the Project Manager of the status of the updating of Record Documents and, if requested by the Project Manager or Architect, demonstrate that the Record Documents have been recently updated to show current conditions. Failure on the part of the Contractor to update the Record Documents as provided herein shall be cause for withholding a portion of monthly payment until such failure is corrected.
- C. Do not permanently conceal any work until required information has been recorded.
- D. Record Drawings ("As-Builts"): Maintain a clean, undamaged set of blue or black line prints of Contract Drawings, Shop Drawings, and Coordination Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is the most capable of showing conditions fully and accurately; where Shop Drawings or Coordination Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date. Submit record drawings at Substantial Completion to the Architect.
 - 1. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.
 - 2. Mark new information that is important to the Owner, but was not shown on Contract Drawings, Shop Drawings, or Coordination Drawings.
 - 3. Note related Request for Information (RFI) numbers and Change Order numbers where applicable.
 - 4. Keep accurate measurements of underground services and utilities referenced to the building or other permanent construction.
 - 5. Note changes of directions and locations, by dimensions and elevations, as utilities are actually installed. Show mechanical dampers, valves, reheat boxes, cleanouts, and other items that require maintenance.
 - 6. Show location of construction-concealed internal utilities and appurtenances referenced to visible and accessible features of the structure.

SECTION 01 7700 – CONTRACT CLOSE-OUT

7. Record accurate locations of piping, valves, traps, dampers, duct work, equipment, and the like.
 8. Indicate field changes of dimension and detail.
 9. "X-out" and appropriately annotate "not constructed" - whichever condition most clearly conveys the actual "as constructed" condition.
 10. Show addenda items.
 11. Organize record drawing sheets into bound manageable sets
 12. Every page needs a red stamp or label on the lower right hand corner near the title block stating "AS-BUILTS"
- E. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Work. Immediately prior to date or dates of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, read with continued use and reference. Submit to the Architect.
- 1.06 OPERATING AND MAINTENANCE MANUALS:
- A. Renovations - Provide one (1) electronic copy through Procore. New Buildings – Provide one (1) electronic copy through Procore and two (2) original hard copies of Maintenance Manual(s). Deliver the preliminary manual to the Architect for review prior to Substantial Completion or starting of major equipment, whichever is sooner. The preliminary copy shall comply with all of these requirements except the covers (although the intended layout for same shall be provided). Deliver final manuals and PDF files to Architect for final review. Architect to forward final sets prior to final completion to Owner.
- B. General Construction Work:
1. All materials and equipment will be listed by corresponding specification section.
 2. Final paint and color schedule, manufacturer of paint used, number, location, matching Sherwin Williams paint formula or number; final carpet selection and color, locations; final plastic laminate selections and color, locations; and all other finishes. Recommended maintenance and cleaning procedures for all exposed interior and exterior materials.
 3. Copies of Warranties and Guaranties, with names of servicing agencies.
 - a. All executed certificates, warranties, bonds, and any required service and maintenance contracts from the respective manufacturers, suppliers, and subcontractors.
 - b. Provide complete information for each of the following:
 - i. Product or work item;
 - ii. Firm, with name of principal, address, and telephone number;
 - iii. Scope;
 - iv. Substantial Completion Letter;
 - v. Date of beginning of warranty or service and maintenance contract (unless approved otherwise, the warranty begins on the date of Substantial Completion);

SECTION 01 7700 – CONTRACT CLOSE-OUT

- vi. Duration of warranty or service maintenance contract;
 - vii. Proper procedure in case of failure;
 - viii. Insurances which might affect validity of warranty or bond;
 - ix. Contractor's name or responsible principal, address, and telephone number.
 - 4. Emergency Instructions.
 - 5. Spare parts list.
 - 6. Recommended "turn around" cycles of equipment, maintenance, and surface treatments or finishes.
 - 7. Shop drawings and product data of actual installed items.
 - 8. Original warranties – to be submitted under separate cover.
 - 9. General custodial cleaning instructions for interior finish materials utilized.
- C. Work of Divisions 21, 22, & 23 (Mechanical) and Divisions 25, 26, 27, & 28 (Electrical):
- 1. Copies of approved equipment submittals including equipment manufacturer, make, model number, size, unique equipment ID, serial number, installed location, etc.
 - 2. Supplier's name, address, phone, and reference order numbers.
 - 3. Equipment nameplate and data of major items.
 - 4. Description of system configuration and operation including component identification and interrelations. A master control schematic drawing(s) will normally be required for this purpose.
 - 5. Dimensional and performance data for specific unit provided. Extraneous catalog data must be eliminated.
 - 6. Manufacturers' recommended operation instructions as appropriate.
 - 7. Manufacturers' recommended lubrication and servicing data.
 - 8. Complete parts list including recording information, recommended spares, and anticipated useful life.
 - 9. Fan and pump curves.
 - 10. Fixture lamping schedule.
 - 11. Wiring diagrams.
 - 12. Inspection Procedures.
 - 13. Recommended "tum around" cycles of all equipment and maintenance.
 - 14. Single-Line Diagrams, Flow Diagrams of systems.
 - 15. Final Testing and Balancing Report – to be submitted under separate cover.
 - 16. As-built sequences of operations, control drawings, and original set points.
 - 17. Recommended schedule of calibrating sensors and actuators.
- D. Binders:
- 1. Copies shall be properly indexed and three-hole punched in locking three-ring binders. Provide pocket folders for folded sheet information.
 - 2. Imprint covers with "OPERATING AND MAINTENANCE MANUAL," "PROJECT TITLE," "Purdue University," Prime Architect/Engineer, and Prime General Contractor, and year of completion.

SECTION 01 7700 – CONTRACT CLOSE-OUT

3. Imprint the back edge with "OPERATING AND MAINTENANCE MANUAL," "PROJECT TITLE," and the year of completion.
4. Each copy shall have a type written index and tabbed dividers between categories or sections.
5. Each copy or volume of manual shall not exceed 3-1/2 inch width when three inch binders are used. Label volumes successively by volume # (Ex. Vol. 1 of 3).
6. Each Volume will contain a Table of Contents and Tabs 1-3 noted below.
7. These manuals shall contain all the information needed to operate and maintain all systems and equipment provided in the project. Present and arrange logically for efficient use by the Owner's operating personnel As a minimum the information provided shall include the following:
 - a. Table of Contents
 - b. Tab 1 – Substantial Completion Letter
 - c. Tab 2 – Contact list and corresponding scope of work containing phone, fax, email, and address of the prime contractor, subcontractors, and major manufacturers.
 - d. Tab 3 – Prime contractor's 1 yr. standard warranty on labor and material.
 - e. Remaining tabs contain CSI Divisions 2-45

1.07 CORRECTION OF WORK DURING GUARANTEE PERIOD

- A. Corrections: Where items on the Architect's "Punch List" have not been corrected prior to expiration of the specified guarantee period, it shall nevertheless be the responsibility of the Contractor to permanently correct said items after the specified guarantee period, and the contract corrections are made.
- B. Guarantee Period: All corrective work performed by the Contractor, in remedying defective work during the guarantee period following the Owner's acceptance of the project, shall be subject to the same guarantee requirements of the original work for a period as specified from the date of completion of the corrective work.

PART 2-PRODUCTS - NOT APPLICABLE

PART 3-EXECUTION

3.01 SYSTEMS DEMONSTRATIONS:

- A. Operating and Maintenance Instructions:
 1. After substantial completion and prior to final inspection or full acceptance of the Project, Contractor shall provide qualified personnel for conducting full operation and maintenance training and instructions in the operation, adjustment and maintenance of all operating equipment and systems to Owner's designated personnel; include all general, mechanical and electrical operating systems and equipment.

SECTION 01 7700 – CONTRACT CLOSE-OUT

- 2. Except as otherwise specified, arrange for each installer of work requiring continuing maintenance or operation to meet with Owner's personnel, at project site, to provide basic instructions needed for proper operation and maintenance of entire work. Include instructions by manufacturer's representatives where installers are not expert in the required procedures.
 - 3. If installers are not experienced in procedures (in the opinion of the Architect; submit list of experience for each instructor), provide instruction by manufacturer's representatives.
- B. Use operating and maintenance manuals as the basis for instruction. Review contents of Manual with personnel in full detail to explain all aspect of operations and maintenance to include but not limited to:
- 1. Maintenance Manuals.
 - 2. Record documents.
 - 3. Spare parts and materials.
 - 4. Tools.
 - 5. Lubricants.
 - 6. Fuels.
 - 7. Identification systems.
 - 8. Control sequences.
 - 9. Hazards.
 - 10. Cleaning.
 - 11. Warranties and bonds.
 - 12. Maintenance agreements and similar continuing commitments.
- C. As part of instruction for operating equipment, demonstrate the following procedures:
- 1. Start-up.
 - 2. Shut down.
 - 3. Emergency operations.
 - 4. Noise and vibration adjustments.
 - 5. Safety procedures.
 - 6. Economy and efficiency adjustments.
 - 7. Effective energy utilization.
- D. For additional requirements for operations instruction, see respective Specification Sections.
- 3.02 FINAL CLEANING:
- A. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
 - B. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.

SECTION 01 7700 – CONTRACT CLOSE-OUT

1. Remove labels that are not permanent labels.
 2. Do not use razor blades to clean any glazing or mirrors.
 3. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
 4. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
 5. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
 6. Clean the site, including landscape development areas, of rubbish, litter and foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.
 7. Leave spaces clean enough so that routine "Daily" maintenance will make them ready for occupancy.
- C. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.
- D. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems.
1. Remove waste materials from the site and dispose of in a lawful manner.
 2. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.
- 3.03 POST CONSTRUCTION REVIEW MEETING:
- A. This will be a final analysis by the Project Team of the overall Project from Design to Post-Construction. Participants will include but not limited to: Project Manager, Architect/Engineer, General Contractor and prime subcontractors, PM&C Clerical Staff and University Clients.
- B. Items to be discussed include but not limited to the following:
1. Project Communication and Processes
 2. Quality of Meetings
 3. Customer Satisfaction
 4. Product / Service Acceptance

SECTION 01 7700 – CONTRACT CLOSE-OUT

5. Project on Time
6. Project within Budget
7. Architect/ Engineer, Contractor Interactions
8. Management

END OF SECTION 01 7700

SECTION 01 7700 – CONTRACT CLOSE-OUT

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DIVISION 2

1 **SECTION 02 4119 - SELECTIVE DEMOLITION**

2 **PART 1 - GENERAL**

3 **1.1 RELATED DOCUMENTS**

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

6 **1.2 SUMMARY**

- 7 A. Section Includes:

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

- 10 B. Related Requirements:

- 11 1. Section 010100 "Project Requirements" for restrictions on the use of the premises,
12 Owner-occupancy requirements, and phasing requirements.

13 **1.3 DEFINITIONS**

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

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

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

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

23 **1.4 MATERIALS OWNERSHIP**

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

- 25 B. Historic items, relics, antiques, and similar objects including, but not limited to,
26 cornerstones and their contents, commemorative plaques and tablets, and other items of
27 interest or value to Owner that may be uncovered during demolition remain the property of
28 Owner.

- 29 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

30 **1.5 CLOSEOUT SUBMITTALS**

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

1 B. Proposed dust-control measures.

2 C. Proposed noise-control measures.

3 **1.6 FIELD CONDITIONS**

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

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

8 1. Before selective demolition, Owner will remove the following items:

9 a. In the last Addenda items to be demolished will be listed.

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

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

14 1. Hazardous materials will be removed by Owner before start of the Work.

15 2. If suspected hazardous materials are encountered, do not disturb; immediately notify
16 Architect and Owner. Hazardous materials will be removed by Owner under a
17 separate contract.

18 E. Storage or sale of removed items or materials on-site is not permitted.

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

21 1. Maintain fire-protection facilities in service during selective demolition operations.
22

23 **PART 2 - PRODUCTS**

24 **2.1 PERFORMANCE REQUIREMENTS**

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

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

29 **PART 3 - EXECUTION**

30 **3.1 EXAMINATION**

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

- 1 B. Review record documents of existing construction provided by Owner. Owner does not
2 guarantee that existing conditions are same as those indicated in record documents.
- 3 C. Survey existing conditions and correlate with requirements indicated to determine extent of
4 selective demolition required.
- 5 D. When unanticipated mechanical, electrical, or structural elements that conflict with
6 intended function or design are encountered, investigate, and measure the nature and
7 extent of conflict. Promptly submit a written report to Architect.

8 **3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS**

- 9 A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and
10 protect them against damage.
- 11 1. Comply with requirements for existing services/systems interruptions specified in
12 Section 011000 "Summary."
- 13 B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify,
14 disconnect, and seal or cap off indicated utility services and mechanical/electrical systems
15 serving areas to be selectively demolished.
- 16 1. Owner will arrange to shut off indicated services/systems when requested by
17 Contractor.
- 18 2. Arrange to shut off indicated utilities with utility companies.
- 19 3. If services/systems are required to be removed, relocated, or abandoned, provide
20 temporary services/systems that bypass area of selective demolition and that
21 maintain continuity of services/systems to other parts of building.
- 22 4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC
23 systems, equipment, and components indicated to be removed.
- 24 a. Piping to Be Removed: Remove portion of piping indicated to be removed and
25 cap or plug remaining piping with same or compatible piping material.
- 26 b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with
27 same or compatible piping material.
- 28 c. Equipment to Be Removed: Disconnect and cap services and remove
29 equipment.
- 30 d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and
31 remove, clean, and store equipment; when appropriate, reinstall, reconnect,
32 and make equipment operational.
- 33 e. Equipment to Be Removed and Salvaged: Disconnect and cap services and
34 remove equipment and deliver to Owner.
- 35 f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and
36 plug remaining ducts with same or compatible ductwork material.
- 37 g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible
38 ductwork material.

39 **3.3 SELECTIVE DEMOLITION, GENERAL**

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

- 1 1. Proceed with selective demolition systematically, from higher to lower level.
- 2 Complete selective demolition operations above each floor or tier before disturbing
- 3 supporting members on the next lower level.
- 4 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use
- 5 cutting methods least likely to damage construction to remain or adjoining
- 6 construction. Use hand tools or small power tools designed for sawing or grinding,
- 7 not hammering and chopping, to minimize disturbance of adjacent surfaces.
- 8 Temporarily cover openings to remain.
- 9 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid
- 10 marring existing finished surfaces.
- 11 4. Do not use cutting torches until work area is cleared of flammable materials. At
- 12 concealed spaces, such as duct and pipe interiors, verify condition and contents of
- 13 hidden space before starting flame-cutting operations. Maintain fire watch and
- 14 portable fire-suppression devices during flame-cutting operations.
- 15 5. Maintain adequate ventilation when using cutting torches.
- 16 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials
- 17 and promptly dispose of off-site.
- 18 7. Remove structural framing members and lower to ground by method suitable to
- 19 avoid free fall and to prevent ground impact or dust generation.
- 20 8. Locate selective demolition equipment and remove debris and materials so as not to
- 21 impose excessive loads on supporting walls, floors, or framing.

22 B. Removed and Salvaged Items:

- 23 1. Protect items from damage during transport and storage.

24 C. Removed and Reinstalled Items:

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

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

35 **3.4 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS**

- 36 A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of
- 37 at least 3/4 inch at junctures with construction to remain. Dislodge concrete from
- 38 reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove
- 39 remainder of concrete. Neatly trim openings to dimensions indicated.

- 40 B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to
- 41 remain and at regular intervals using power-driven saw, then remove concrete between
- 42 saw cuts.

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

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

3 E. Resilient Floor Coverings: Remove floor coverings and adhesive according to
4 recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient
5 Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

6 **3.5 DISPOSAL OF DEMOLISHED MATERIALS**

7 A. General: Except for items or materials indicated to be recycled, reused, salvaged,
8 reinstalled, or otherwise indicated to remain Owner's property, remove demolished
9 materials from Project site and legally dispose of them in an EPA-approved landfill.

- 10 1. Do not allow demolished materials to accumulate on-site.
- 11 2. Remove and transport debris in a manner that will prevent spillage on adjacent
12 surfaces and areas.
- 13 3. Remove debris from elevated portions of building by chute, hoist, or other device
14 that will convey debris to grade level in a controlled descent.
- 15 4. Comply with requirements specified in Section 017419 "Construction Waste
16 Management and Disposal."

17 B. Burning: Do not burn demolished materials.

18 C. Disposal: Transport demolished materials off Owner's property and legally dispose of
19 them.

20 **3.6 CLEANING**

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

24 **END OF SECTION 02 4119**

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DIVISION 5

1 **SECTION 05 5000 - METAL FABRICATIONS**

2 **PART 1 GENERAL**

3 **1.01 SECTION INCLUDES**

- 4 A. Shop fabricated steel and aluminum items.

5 **1.02 RELATED REQUIREMENTS**

- 6 A. Section 099100 - Painting: Paint finish.

7 **1.03 REFERENCE STANDARDS**

- 8 A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015
9 Errata).
- 10 B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- 11 C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-
12 Coated, Welded and Seamless; 2012.
- 13 D. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength
14 Carbon Steel Plates; 2013.
- 15 E. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60
16 000 PSI Tensile Strength; 2014.
- 17 F. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless
18 Carbon Steel Structural Tubing; 2014.
- 19 G. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or
20 Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- 21 H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled,
22 Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved
23 Formability, and Ultra-High Strength; 2017.
- 24 I. ASTM B26/B26M - Standard Specification for Aluminum-Alloy Sand Castings; 2014, with
25 Editorial Revision (2015).
- 26 J. ASTM B85/85M - Standard Specification for Aluminum-Alloy Die Castings; 2014.
- 27 K. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate;
28 2014.
- 29 L. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
30 (Metric); 2014.
- 31 M. ASTM B210 - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless
32 Tubes; 2012.
- 33 N. ASTM B210M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless
34 Tubes (Metric); 2012.

- 1 O. ASTM B211 - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold
2 Finished Bar, Rod, and Wire; 2012.
- 3 P. ASTM B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold-
4 Finished Bar, Rod, and Wire (Metric); 2012.
- 5 Q. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars,
6 Rods, Wire, Profiles, and Tubes; 2014.
- 7 R. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts, Steel
8 and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum
9 Tensile Strength, Inch and Metric Dimensions; 2015a.
- 10 S. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015 (Errata 2016).
- 11 T. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2008.
- 12 U. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).
- 13 V. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed.
14 2004).

15 **PART 2 PRODUCTS**

16 **2.01 MATERIALS - STEEL**

- 17 A. Steel Sections: ASTM A36/A36M.
- 18 B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.
- 19 C. Plates: ASTM A283/A283M.
- 20 D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.
- 21 E. Slotted Channel Framing: ASTM A653/A653M, Grade 33.
- 22 F. Slotted Channel Fittings: ASTM A1011/A1011M.
- 23 G. Bolts, Nuts, and Washers: ASTM A307, Grade A, plain.
- 24 H. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.
- 25 I. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- 26 J. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities
27 having jurisdiction.
- 28 K. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying
29 with VOC limitations of authorities having jurisdiction.

30 **2.02 MATERIALS - ALUMINUM**

- 31 A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.
- 32 B. Sheet Aluminum: ASTM B209 (ASTM B209M), 5052 alloy, H32 or H22 temper.
- 33 C. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210 (ASTM B210M), 6063 alloy, T6
34 temper.

- 1 D. Aluminum-Alloy Bars: ASTM B211 (ASTM B211M), 6061 alloy, T6 temper.
- 2 E. Aluminum-Alloy Sand Castings: ASTM B26/B26M.
- 3 F. Aluminum-Alloy Die Castings: ASTM B85/B85M.
- 4 G. Bolts, Nuts, and Washers: Stainless steel.
- 5 H. Welding Materials: AWS D1.2/D1.2M; type required for materials being welded.

6 **2.03 FABRICATION**

- 7 A. Fit and shop assemble items in largest practical sections, for delivery to site.
- 8 B. Fabricate items with joints tightly fitted and secured.
- 9 C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints
10 butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- 11 D. Supply components required for anchorage of fabrications. Fabricate anchors and related
12 components of same material and finish as fabrication, except where specifically noted
13 otherwise.

14 **2.04 FABRICATED ITEMS**

- 15 A. Lintels: As detailed; prime paint finish.
- 16 B. Door Frames for Overhead Door Openings, and Wall Openings: Channel sections; prime
17 paint finish.
- 18 C. Slotted Channel Framing: Fabricate channels and fittings from structural steel complying
19 with the referenced standards; factory-applied, rust-inhibiting thermoset acrylic enamel
20 finish.

21 **2.05 FINISHES - ALUMINUM**

- 22 A. Interior Aluminum Surfaces: Class I natural anodized.
- 23 B. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less
24 than 0.7 mils (0.018 mm) thick.

25 **2.06 FABRICATION TOLERANCES**

- 26 A. Squareness: 1/8 inch (3 mm) maximum difference in diagonal measurements.
- 27 B. Maximum Offset Between Faces: 1/16 inch (1.5 mm).
- 28 C. Maximum Misalignment of Adjacent Members: 1/16 inch (1.5 mm).
- 29 D. Maximum Bow: 1/8 inch (3 mm) in 48 inches (1.2 m).
- 30 E. Maximum Deviation From Plane: 1/16 inch (1.5 mm) in 48 inches (1.2 m).

1 **PART 3 EXECUTION**

2 **3.01 EXAMINATION**

- 3 A. Verify that field conditions are acceptable and are ready to receive work.

4 **3.02 INSTALLATION**

- 5 A. Install items plumb and level, accurately fitted, free from distortion or defects.
- 6 B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment
7 until completion of erection and installation of permanent attachments.
- 8 C. Perform field welding in accordance with AWS D1.1/D1.1M.
- 9 D. Obtain approval prior to site cutting or making adjustments not scheduled.
- 10 E. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to
11 be in contact with concrete.

12 **3.03 TOLERANCES**

- 13 A. Maximum Variation From Plumb: 1/4 inch (6 mm) per story, non-cumulative.
- 14 B. Maximum Offset From True Alignment: 1/4 inch (6 mm).
- 15 C. Maximum Out-of-Position: 1/4 inch (6 mm).

16 **END OF SECTION 05 5000**

DIVISION 6

1 **SECTION 06 1053 - MISCELLANEOUS ROUGH CARPENTRY**

2 **PART 1 - GENERAL**

3 **1.1 RELATED DOCUMENTS**

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

6 **1.2 SUMMARY**

- 7 A. Section Includes:

- 8 1. Wood blocking and nailers.

9 **1.3 DEFINITIONS**

- 10 A. Boards or Strips: Lumber of less than 2 inches nominal (38 mm actual) size in least
11 dimension.

- 12 B. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater size but less
13 than 5 inches nominal (114 mm actual) size in least dimension.

14 **1.4 ACTION SUBMITTALS**

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

- 17 1. Include data for wood-preservative treatment from chemical treatment manufacturer
18 and certification by treating plant that treated materials comply with requirements.
19 Indicate type of preservative used and net amount of preservative retained.
20 2. Include data for fire-retardant treatment from chemical treatment manufacturer and
21 certification by treating plant that treated materials comply with requirements.
22 Include physical properties of treated materials based on testing by a qualified
23 independent testing agency.
24 3. For fire-retardant treatments, include physical properties of treated lumber both
25 before and after exposure to elevated temperatures, based on testing by a qualified
26 independent testing agency according to ASTM D 5664.
27 4. For products receiving a waterborne treatment, include statement that moisture
28 content of treated materials was reduced to levels specified before shipment to
29 Project site.

30 **1.5 QUALITY ASSURANCE**

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

1 **1.6 DELIVERY, STORAGE, AND HANDLING**

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

5 **PART 2 - PRODUCTS**

6 **2.1 WOOD PRODUCTS, GENERAL**

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

- 12 1. Factory mark each piece of lumber with grade stamp of grading agency.
13 2. For exposed lumber indicated to receive a stained or natural finish, mark grade
14 stamp on end or back of each piece.
15 3. Dress lumber, S4S, unless otherwise indicated.

- 16 B. Maximum Moisture Content of Lumber: 19 percent for 2-inch nominal (38-mm actual)
17 thickness or less; no limit for more than 2-inch nominal (38-mm actual) thickness unless
18 otherwise indicated.

19 **2.2 WOOD-PRESERVATIVE-TREATED MATERIALS**

- 20 A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC2 for interior
21 construction not in contact with ground, Use Category UC3b for exterior construction not in
22 contact with ground, and Use Category UC4a for items in contact with ground.

- 23 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing
24 no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
25 2. For exposed items indicated to receive a stained or natural finish, chemical
26 formulations shall not require incising, contain colorants, bleed through, or otherwise
27 adversely affect finishes.

- 28 B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use
29 material that is warped or does not comply with requirements for untreated material.

- 30 C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC
31 Board of Review.

- 32 1. For exposed lumber indicated to receive a stained or natural finish, mark end or
33 back of each piece.

- 34 D. Application: Treat items indicated on Drawings, and the following:

- 35 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and
36 similar members in connection with roofing, flashing, vapor barriers, and
37 waterproofing.

- 1 2. Wood framing and furring attached directly to the interior of below-grade exterior
- 2 masonry or concrete walls.
- 3 3. Wood framing members that are less than 18 inches (460 mm) above the ground in
- 4 crawlspaces or unexcavated areas.
- 5 4. Wood floor plates that are installed over concrete slabs-on-grade.

6 **2.3 FIRE-RETARDANT-TREATED MATERIALS**

7 A. General: Where fire-retardant-treated materials are indicated, materials shall comply with
8 requirements in this article, that are acceptable to authorities having jurisdiction, and with
9 fire-test-response characteristics specified as determined by testing identical products per
10 test method indicated by a qualified testing agency.

11 B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-
12 spread index of 25 or less when tested according to ASTM E 84, and with no evidence of
13 significant progressive combustion when the test is extended an additional 20 minutes, and
14 with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the
15 burners at any time during the test.

- 16 1. Treatment shall not promote corrosion of metal fasteners.
- 17 2. Exterior Type: Treated materials shall comply with requirements specified above for
18 fire-retardant-treated lumber and plywood by pressure process after being subjected
19 to accelerated weathering according to ASTM D 2898. Use for exterior locations and
20 where indicated.
- 21 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or
22 less when tested according to ASTM D 3201 at 92 percent relative humidity. Use
23 where exterior type is not indicated.
- 24 4. Design Value Adjustment Factors: Treated lumber shall be tested according to
25 ASTM D 5664, and design value adjustment factors shall be calculated according to
26 ASTM D 6841. For enclosed roof framing, framing in attic spaces, and where high-
27 temperature fire-retardant treatment is indicated, provide material with adjustment
28 factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in
29 bending for Project's climatological zone.

30 C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry
31 plywood after treatment to a maximum moisture content of 15 percent.

32 D. Identify fire-retardant-treated wood with appropriate classification marking of qualified
33 testing agency.

- 34 1. For exposed lumber indicated to receive a stained or natural finish, mark end or
35 back of each piece.

36 E. For exposed items indicated to receive a stained or natural finish, chemical formulations
37 shall not bleed through, contain colorants, or otherwise adversely affect finishes.

38 F. Application: Treat items indicated on Drawings, and the following:

- 39 1. Framing for raised platforms.
- 40 2. Concealed blocking.
- 41 3. Roof framing and blocking.
- 42 4. Wood cants, nailers, curbs, equipment support bases, blocking, and similar
43 members in connection with roofing.
- 44 5. Plywood backing panels.

1 **2.4 MISCELLANEOUS LUMBER**

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

- 4 1. Blocking.
5 2. Nailers.

6 B. Dimension Lumber Items: Construction or No. 2 grade lumber of any of the following
7 species:

- 8 1. Mixed southern pine or southern pine; SPIB.
9 2. Northern species; NLGA.

10 C. Concealed Boards: 19 percent maximum moisture content of any of the following species
11 and grades:

- 12 1. Mixed southern pine or southern pine, No. 2 grade; SPIB.
13 2. Northern species, No. 2 Common grade; NLGA.

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

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

19 **2.5 FASTENERS**

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

- 22 1. Where carpentry is exposed to weather, in ground contact, pressure-preservative
23 treated, or in area of high relative humidity, provide fasteners with hot-dip zinc
24 coating complying with ASTM A 153/A 153M.

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

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

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

30 **PART 3 - EXECUTION**

31 **3.1 INSTALLATION, GENERAL**

32 A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame
33 Construction," unless otherwise indicated.

- 1 B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.
2 Fit carpentry accurately to other construction. Locate nailers, blocking, and similar supports
3 to comply with requirements for attaching other construction.
- 4 C. Install plywood backing panels by fastening to studs; coordinate locations with utilities
5 requiring backing panels. Install fire-retardant-treated plywood backing panels with
6 classification marking of testing agency exposed to view.
- 7 D. Install metal framing anchors to comply with manufacturer's written instructions. Install
8 fasteners through each fastener hole.
- 9 E. Do not splice structural members between supports unless otherwise indicated.
- 10 F. Provide blocking and framing as indicated and as required to support facing materials,
11 fixtures, specialty items, and trim.
- 12 1. Provide metal clips for fastening gypsum board or lath at corners and intersections
13 where framing or blocking does not provide a surface for fastening edges of panels.
14 Space clips not more than 16 inches (406 mm) o.c.
- 15 G. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as
16 indicated and as follows:
- 17 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than
18 96 inches (2438 mm) o.c. with solid wood blocking or noncombustible materials
19 accurately fitted to close furred spaces.
- 20 2. Fire block concealed spaces of wood-framed walls and partitions at each floor level,
21 at ceiling line of top story, and at not more than 96 inches (2438 mm) o.c. Where fire
22 blocking is not inherent in framing system used, provide closely fitted solid wood
23 blocks of same width as framing members and 2-inch nominal (38-mm actual)
24 thickness.
- 25 3. Fire block concealed spaces between floor sleepers with same material as sleepers
26 to limit concealed spaces to not more than 100 sq. ft. (9.3 sq. m) and to solidly fill
27 space below partitions.
- 28 4. Fire block concealed spaces behind combustible cornices and exterior trim at not
29 more than 20 feet (6 m) o.c.
- 30 H. Sort and select lumber so that natural characteristics do not interfere with installation or
31 with fastening other materials to lumber. Do not use materials with defects that interfere
32 with function of member or pieces that are too small to use with minimum number of joints
33 or optimum joint arrangement.
- 34 I. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated
35 lumber.
- 36 1. Use inorganic boron for items that are continuously protected from liquid water.
37 2. Use copper naphthenate for items not continuously protected from liquid water.
- 38 J. Where wood-preservative-treated lumber is installed adjacent to metal decking, install
39 continuous flexible flashing separator between wood and metal decking.
- 40 K. Securely attach carpentry work to substrate by anchoring and fastening as indicated,
41 complying with the following:

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

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

10 3.2 WOOD BLOCKING AND NAILER INSTALLATION

- 11 A. Install where indicated and where required for screeding or attaching other work. Form to
- 12 shapes indicated and cut as required for true line and level of attached work. Coordinate
- 13 locations with other work involved.
- 14 B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with
- 15 surfaces unless otherwise indicated.
- 16 C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber
- 17 not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground
- 18 to exact thickness of finish material. Remove temporary grounds when no longer required.

19 3.3 PROTECTION

- 20 A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite
- 21 protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate
- 22 treatment. Apply borate solution by spraying to comply with EPA-registered label.
- 23 B. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous
- 24 rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate
- 25 solution by spraying to comply with EPA-registered label.

26 **END OF SECTION 06 1053**

DIVISION 7

1 **SECTION 07 9200 - JOINT SEALANTS**

2
3
4 **PART 1 - GENERAL**

5
6 **1.1 RELATED DOCUMENTS**

- 7
8 A. Drawings and general provisions of the Contract, including General and Supplementary
9 Conditions and Division 01 Specification Sections, apply to this Section.

10
11 **1.2 SUMMARY**

- 12
13 A. Section Includes:

- 14
15 1. Silicone joint sealants.
16 2. Urethane joint sealants.
17 3. Latex joint sealants.
18 4. Acoustical joint sealants.

- 19
20 B. Related Sections:

- 21
22 1. Division 08 Section "Glazing" for glazing sealants.
23 2. Division 09 Section "Gypsum Board" for sealing perimeter joints.

24 **1.3 PERFORMANCE REQUIREMENTS**

- 25 A. Provide elastomeric joint sealants that establish and maintain watertight and airtight
26 continuous joint seals without staining or deteriorating joint substrates.
27 B. Provide joint sealants for interior applications that establish and maintain airtight and water-
28 resistant continuous joint seals without staining or deteriorating joint substrates.

29
30 **1.4 ACTION SUBMITTALS**

- 31 A. Product Data: For each joint-sealant product indicated.
32
33 B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured
34 sealants showing the full range of colors available for each product exposed to view.
35
36

37 **1.5 INFORMATIONAL SUBMITTALS**

- 38 A. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
39
40 B. Product Test Reports: Based on evaluation of comprehensive tests performed by a
41 qualified testing agency, indicating that sealants comply with requirements.
42
43 C. Field-Adhesion Test Reports: For each sealant application tested.
44
45 D. Warranties: Sample of special warranties.
46
47
48
49

1 **1.6 QUALITY ASSURANCE**

- 2
- 3 A. Installer Qualifications: Manufacturer's authorized representative who is trained and
- 4 approved for installation of units required for this Project.
- 5
- 6 B. Source Limitations: Obtain each kind of joint sealant from single source from single
- 7 manufacturer.
- 8
- 9 C. Product Testing: Test joint sealants using a qualified testing agency.
- 10
- 11 1. Testing Agency Qualifications: An independent testing agency qualified according
- 12 to ASTM C 1021 to conduct the testing indicated.
- 13

14 **1.7 PROJECT CONDITIONS**

- 15
- 16 A. Do not proceed with installation of joint sealants under the following conditions:
- 17
- 18 1. When ambient and substrate temperature conditions are outside limits permitted by
- 19 joint-sealant manufacturer or are below 40 deg F (5 deg C).
- 20 2. When joint substrates are wet.
- 21 3. Where joint widths are less than those allowed by joint-sealant manufacturer for
- 22 applications indicated.
- 23 4. Where contaminants capable of interfering with adhesion have not yet been
- 24 removed from joint substrates.
- 25

26 **1.8 WARRANTY**

- 27
- 28 A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to
- 29 repair or replace joint sealants that do not comply with performance and other
- 30 requirements specified in this Section within specified warranty period.
- 31
- 32 1. Warranty Period: Two years from date of Substantial Completion.
- 33
- 34 B. Special warranties specified in this article exclude deterioration or failure of joint sealants
- 35 from the following:
- 36
- 37 1. Movement of the structure caused by structural settlement or errors attributable to
- 38 design or construction resulting in stresses on the sealant exceeding sealant
- 39 manufacturer's written specifications for sealant elongation and compression.
- 40 2. Disintegration of joint substrates from natural causes exceeding design
- 41 specifications.
- 42 3. Mechanical damage caused by individuals, tools, or other outside agents.
- 43 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric
- 44 contaminants.
- 45
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- 47

1 **PART 2 - PRODUCTS**

2
3 **2.1 MATERIALS, GENERAL**

- 4
5 A. Compatibility: Provide joint sealants, backings, and other related materials that are
6 compatible with one another and with joint substrates under conditions of service and
7 application, as demonstrated by joint-sealant manufacturer, based on testing and field
8 experience.
9
10 B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated
11 for each liquid-applied joint sealant specified, including those referencing ASTM C 920
12 classifications for type, grade, class, and uses related to exposure and joint substrates.
13
14 1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints
15 that will be continuously immersed in liquids, provide products that have undergone
16 testing according to ASTM C 1247. Liquid used for testing sealants is deionized
17 water, unless otherwise indicated.
18
19 C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to
20 porous substrates, provide products that have undergone testing according to
21 ASTM C 1248 and have not stained porous joint substrates indicated for Project.
22
23 D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in
24 repeated contact with food, provide products that comply with 21 CFR 177.2600.
25
26 E. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

27
28 **2.2 SILICONE JOINT SEALANTS**

- 29
30 A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S,
31 Grade NS, Class 100/50, for Use NT.
32
33 1. Products: Subject to compliance with requirements, available products that may be
34 incorporated into the Work include, but are not limited to, the following:
35
36 a. Pecora Corporation; 890FTS.
37 b. Sika Corporation, Construction Products Division; SikaSil-C990.
38 c. Tremco Incorporated; Spectrem 1.
39
40 B. Single-Component, Nonsag, Traffic-Grade, Neutral-Curing Silicone Joint Sealant:
41 ASTM C 920, Type S, Grade NS, Class 100/50, for Use T.
42
43 1. Products: Subject to compliance with requirements, available products that may be
44 incorporated into the Work include, but are not limited to, the following:
45
46 a. Pecora Corporation; 301 NS.
47 b. Tremco Incorporated; Spectrem 800.
48
49 C. Mildew-Resistant, Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant:
50 ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
51
52 1. Products: Subject to compliance with requirements, available products that may be
53 incorporated into the Work include, but are not limited to, the following:
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- a. Pecora Corporation; 898.

2.3 URETHANE JOINT SEALANTS

- A. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

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

- a. Pecora Corporation; Dynatrol I-XL.
- b. Sika Corporation, Construction Products Division; Sikaflex - 1a.
- c. Tremco Incorporated; Dymonic.

- B. Single-Component, Nonsag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920. Type S, Grade NS, Class 25, for Use T.

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

- a. Sika Corporation, Construction Products Division; Sikaflex - 1a.
- b. Tremco Incorporated; Vulkem 116.

- C. Multicomponent, Nonsag, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use NT.

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

- a. Pecora Corporation; Dynatred.
- b. Sika Corporation, Construction Products Division; Sikaflex - 2c EZ Mix.
- c. Tremco Incorporated; Vulkem 227.

- D. Multicomponent, Nonsag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 50, for Use T.

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

- a. Tremco Incorporated; Dymeric 240 FC.

2.4 LATEX JOINT SEALANTS

- A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

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

- a. Pecora Corporation; AC-20+.
- b. Tremco Incorporated; Tremflex 834.

1 **2.5 ACOUSTICAL JOINT SEALANTS**

2
3 A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex
4 sealant complying with ASTM C 834. Product effectively reduces airborne sound
5 transmission through perimeter joints and openings in building construction as
6 demonstrated by testing representative assemblies according to ASTM E 90.

7
8 1. Products: Subject to compliance with requirements, available products that may be
9 incorporated into the Work include, but are not limited to, the following:

- 10
11 a. Pecora Corporation; AC-20 FTR.
12 b. USG Corporation; SHEETROCK Acoustical Sealant.

13
14 **2.6 JOINT SEALANT BACKING**

15
16 A. General: Provide sealant backings of material that are nonstaining; are compatible with
17 joint substrates, sealants, primers, and other joint fillers; and are approved for applications
18 indicated by sealant manufacturer based on field experience and laboratory testing.

19
20 B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface
21 skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer
22 for joint application indicated, and of size and density to control sealant depth and
23 otherwise contribute to producing optimum sealant performance.

24
25 C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant
26 manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or
27 joint surfaces at back of joint. Provide self-adhesive tape where applicable.

28
29 **2.7 MISCELLANEOUS MATERIALS**

30
31 A. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of
32 sealants and sealant backing materials, free of oily residues or other substances capable
33 of staining or harming joint substrates and adjacent nonporous surfaces in any way, and
34 formulated to promote optimum adhesion of sealants to joint substrates.

35
36 B. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and
37 surfaces adjacent to joints.

38
39
40 **PART 3 - EXECUTION**

41
42 **3.1 EXAMINATION**

43
44 A. Examine joints indicated to receive joint sealants, with Installer present, for compliance
45 with requirements for joint configuration, installation tolerances, and other conditions
46 affecting joint-sealant performance.

47
48 B. Proceed with installation only after unsatisfactory conditions have been corrected.
49
50
51

1 **3.2 PREPARATION**

2
3 A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to
4 comply with joint-sealant manufacturer's written instructions and the following
5 requirements:

6
7 1. Remove all foreign material from joint substrates that could interfere with adhesion
8 of joint sealant, including dust, paints (except for permanent, protective coatings
9 tested and approved for sealant adhesion and compatibility by sealant
10 manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water,
11 surface dirt, and frost.

12 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or
13 a combination of these methods to produce a clean, sound substrate capable of
14 developing optimum bond with joint sealants. Remove loose particles remaining
15 after cleaning operations above by vacuuming or blowing out joints with oil-free
16 compressed air. Porous joint substrates include the following:

- 17
18 a. Concrete.
19 b. Masonry.

20
21 3. Remove laitance and form-release agents from concrete.

22 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means
23 that do not stain, harm substrates, or leave residues capable of interfering with
24 adhesion of joint sealants. Nonporous joint substrates include the following:

- 25
26 a. Metal.
27 b. Glass.
28 c. Porcelain enamel.

29
30 B. Masking Tape: Use masking tape where required to prevent contact of sealant or primer
31 with adjoining surfaces that otherwise would be permanently stained or damaged by such
32 contact or by cleaning methods required to remove sealant smears. Remove tape
33 immediately after tooling without disturbing joint seal.
34

35 **3.3 INSTALLATION OF JOINT SEALANTS**

36
37 A. General: Comply with joint-sealant manufacturer's written installation instructions for
38 products and applications indicated, unless more stringent requirements apply.
39

40 B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of
41 joint sealants as applicable to materials, applications, and conditions indicated.
42

43 C. Install sealant backings of kind indicated to support sealants during application and at
44 position required to produce cross-sectional shapes and depths of installed sealants
45 relative to joint widths that allow optimum sealant movement capability.
46

- 47 1. Do not leave gaps between ends of sealant backings.
48 2. Do not stretch, twist, puncture, or tear sealant backings.
49 3. Remove absorbent sealant backings that have become wet before sealant
50 application and replace them with dry materials.

51
52 D. Install bond-breaker tape behind sealants where sealant backings are not used between
53 sealants and backs of joints.

- 1 E. Install sealants using proven techniques that comply with the following and at the same
2 time backings are installed:
3
4 1. Place sealants so they directly contact and fully wet joint substrates.
5 2. Completely fill recesses in each joint configuration.
6 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that
7 allow optimum sealant movement capability.
8
9 F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or
10 curing begins, tool sealants according to requirements specified in subparagraphs below to
11 form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to
12 ensure contact and adhesion of sealant with sides of joint.
13
14 1. Remove excess sealant from surfaces adjacent to joints.
15 2. Use tooling agents that are approved in writing by sealant manufacturer and that do
16 not discolor sealants or adjacent surfaces.
17 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise
18 indicated.
19 4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
20 5. Provide recessed joint configuration of recess depth and at locations indicated per
21 Figure 8C in ASTM C 1193.
22
23 a. Use masking tape to protect surfaces adjacent to recessed tooled joints.
24
25 G. Installation of Preformed Foam Sealants: Install each length of sealant immediately after
26 removing protective wrapping. Do not pull or stretch material. Produce seal continuity at
27 ends, turns, and intersections of joints. For applications at low ambient temperatures,
28 apply heat to sealant in compliance with sealant manufacturer's written instructions.
29
30 H. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated,
31 seal construction at perimeters, behind control joints, and at openings and penetrations
32 with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of
33 partitions at perimeters and through penetrations. Comply with ASTM C 919 and with
34 manufacturer's written recommendations.
35

36 3.4 FIELD QUALITY CONTROL

- 37
38 A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
39
40 1. Extent of Testing: Test completed and cured sealant joints as follows:
41
42 a. Perform 10 tests for the first 1000 feet (300 m) of joint length for each kind of
43 sealant and joint substrate.
44 b. Perform 1 test for each 1000 feet (300 m) of joint length thereafter or 1 test
45 per each floor per elevation.
46
47 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint
48 Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in
49 ASTM C 1521.
50
51 a. For joints with dissimilar substrates, verify adhesion to each substrate
52 separately; extend cut along one side, verifying adhesion to opposite side.
53 Repeat procedure for opposite side.
54

- 1 3. Inspect tested joints and report on the following:
2
3 a. Whether sealants filled joint cavities and are free of voids.
4 b. Whether sealant dimensions and configurations comply with specified
5 requirements.
6 c. Whether sealants in joints connected to pulled-out portion failed to adhere to
7 joint substrates or tore cohesively. Include data on pull distance used to test
8 each kind of product and joint substrate. Compare these results to determine
9 if adhesion passes sealant manufacturer's field-adhesion hand-pull test
10 criteria.
11
12 4. Record test results in a field-adhesion-test log. Include dates when sealants were
13 installed, names of persons who installed sealants, test dates, test locations,
14 whether joints were primed, adhesion results and percent elongations, sealant fill,
15 sealant configuration, and sealant dimensions.
16 5. Repair sealants pulled from test area by applying new sealants following same
17 procedures used originally to seal joints. Ensure that original sealant surfaces are
18 clean and that new sealant contacts original sealant.
19
20 B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from
21 testing or noncompliance with other indicated requirements will be considered satisfactory.
22 Remove sealants that fail to adhere to joint substrates during testing or to comply with
23 other requirements. Retest failed applications until test results prove sealants comply with
24 indicated requirements.

25
26 **3.5 CLEANING**

- 27
28 A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by
29 methods and with cleaning materials approved in writing by manufacturers of joint sealants
30 and of products in which joints occur.
31

32 **3.6 PROTECTION**

- 33
34 A. Protect joint sealants during and after curing period from contact with contaminating
35 substances and from damage resulting from construction operations or other causes so
36 sealants are without deterioration or damage at time of Substantial Completion. If, despite
37 such protection, damage or deterioration occurs, cut out and remove damaged or
38 deteriorated joint sealants immediately so installations with repaired areas are
39 indistinguishable from original work.

40 **END OF SECTION 07 9200**

DIVISION 8

1 **SECTION 08 1213 - HOLLOW METAL FRAMES**

2 **PART 1 - GENERAL**

3 **1.1 RELATED DOCUMENTS**

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

6 **1.2 SUMMARY**

- 7 A. Section includes hollow-metal frames.

- 8 B. Related Requirements:

- 9 1. Section 081416 "Flush Wood Doors" for wood doors installed in hollow-metal
10 frames.

11 **1.3 DEFINITIONS**

- 12 A. Minimum Thickness: Minimum thickness of base metal without coatings according to
13 NAAMM-HMMA 803 or SDI A250.8.

14 **1.4 COORDINATION**

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

19 **1.5 ACTION SUBMITTALS**

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

- 21 B. Shop Drawings: Include the following:

- 22 1. Frame details for each frame type, including dimensioned profiles and metal
23 thicknesses.
24 2. Locations of reinforcement and preparations for hardware.
25 3. Details of each different wall opening condition.
26 4. Details of anchorages, joints, field splices, and connections.
27 5. Details of moldings, removable stops, and glazing.
28 6. Details of conduit and preparations for power, signal, and control systems.

- 29 C. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision
30 of supplier, using same reference numbers for details and openings as those on Drawings.
31 Coordinate with final Door Hardware Schedule.

1 **1.6 DELIVERY, STORAGE, AND HANDLING**

2 A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during
3 transit and Project-site storage. Do not use nonvented plastic.

4 1. Provide additional protection to prevent damage to factory-finished units.

5 B. Deliver welded frames with two removable spreader bars across bottom of frames, tack
6 welded to jambs and mullions.

7 C. Store hollow-metal work vertically under cover at Project site with head up. Place on
8 minimum 4-inch-high wood blocking. Provide minimum 1/4-inch space between each unit
9 to permit air circulation.
10

11 **PART 2 - PRODUCTS**

12 **2.1 MANUFACTURERS**

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

- 15 1. Ceco Door; ASSA ABLOY.
- 16 2. Curries Company; ASSA ABLOY.
- 17 3. Deansteel Manufacturing Company, Inc.
- 18 4. Door Components, Inc.
- 19 5. Hollow Metal Xpress.
- 20 6. Mesker Door Inc.
- 21 7. MPI Group, LLC (The).
- 22 8. North American Door Corp.
- 23 9. Pioneer Industries.
- 24 10. Republic Doors and Frames.
- 25 11. Security Metal Products; a brand of ASSA ABLOY.
- 26 12. Steelcraft; an Allegion brand.

27 B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

28 **2.2 INTERIOR FRAMES**

29 A. Construct interior frames to comply with the standards indicated for materials, fabrication,
30 hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

31 B. Heavy-Duty Frames: SDI A250.8, Level 2. At locations indicated in the Door and Frame
32 Schedule.

- 33 1. Physical Performance: Level B according to SDI A250.4.
- 34 2. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch.
- 35 3. Construction: Full profile welded.
- 36 4. Exposed Finish: Prime.

37 **2.3 FRAME ANCHORS**

38 A. Jamb Anchors:

- 1 1. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible
2 face seams or joints, fabricated from same material as door frame. Fasten members
3 at crossings and to jambs by butt welding.
- 4 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed
5 fasteners unless otherwise indicated.
- 6 3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be
7 grouted.
- 8 4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per
9 anchor; however, for slip-on drywall frames, provide anchor clips or countersunk
10 holes at bottoms of jambs.
- 11 5. Jamb Anchors: Provide number and spacing of anchors as follows:
 - 12 a. Masonry Type: Locate anchors not more than 16 inches from top and bottom
13 of frame. Space anchors not more than 32 inches o.c., to match coursing, and
14 as follows:
 - 15 1) Two anchors per jamb up to 60 inches high.
 - 16 2) Three anchors per jamb from 60 to 90 inches high.
 - 17 3) Four anchors per jamb from 90 to 120 inches high.
 - 18 4) Four anchors per jamb plus one additional anchor per jamb for each 24
19 inches or fraction thereof above 120 inches high.
 - 20 b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom
21 of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 22 1) Three anchors per jamb up to 60 inches high.
 - 23 2) Four anchors per jamb from 60 to 90 inches high.
 - 24 3) Five anchors per jamb from 90 to 96 inches high.
 - 25 4) Five anchors per jamb plus one additional anchor per jamb for each 24
26 inches or fraction thereof above 96 inches high.
- 27 6. Head Anchors: Two anchors per head for frames more than 42 inches wide and
28 mounted in metal-stud partitions.
- 29 7. Door Silencers: Except on weather-stripped frames, drill stops to receive door
30 silencers as follows. Keep holes clear during construction.
 - 31 a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - 32 b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- 33 8. Terminated Stops: Terminate stops 6 inches above finish floor with a 90-degree
34 angle cut, and close open end of stop with steel sheet closure. Cover opening in
35 extension of frame with welded-steel filler plate, with welds ground smooth and flush
36 with frame.
- 37 C. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised
38 hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI
39 A250.6, the Door Hardware Schedule, and templates.
 - 40 1. Reinforce frames to receive nontemplated, mortised, and surface-mounted
41 hardware.
 - 42 2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for
43 preparation of hollow-metal work for hardware.

- 1 D. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where
2 indicated. Form corners of stops and moldings with mitered hairline joints.
- 3 1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of
4 hollow-metal work.
- 5 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each
6 glazed lite is capable of being removed independently.
- 7 3. Provide fixed frame moldings on outside of exterior and on secure side of interior
8 frames.
- 9 4. Provide loose stops and moldings on inside of hollow-metal work.
- 10 5. Coordinate rabbet width between fixed and removable stops with glazing and
11 installation types indicated.

12 **2.6 STEEL FINISHES**

- 13 A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
- 14 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer
15 complying with SDI A250.10; recommended by primer manufacturer for substrate;
16 compatible with substrate and field-applied coatings despite prolonged exposure.

17 **2.7 ACCESSORIES**

- 18 A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical
19 anchors.
- 20 B. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

21 **PART 3 - EXECUTION**

22 **3.1 EXAMINATION**

- 23 A. Examine substrates, areas, and conditions, with Installer present, for compliance with
24 requirements for installation tolerances and other conditions affecting performance of the
25 Work.
- 26 B. Examine roughing-in for embedded and built-in anchors to verify actual locations before
27 frame installation.
- 28 C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance
29 of the Work.
- 30 D. Proceed with installation only after unsatisfactory conditions have been corrected.

31 **3.2 PREPARATION**

- 32 A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by
33 grinding, filling, and dressing, as required to make repaired area smooth, flush, and
34 invisible on exposed faces.
- 35 B. Drill and tap frames to receive nontemplated, mortised, and surface-mounted hardware.

- 1 **3.3 INSTALLATION**
- 2 A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in
3 place. Comply with Drawings and manufacturer's written instructions.
- 4 B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with
5 SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
- 6 1. Set frames accurately in position; plumbed, aligned, and braced securely until
7 permanent anchors are set. After wall construction is complete, remove temporary
8 braces, leaving surfaces smooth and undamaged.
- 9 a. Where frames are fabricated in sections because of shipping or handling
10 limitations, field splice at approved locations by welding face joint
11 continuously; grind, fill, dress, and make splice smooth, flush, and invisible on
12 exposed faces.
- 13 b. Install frames with removable stops located on secure side of opening.
- 14 c. Install door silencers in frames before grouting.
- 15 d. Remove temporary braces necessary for installation only after frames have
16 been properly set and secured.
- 17 e. Check plumb, square, and twist of frames as walls are constructed. Shim as
18 necessary to comply with installation tolerances.
- 19 f. Field apply bituminous coating to backs of frames that will be filled with grout
20 containing antifreezing agents.
- 21 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor,
22 and secure with postinstalled expansion anchors.
- 23 a. Floor anchors may be set with power-actuated fasteners instead of
24 postinstalled expansion anchors if so indicated and approved on Shop
25 Drawings.
- 26 3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
- 27 4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space
28 between frames and masonry with grout.
- 29 5. In-Place Concrete or Masonry Construction: Secure frames in place with
30 postinstalled expansion anchors. Countersink anchors, and fill and make smooth,
31 flush, and invisible on exposed faces.
- 32 6. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place
33 according to manufacturer's written instructions.
- 34 7. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment,
35 twist, and plumb to the following tolerances:
- 36 a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90
37 degrees from jamb perpendicular to frame head.
- 38 b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line
39 parallel to plane of wall.
- 40 c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs
41 on parallel lines, and perpendicular to plane of wall.
- 42 d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- 43 C. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with
44 hollow-metal manufacturer's written instructions.

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

3 **3.4 ADJUSTING AND CLEANING**

- 4 A. Final Adjustments: Remove and replace defective work, including hollow-metal work that is
5 warped, bowed, or otherwise unacceptable.
- 6 B. Remove grout and other bonding material from hollow-metal work immediately after
7 installation.
- 8 C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of
9 prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- 10 D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair
11 paint according to manufacturer's written instructions.
- 12 E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in
13 painting Sections.

14

15 **END OF SECTION 08 1213**

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1 **SECTION 08 1416 - FLUSH WOOD DOORS**

2 **PART 1 - GENERAL**

3 **1.1 RELATED DOCUMENTS**

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

6 **1.2 SUMMARY**

- 7 A. Section Includes:

- 8 1. Solid-core doors with wood-veneer faces.
9 2. Factory finishing flush wood doors.
10 3. Factory fitting flush wood doors to frames and factory machining for hardware.

11 **1.3 ACTION SUBMITTALS**

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

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

- 16 1. Dimensions and locations of blocking.
17 2. Dimensions and locations of mortises and holes for hardware.
18 3. Dimensions and locations of cutouts.
19 4. Undercuts.
20 5. Requirements for veneer matching.
21 6. Doors to be factory finished and finish requirements.

- 22 C. Samples for Initial Selection: For factory-finished doors.

23 **1.4 QUALITY ASSURANCE**

- 24 A. Manufacturer Qualifications: A qualified manufacturer that is a certified participant in AWI's
25 Quality Certification Program.

- 26 B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited
27 certification body.

28 **1.5 DELIVERY, STORAGE, AND HANDLING**

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

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

- 31 C. Mark each door on top and bottom rail with opening number used on Shop Drawings.
32

1 **1.6 FIELD CONDITIONS**

2 A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and
3 weathertight, wet work in spaces is complete and dry, and HVAC system is operating and
4 maintaining temperature between 60 and 90 deg F and relative humidity between 25 and
5 55 percent during remainder of construction period.

6 **1.7 WARRANTY**

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

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

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

13 2. Warranty shall also include installation and finishing that may be required due to
14 repair or replacement of defective doors.

15 3. Warranty Period for Solid-Core Interior Doors: Life of installation.

16 **PART 2 - PRODUCTS**

17 **2.1 MANUFACTURERS**

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

- 20 1. Algoma Hardwoods, Inc.
21 2. Chappell Door Co.
22 3. Eggers Industries.
23 4. Graham Wood Doors; an Assa Abloy Group company.
24 5. Marshfield Door Systems, Inc.
25 6. Oshkosh Door Company.
26 7. VT Industries, Inc.

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

28 **2.2 FLUSH WOOD DOORS, GENERAL**

29 A. Quality Standard: In addition to requirements specified, comply with AWI's, AWMAC's, and
30 WI's "Architectural Woodwork Standards and WDMA I.S.1-A, "Architectural Wood Flush
31 Doors."

32 1. Provide AWI Quality Certification Labels indicating that doors comply with
33 requirements of grades specified.

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

35 C. Particleboard-Core Doors:

- 1 1. Particleboard: ANSI A208.1, Grade LD-1.
- 2 2. Blocking: Provide wood blocking in particleboard-core doors as follows:
 - 3 a. 5-inch top-rail blocking, in doors indicated to have closers.
 - 4 b. 5-inch bottom-rail blocking, in exterior doors and doors indicated to have kick,
5 mop, or armor plates.
 - 6 c. 5-inch midrail blocking, in doors indicated to have exit devices.

7 **2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH**

8 A. Interior Solid-Core Doors:

- 9 1. Grade: Premium, with Grade A faces.
- 10 2. Species: Match existing.
- 11 3. Cut: Match existing.
- 12 4. Match between Veneer Leaves: Match existing.
- 13 5. Assembly of Veneer Leaves on Door Faces: Center-balance match.
- 14 6. Pair and Set Match: Provide for doors hung in same opening.
- 15 7. Exposed Vertical Edges: Same species as faces or a compatible species - edge
16 Type A.
- 17 8. Core: Particleboard.
- 18 9. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire
19 unit is abrasive planed before veneering. Faces are bonded to core using a hot
20 press.
- 21 10. Construction: Seven plies, either bonded or nonbonded construction.
- 22 11. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

23 **2.4 FABRICATION**

24 A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance 25 requirements of referenced quality standard for fitting unless otherwise indicated.

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

27 B. Factory machine doors for hardware that is not surface applied. Locate hardware to 28 comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop 29 Drawings, BHMA-156.115-W, and hardware templates.

- 30 1. Coordinate with hardware mortises in metal frames to verify dimensions and
31 alignment before factory machining.
- 32 2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware
33 for pairs of fire-rated doors.

34 C. Transom and Side Panels: Fabricate matching panels with same construction, exposed 35 surfaces, and finish as specified for associated doors. Finish bottom edges of transoms 36 and top edges of rabbeted doors same as door stiles.

- 37 1. Fabricate door and transom panels with full-width, solid-lumber, rabbeted, meeting
38 rails. Provide factory-installed spring bolts for concealed attachment into jambs of
39 metal door frames.

40

1 **2.5 FACTORY FINISHING**

- 2 A. General: Comply with referenced quality standard for factory finishing. Complete
3 fabrication, including fitting doors for openings and machining for hardware that is not
4 surface applied, before finishing.
- 5 1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may
6 be omitted on top and bottom edges, edges of cutouts, and mortises.
- 7 B. Factory finish doors.
- 8 C. Factory finish doors that are indicated to receive transparent finish.
- 9 D. Factory finish doors where indicated in schedules or on Drawings as factory finished.
- 10 E. Use only paints and coatings that comply with the testing and product requirements of the
11 California Department of Health Services' "Standard Practice for the Testing of Volatile
12 Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- 13 F. Transparent Finish:
- 14 1. Grade: Premium.
- 15 2. Finish: AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" System 5,
16 conversion varnish.
- 17 3. Finish: WDMA TR-4 conversion varnish or WDMA TR-6 catalyzed polyurethane.
- 18 4. Staining: Match Existing.
- 19 5. Effect: Open-grain finish.
- 20 6. Sheen: Match Existing.

21 **PART 3 - EXECUTION**

22 **3.1 EXAMINATION**

- 23 A. Examine doors and installed door frames, with Installer present, before hanging doors.
- 24 1. Verify that installed frames comply with indicated requirements for type, size,
25 location, and swing characteristics and have been installed with level heads and
26 plumb jambs.
- 27 2. Reject doors with defects.
- 28 B. Proceed with installation only after unsatisfactory conditions have been corrected.

29 **3.2 INSTALLATION**

- 30 A. Hardware: For installation, see Section 087100 "Door Hardware (Descriptive
31 Specification)."
- 32 B. Installation Instructions: Install doors to comply with manufacturer's written instructions
33 and referenced quality standard, and as indicated.
- 34 C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

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

3 **3.3 ADJUSTING**

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

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

8 **END OF SECTION 08 1416**

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1 **SECTION 08 8000 - GLAZING**

2 **PART 1 - GENERAL**

3 **1.1 RELATED DOCUMENTS**

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

6 **1.2 SUMMARY**

- 7 A. Section includes glazing for the following products and applications, including those
8 specified in other Sections where glazing requirements are specified by reference to this
9 Section:

- 10 1. Doors.
11 2. Storefront framing.

12 **1.3 DEFINITIONS**

- 13 A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as
14 defined in referenced glazing publications.
- 15 B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM
16 C 1036.
- 17 C. Interspace: Space between lites of an insulating-glass unit.

18 **1.4 PERFORMANCE REQUIREMENTS**

- 19 A. General: Installed glazing systems shall withstand normal thermal movement and wind and
20 impact loads (where applicable) without failure, including loss or glass breakage
21 attributable to the following: defective manufacture, fabrication, or installation; failure of
22 sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or
23 other defects in construction.
- 24 B. Delegated Design: Design glass, including comprehensive engineering analysis according
25 to ICC's 2003 International Building Code by a qualified professional engineer, using the
26 following design criteria:
- 27 1. Design Wind Pressures: As indicated on Drawings.
28 2. Design Wind Pressures: Determine design wind pressures applicable to Project
29 according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
- 30 a. Wind Design Data: As indicated on Drawings.
31 b. Basic Wind Speed: 90 mph.
32 c. Exposure Category: C.
- 33 3. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design
34 glass to resist design wind pressure based on glass type factors for short-duration
35 load.

- 1 4. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-
2 glass deflection at design wind pressure to not more than 1/50 times the short-side
3 length or 1 inch, whichever is less.
4 5. Differential Shading: Design glass to resist thermal stresses induced by differential
5 shading within individual glass lites.

- 6 C. Thermal Movements: Allow for thermal movements from ambient and surface temperature
7 changes acting on glass framing members and glazing components.

- 8 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

9 **1.5 ACTION SUBMITTALS**

- 10 A. Product Data: For each glass product and glazing material indicated.

- 11 1. Clear monolithic vision glass. Glass Samples: For each type of the following
12 products; 12 inches square.

- 13 B. Glazing Schedule: List glass types and thicknesses for each size opening and location.
14 Use same designations indicated on Drawings.

15 **1.6 INFORMATIONAL SUBMITTALS**

- 16 A. Product Certificates: For glass and glazing products, from manufacturer.

- 17 B. Warranties: Sample of special warranties.

18 **1.7 QUALITY ASSURANCE**

- 19 A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E
20 Coatings: A qualified insulating-glass manufacturer who is approved and certified by
21 coated-glass manufacturer.

- 22 B. Installer Qualifications: A qualified installer who employs glass installers for this Project
23 who are certified under the National Glass Association's Certified Glass Installer Program.

- 24 C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited
25 according to the NFRC CAP 1 Certification Agency Program.

- 26 D. Source Limitations for Glass: Obtain ultraclear float glass from single source from single
27 manufacturer for each glass type.

- 28 E. Source Limitations for Glazing Accessories: Obtain from single source from single
29 manufacturer for each product and installation method.

- 30 F. Glazing Publications: Comply with published recommendations of glass product
31 manufacturers and organizations below, unless more stringent requirements are indicated.
32 Refer to these publications for glazing terms not otherwise defined in this Section or in
33 referenced standards.
34

- 1 G. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark
2 glazing with certification label of the SGCC or another certification agency acceptable to
3 authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass,
4 thickness, and safety glazing standard with which glass complies.
- 5 H. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing
6 with certification label of a testing agency acceptable to authorities having jurisdiction.
7 Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire
8 doors or other openings, whether or not glazing passes hose-stream test, whether or not
9 glazing has a temperature rise rating of 450 deg F, and the fire-resistance rating in
10 minutes.
- 11 I. Preinstallation Conference: Conduct conference at Project site.
- 12 1. Review and finalize construction schedule and verify availability of materials,
13 Installer's personnel, equipment, and facilities needed to make progress and avoid
14 delays.
15 2. Review temporary protection requirements for glazing during and after installation.

16 **1.8 DELIVERY, STORAGE, AND HANDLING**

- 17 A. Protect glazing materials according to manufacturer's written instructions. Prevent damage
18 to glass and glazing materials from condensation, temperature changes, direct exposure to
19 sun, or other causes.
- 20 B. Comply with insulating-glass manufacturer's written recommendations for venting and
21 sealing units to avoid hermetic seal ruptures due to altitude change.

22 **1.9 PROJECT CONDITIONS**

- 23 A. Environmental Limitations: Do not proceed with glazing when ambient and substrate
24 temperature conditions are outside limits permitted by glazing material manufacturers and
25 when glazing channel substrates are wet from rain, frost, condensation, or other causes.
- 26 1. Do not install glazing sealants when ambient and substrate temperature conditions
27 are outside limits permitted by sealant manufacturer or below 40 deg F.

28 **1.10 WARRANTY**

- 29 A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form
30 in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate
31 within specified warranty period. Deterioration of coated glass is defined as defects
32 developed from normal use that are not attributed to glass breakage or to maintaining and
33 cleaning coated glass contrary to manufacturer's written instructions. Defects include
34 peeling, cracking, and other indications of deterioration in coating.
- 35 1. Warranty Period: 10 years from date of Substantial Completion.
36

1 **PART 2 - PRODUCTS**

2 **2.1 GLASS PRODUCTS, GENERAL**

3 A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in
4 thicknesses as needed to comply with requirements indicated.

5 1. Minimum Glass Thickness for Interior Lites: Not less than 6.0 mm.

6 B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated
7 float glass, or Kind FT heat-treated float glass as needed to comply with "Performance
8 Requirements" Article. Where heat-strengthened glass is indicated, provide Kind HS heat-
9 treated float glass or Kind FT heat-treated float glass as needed to comply with
10 "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind
11 FT heat-treated float glass.

12 C. Windborne-Debris-Impact Resistance: Provide exterior glazing that passes basic-
13 protection testing requirements in ASTM E 1996 for Wind Zone 2 when tested according to
14 ASTM E 1886. Test specimens shall be no smaller in width and length than glazing
15 indicated for use on the Project and shall be installed in same manner as glazing indicated
16 for use on the Project.

17 1. Large-Missile Test: For glazing located within 30 feet of grade.
18 2. Small-Missile Test: For glazing located more than 30 feet above grade.
19 3. Large-Missile Test: For all glazing, regardless of height above grade.

20 D. Thermal and Optical Performance Properties: Provide glass with performance properties
21 specified, as indicated in manufacturer's published test data, based on procedures
22 indicated below:

23 1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
24 2. For laminated-glass lites, properties are based on products of construction indicated.
25 3. For insulating-glass units, properties are based on units of thickness indicated for
26 overall unit and for each lite.
27 4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's
28 WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
29 5. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values,
30 according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
31 6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

32 **2.2 GLASS PRODUCTS**

33 A. Ultraclear Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I, complying with other
34 requirements specified and with visible light transmission not less than 91 percent and
35 solar heat gain coefficient not less than 0.87.

36 B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless
37 otherwise indicated; of kind and condition indicated.

38 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion
39 parallel to bottom edge of glass as installed unless otherwise indicated.
40 2. For uncoated glass, comply with requirements for Condition A.
41 3. For coated vision glass, comply with requirements for Condition C (other coated
42 glass).

1 **2.3 GLAZING GASKETS**

2 A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required
3 to maintain watertight seal, made from one of the following:

- 4 1. Neoprene complying with ASTM C 864.
5 2. EPDM complying with ASTM C 864.
6 3. Silicone complying with ASTM C 1115.
7 4. Thermoplastic polyolefin rubber complying with ASTM C 1115.

8 B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene,
9 EPDM, silicone, or thermoplastic polyolefin rubber gaskets complying with ASTM C 509,
10 Type II, black; of profile and hardness required to maintain watertight seal.

11 1. Application: Use where soft compression gaskets will be compressed by inserting
12 dense compression gaskets on opposite side of glazing or pressure applied by
13 means of pressure-glazing stops on opposite side of glazing.

14 C. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into
15 frames with molded corner units and zipper lock-strips, complying with ASTM C 542, black.

16 **2.4 GLAZING SEALANTS**

17 A. General:

- 18 1. Compatibility: Provide glazing sealants that are compatible with one another and
19 with other materials they will contact, including glass products, seals of insulating-
20 glass units, and glazing channel substrates, under conditions of service and
21 application, as demonstrated by sealant manufacturer based on testing and field
22 experience.
23 2. Suitability: Comply with sealant and glass manufacturers' written instructions for
24 selecting glazing sealants suitable for applications indicated and for conditions
25 existing at time of installation.
26 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's
27 full range.

28 B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type
29 S, Grade NS, Class 100/50, Use NT.

30 1. Products: Subject to compliance with requirements, provide one of the following:

- 31 a. Dow Corning Corporation; 790.
32 b. Pecora Corporation; 890.
33 c. Sika Corporation, Construction Products Division; SikaSil-C990.
34 d. Tremco Incorporated; Spectrem 1.

35 **2.5 GLAZING TAPES**

36 A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids
37 elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or
38 without spacer rod as recommended in writing by tape and glass manufacturers for
39 application indicated; and complying with ASTM C 1281 and AAMA 800 for products
40 indicated below:

- 1 1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous
2 pressure.
- 3 2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous
4 pressure.
- 5 B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with
6 adhesive on both surfaces; and complying with AAMA 800 for the following types:
 - 7 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary
8 sealant.
 - 9 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination
10 with a full bead of liquid sealant.

11 2.6 MISCELLANEOUS GLAZING MATERIALS

- 12 A. General: Provide products of material, size, and shape complying with referenced glazing
13 standard, requirements of manufacturers of glass and other glazing materials for
14 application indicated, and with a proven record of compatibility with surfaces contacted in
15 installation.
- 16 B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- 17 C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus
18 or minus 5.
- 19 D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass
20 manufacturer to maintain glass lites in place for installation indicated.
- 21 E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement
22 (side walking).
- 23 F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size
24 and density to control glazing sealant depth and otherwise produce optimum glazing
25 sealant performance.
- 26 G. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency
27 that listed and labeled fire-resistant glazing product with which it is used for application and
28 fire-protection rating indicated.

29 2.7 FABRICATION OF GLAZING UNITS

- 30 A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and
31 face clearances, edge and surface conditions, and bite complying with written instructions
32 of product manufacturer and referenced glazing publications, to comply with system
33 performance requirements.
- 34 B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square
35 edges with slight chamfers at junctions of edges and faces.
- 36 C. Grind smooth and polish exposed glass edges and corners.

1 **2.8 MONOLITHIC-GLASS TYPES**

2 A. Glass Type ■: Ultraclear fully tempered float glass.

3 1. Thickness: 1/4".

4 2. Provide safety glazing labeling.

5 **PART 3 - EXECUTION**

6 **3.1 EXAMINATION**

7 A. Examine framing, glazing channels, and stops, with Installer present, for compliance with
8 the following:

9 1. Manufacturing and installation tolerances, including those for size, squareness, and
10 offsets at corners.

11 2. Presence and functioning of weep systems.

12 3. Minimum required face and edge clearances.

13 4. Effective sealing between joints of glass-framing members.

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

15 **3.2 PREPARATION**

16 A. Clean glazing channels and other framing members receiving glass immediately before
17 glazing. Remove coatings not firmly bonded to substrates.

18 B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as
19 needed so that exterior and interior surfaces are readily identifiable. Do not use materials
20 that will leave visible marks in the completed work.

21 **3.3 GLAZING, GENERAL**

22 A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets,
23 and other glazing materials, unless more stringent requirements are indicated, including
24 those in referenced glazing publications.

25 B. Adjust glazing channel dimensions as required by Project conditions during installation to
26 provide necessary bite on glass, minimum edge and face clearances, and adequate
27 sealant thicknesses, with reasonable tolerances.

28 C. Protect glass edges from damage during handling and installation. Remove damaged
29 glass from Project site and legally dispose of off Project site. Damaged glass is glass with
30 edge damage or other imperfections that, when installed, could weaken glass and impair
31 performance and appearance.

32 D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by
33 preconstruction testing.

34 E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing
35 publications, unless otherwise required by glass manufacturer. Set blocks in thin course of
36 compatible sealant suitable for heel bead.

- 1 F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- 2 G. Provide spacers for glass lites where length plus width is larger than 50 inches.
- 3 1. Locate spacers directly opposite each other on both inside and outside faces of
4 glass. Install correct size and spacing to preserve required face clearances, unless
5 gaskets and glazing tapes are used that have demonstrated ability to maintain
6 required face clearances and to comply with system performance requirements.
- 7 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to
8 sealant width. With glazing tape, use thickness slightly less than final compressed
9 thickness of tape.
- 10 H. Provide edge blocking where indicated or needed to prevent glass lites from moving
11 sideways in glazing channel, as recommended in writing by glass manufacturer and
12 according to requirements in referenced glazing publications.
- 13 I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- 14 J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- 15 K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or
16 gasket on opposite side, provide adequate anchorage so gasket cannot walk out when
17 installation is subjected to movement.
- 18 L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner
19 recommended by gasket manufacturer to prevent corners from pulling away; seal corner
20 joints and butt joints with sealant recommended by gasket manufacturer.
- 21 **3.4 TAPE GLAZING**
- 22 A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are
23 flush with or protrude slightly above sightline of stops.
- 24 B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch
25 tapes to make them fit opening.
- 26 C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs.
27 Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- 28 D. Place joints in tapes at corners of opening with adjoining lengths butted together, not
29 lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- 30 E. Do not remove release paper from tape until right before each glazing unit is installed.
- 31 F. Apply heel bead of elastomeric sealant.
- 32 G. Center glass lites in openings on setting blocks and press firmly against tape by inserting
33 dense compression gaskets formed and installed to lock in place against faces of
34 removable stops. Start gasket applications at corners and work toward centers of
35 openings.
- 36 H. Apply cap bead of elastomeric sealant over exposed edge of tape.

1 **3.5 GASKET GLAZING (DRY)**

- 2 A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings
3 exactly, with allowance for stretch during installation.
- 4 B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in
5 place with joints miter cut and bonded together at corners.
- 6 C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks
7 and press firmly against soft compression gasket by inserting dense compression gaskets
8 formed and installed to lock in place against faces of removable stops. Start gasket
9 applications at corners and work toward centers of openings. Compress gaskets to
10 produce a weathertight seal without developing bending stresses in glass. Seal gasket
11 joints with sealant recommended by gasket manufacturer.
- 12 D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks
13 and press firmly against soft compression gasket. Install dense compression gaskets and
14 pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress
15 gaskets to produce a weathertight seal without developing bending stresses in glass. Seal
16 gasket joints with sealant recommended by gasket manufacturer.
- 17 E. Install gaskets so they protrude past face of glazing stops.

18 **3.6 SEALANT GLAZING (WET)**

- 19 A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between
20 glass lites and glazing stops to maintain glass face clearances and to prevent sealant from
21 extruding into glass channel and blocking weep systems until sealants cure. Secure
22 spacers or spacers and backings in place and in position to control depth of installed
23 sealant relative to edge clearance for optimum sealant performance.
- 24 B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or
25 bond of sealant to glass and channel surfaces.
- 26 C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

27 **3.7 LOCK-STRIP GASKET GLAZING**

- 28 A. Comply with ASTM C 716 and gasket manufacturer's written instructions. Provide
29 supplementary wet seal and weep system unless otherwise indicated.

30 **3.8 CLEANING AND PROTECTION**

- 31 A. Protect exterior glass from damage immediately after installation by attaching crossed
32 streamers to framing held away from glass. Do not apply markers to glass surface.
33 Remove nonpermanent labels and clean surfaces.
- 34 B. Protect glass from contact with contaminating substances resulting from construction
35 operations. If, despite such protection, contaminating substances do come into contact with
36 glass, remove substances immediately as recommended in writing by glass manufacturer.
37

- 1 C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces
2 at frequent intervals during construction, but not less than once a month, for buildup of dirt,
3 scum, alkaline deposits, or stains; remove as recommended in writing by glass
4 manufacturer.
- 5 D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged
6 from natural causes, accidents, and vandalism, during construction period.
- 7 E. Wash glass on both exposed surfaces in each area of Project not more than four days
8 before date scheduled for inspections that establish date of Substantial Completion. Wash
9 glass as recommended in writing by glass manufacturer.

10 **END OF SECTION 08 8000**

DIVISION 9

1 **SECTION 09 2216 - NON-STRUCTURAL METAL FRAMING**

2 **PART 1 - GENERAL**

3 **1.1 RELATED DOCUMENTS**

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

6 **1.2 SUMMARY**

- 7 A. Section Includes:

- 8 1. Non-load-bearing steel framing systems for interior gypsum board assemblies.

9 **1.3 ACTION SUBMITTALS**

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

11 **PART 2 - PRODUCTS**

12 **2.1 PERFORMANCE REQUIREMENTS**

- 13 A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate
14 non-load-bearing steel framing, provide materials and construction identical to those tested
15 in assembly indicated, according to ASTM E 119 by an independent testing agency.

16 **2.2 FRAMING SYSTEMS**

- 17 A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

- 18 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless
19 otherwise indicated.

- 20 2. Protective Coating: ASTM A 653/A 653M, G40, hot-dip galvanized unless otherwise
21 indicated.

- 22 B. Studs and Runners: ASTM C 645.

- 23 1. Steel Studs and Runners:

- 24 a. Minimum Base-Metal Thickness: 20 gauge.

- 25 b. Depth: As indicated on Drawings.

- 26 2. Dimpled Steel Studs and Runners:

- 27 a. Minimum Base-Metal Thickness: As indicated on Drawings.

- 28 b. Depth: As indicated on Drawings.

- 29 C. Slip-Type Head Joints: Where indicated, provide one of the following:

- 1 1. Deflection Track: Steel sheet top runner manufactured to prevent cracking of
2 finishes applied to interior partition framing resulting from deflection of structure
3 above; in thickness not less than indicated for studs and in width to accommodate
4 depth of studs.
- 5 a. Products: Subject to compliance with requirements, available products that
6 may be incorporated into the Work include, but are not limited to, the
7 following:
- 8 1) Dietrich Metal Framing; SLP-TRK Slotted Deflection Track.
9 2) MBA Building Supplies; FlatSteel Deflection Track.
10 3) Steel Network Inc. (The); VertiClip SLD Series.
11 4) Superior Metal Trim; Superior Flex Track System (SFT).
- 12 D. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract
13 with movement of the structure while maintaining continuity of fire-resistance-rated
14 assembly indicated; in thickness not less than indicated for studs and in width to
15 accommodate depth of studs.
- 16 1. Products: Subject to compliance with requirements, available products that may be
17 incorporated into the Work include, but are not limited to, the following:
- 18 a. Fire Trak Corp.; Fire Trak System attached to studs with Fire Trak Posi Klip.
19 b. Grace Construction Products; FlameSafe FlowTrak System.
20 c. Metal-Lite, Inc.; The System.
- 21 E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width
22 indicated.
- 23 1. Minimum Base-Metal Thickness: As indicated on Drawings.
- 24 F. Cold-Rolled Channel Bridging: Steel, 0.053-inch minimum base-metal thickness, with
25 minimum 1/2-inch- wide flanges.
- 26 1. Depth: As indicated on Drawings.
27 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch- thick, galvanized steel.
- 28 G. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
- 29 1. Minimum Base-Metal Thickness: As indicated on Drawings.
30 2. Depth: As indicated on Drawings.
- 31 H. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce
32 sound transmission.
- 33 1. Configuration: Asymmetrical or hat shaped.
- 34 I. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-
35 inch- wide flanges.
- 36 1. Depth: As indicated on Drawings.
37 2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum
38 uncoated-steel thickness of 0.033 inch.

1 **3.3 INSTALLATION, GENERAL**

2 A. Installation Standard: ASTM C 754.

3 1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C 841 that
4 apply to framing installation.

5 2. Portland Cement Plaster Assemblies: Also comply with requirements in
6 ASTM C 1063 that apply to framing installation.

7 3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in
8 ASTM C 844 that apply to framing installation.

9 4. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that
10 apply to framing installation.

11 B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy
12 trim, grab bars, toilet accessories, furnishings, or similar construction.

13 C. Install bracing at terminations in assemblies.

14 D. Do not bridge building control and expansion joints with non-load-bearing steel framing
15 members. Frame both sides of joints independently.

16 **3.4 INSTALLING FRAMED ASSEMBLIES**

17 A. Install framing system components according to spacings indicated, but not greater than
18 spacings required by referenced installation standards for assembly types.

19 1. Single-Layer Application: 16 inches o.c. unless otherwise indicated.

20 2. Multilayer Application: 16 inches o.c. unless otherwise indicated.

21 3. Tile Backing Panels: 16 inches o.c. unless otherwise indicated.

22 B. Where studs are installed directly against exterior masonry walls or dissimilar metals at
23 exterior walls, install isolation strip between studs and exterior wall.

24 C. Install studs so flanges within framing system point in same direction.

25 D. Install tracks (runners) at floors and overhead supports. Extend framing full height to
26 structural supports or substrates above suspended ceilings except where partitions are
27 indicated to terminate at suspended ceilings. Continue framing around ducts penetrating
28 partitions above ceiling.

29 1. Slip-Type Head Joints: Where framing extends to overhead structural supports,
30 install to produce joints at tops of framing systems that prevent axial loading of
31 finished assemblies.

32 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames;
33 install runner track section (for cripple studs) at head and secure to jamb studs.

34 a. Install two studs at each jamb unless otherwise indicated.

35 b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-
36 inch clearance from jamb stud to allow for installation of control joint in
37 finished assembly.

38 c. Extend jamb studs through suspended ceilings and attach to underside of
39 overhead structure.

- 1 3. Other Framed Openings: Frame openings other than door openings the same as
2 required for door openings unless otherwise indicated. Install framing below sills of
3 openings to match framing required above door heads.
4 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated
5 assembly indicated and support closures and to make partitions continuous from
6 floor to underside of solid structure.
- 7 a. Firestop Track: Where indicated, install to maintain continuity of fire-
8 resistance-rated assembly indicated.
- 9 5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly
10 indicated.
11 6. Curved Partitions:
- 12 a. Bend track to uniform curve and locate straight lengths so they are tangent to
13 arcs.
14 b. Begin and end each arc with a stud, and space intermediate studs equally
15 along arcs. On straight lengths of no fewer than two studs at ends of arcs,
16 place studs 6 inches o.c.
- 17 E. Direct Furring:
- 18 1. Screw to wood framing.
19 2. Attach to concrete or masonry with stub nails, screws designed for masonry
20 attachment, or powder-driven fasteners spaced 24 inches o.c.
- 21 F. Z-Furring Members:
- 22 1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold
23 in place with Z-furring members spaced 24 inches o.c.
24 2. Except at exterior corners, securely attach narrow flanges of furring members to wall
25 with concrete stub nails, screws designed for masonry attachment, or powder-driven
26 fasteners spaced 24 inches o.c.
27 3. At exterior corners, attach wide flange of furring members to wall with short flange
28 extending beyond corner; on adjacent wall surface, screw-attach short flange of
29 furring channel to web of attached channel. At interior corners, space second
30 member no more than 12 inches from corner and cut insulation to fit.
- 31 G. Installation Tolerance: Install each framing member so fastening surfaces vary not more
32 than 1/8 inch from the plane formed by faces of adjacent framing.
33
34

35 **END OF SECTION 09 2216**
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1 **SECTION 09 2900 - GYPSUM BOARD**

2 **PART 1 - GENERAL**

3 **1.1 RELATED DOCUMENTS**

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

6 **1.2 SUMMARY**

- 7 A. Section Includes:

- 8 1. Interior gypsum board.
9 2. Sound attenuation blankets.

- 10 B. Related Requirements:

- 11 1. Section 092216 "Non-Structural Metal Framing" for non-structural framing and
12 suspension systems that support gypsum board panels.

13 **1.3 ACTION SUBMITTALS**

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

15 **1.4 DELIVERY, STORAGE AND HANDLING**

- 16 A. Store materials inside under cover and keep them dry and protected against weather,
17 condensation, direct sunlight, construction traffic, and other potential causes of damage.
18 Stack panels flat and supported on risers on a flat platform to prevent sagging.

19 **1.5 FIELD CONDITIONS**

- 20 A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board
21 manufacturer's written recommendations, whichever are more stringent.

- 22 B. Do not install paper-faced gypsum panels until installation areas are enclosed and
23 conditioned.

- 24 C. Do not install panels that are wet, those that are moisture damaged, and those that are
25 mold damaged.

- 26 1. Indications that panels are wet or moisture damaged include, but are not limited to,
27 discoloration, sagging, or irregular shape.

- 28 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or
29 splotchy surface contamination and discoloration.

30 **PART 2 - PRODUCTS**

1 **2.1 PERFORMANCE REQUIREMENTS**

- 2 A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide
3 materials and construction identical to those tested in assembly indicated according to
4 ASTM E 119 by an independent testing agency.

5 **2.2 GYPSUM BOARD, GENERAL**

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

8 **2.3 INTERIOR GYPSUM BOARD**

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

- 12 1. American Gypsum.
13 2. CertainTeed Corp.
14 3. Georgia-Pacific Gypsum LLC.
15 4. Lafarge North America Inc.
16 5. National Gypsum Company.
17 6. USG Corporation.

- 18 B. Gypsum Board, Type X: ASTM C 1396/C 1396M.

- 19 1. Thickness: 5/8 inch.
20 2. Long Edges: Tapered.

21 **2.4 TRIM ACCESSORIES**

- 22 A. Interior Trim: ASTM C 1047.

- 23 1. Material: Plastic.
24 2. Shapes:

- 25 a. Cornerbead.
26 b. Bullnose bead.
27 c. LC-Bead: J-shaped; exposed long flange receives joint compound.
28 d. L-Bead: L-shaped; exposed long flange receives joint compound.
29 e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
30 f. Expansion (control) joint.

31 **2.5 JOINT TREATMENT MATERIALS**

- 32 A. General: Comply with ASTM C 475/C 475M.

- 33 B. Joint Tape:

- 34 1. Interior Gypsum Board: Paper.

- 35 C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is
36 compatible with other compounds applied on previous or for successive coats.

- 1 1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface
2 areas, use setting-type taping compound.
- 3 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners,
4 and trim flanges, use drying-type, all-purpose compound.
- 5 a. Use setting-type compound for installing paper-faced metal trim accessories.
- 6 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
- 7 4. Finish Coat: For third coat, use drying-type, all-purpose compound.
- 8 5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.

9 **2.6 AUXILIARY MATERIALS**

- 10 A. General: Provide auxiliary materials that comply with referenced installation standards and
11 manufacturer's written recommendations.
- 12 B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 - 13 1. Use screws complying with ASTM C 954 for fastening panels to steel members from
14 0.033 to 0.112 inch thick.
 - 15 2. For fastening cementitious backer units, use screws of type and size recommended
16 by panel manufacturer.
- 17 C. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing)
18 produced by combining thermosetting resins with mineral fibers manufactured from glass,
19 slag wool, or rock wool.
 - 20 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of
21 assembly.
- 22 D. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex
23 sealant complying with ASTM C 834. Product effectively reduces airborne sound
24 transmission through perimeter joints and openings in building construction as
25 demonstrated by testing representative assemblies according to ASTM E 90.
 - 26 1. Products: Subject to compliance with requirements, available products that may be
27 incorporated into the Work include, but are not limited to, the following:
 - 28 a. Accumetric LLC; BOSS 824 Acoustical Sound Sealant.
 - 29 b. Grabber Construction Products; Acoustical Sealant GSC.
 - 30 c. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.
 - 31 d. USG Corporation; SHEETROCK Acoustical Sealant.

32 **PART 3 - EXECUTION**

33 **3.1 EXAMINATION**

- 34 A. Examine areas and substrates including welded hollow-metal frames and framing, with
35 Installer present, for compliance with requirements and other conditions affecting
36 performance.

1 B. Examine panels before installation. Reject panels that are wet, moisture damaged, and
2 mold damaged.

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

4 **3.2 APPLYING AND FINISHING PANELS, GENERAL**

5 A. Comply with ASTM C 840.

6 B. Install ceiling panels across framing to minimize the number of abutting end joints and to
7 avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of
8 adjacent panels not less than one framing member.

9 C. Install panels with face side out. Butt panels together for a light contact at edges and ends
10 with not more than 1/16 inch of open space between panels. Do not force into place.

11 D. Locate edge and end joints over supports, except in ceiling applications where
12 intermediate supports or gypsum board back-blocking is provided behind end joints. Do
13 not place tapered edges against cut edges or ends. Stagger vertical joints on opposite
14 sides of partitions. Do not make joints other than control joints at corners of framed
15 openings.

16 E. Form control and expansion joints with space between edges of adjoining gypsum panels.

17 F. Cover both faces of support framing with gypsum panels in concealed spaces (above
18 ceilings, etc.), except in chases braced internally.

19 1. Unless concealed application is indicated or required for sound, fire, air, or smoke
20 ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.

21 2. Fit gypsum panels around ducts, pipes, and conduits.

22 3. Where partitions intersect structural members projecting below underside of
23 floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural
24 members; allow 1/4- to 3/8-inch- wide joints to install sealant.

25 G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural
26 abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim
27 edges with edge trim where edges of panels are exposed. Seal joints between edges and
28 abutting structural surfaces with acoustical sealant.

29 H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is
30 attached to open (unsupported) edges of stud flanges first.

31 I. Install sound attenuation blankets before installing gypsum panels unless blankets are
32 readily installed after panels have been installed on one side.

33 **3.3 APPLYING INTERIOR GYPSUM BOARD**

34 A. Install interior gypsum board in the following locations:

35 1. Wallboard Type: As indicated on Drawings.

36 2. Type X: As indicated on Drawings.

- 1 3. Moisture- and Mold-Resistant Type: As indicated on Drawings. At all wet walls not
2 scheduled for wall tile.
- 3 B. Single-Layer Application:
- 4 1. On ceilings, apply gypsum panels before wall/partition board application to greatest
5 extent possible and at right angles to framing unless otherwise indicated.
- 6 2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless
7 otherwise indicated or required by fire-resistance-rated assembly, and minimize end
8 joints.
- 9 a. Stagger abutting end joints not less than one framing member in alternate
10 courses of panels.
- 11 b. At stairwells and other high walls, install panels horizontally unless otherwise
12 indicated or required by fire-resistance-rated assembly.
- 13 3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no
14 end joints. Locate edge joints over furring members.
- 15 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- 16

17 **3.4 INSTALLING TRIM ACCESSORIES**

- 18 A. General: For trim with back flanges intended for fasteners, attach to framing with same
19 fasteners used for panels. Otherwise, attach trim according to manufacturer's written
20 instructions.
- 21 B. Interior Trim: Install in the following locations:
- 22 1. Cornerbead: Use at outside corners unless otherwise indicated.
- 23 2. LC-Bead: Use at exposed panel edges.
- 24 3. L-Bead: Use where indicated.
- 25 4. U-Bead: Use at exposed panel edges.

26 **3.5 FINISHING GYPSUM BOARD**

- 27 A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations,
28 fastener heads, surface defects, and elsewhere as required to prepare gypsum board
29 surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- 30 B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- 31 C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as
32 not intended to receive tape.
- 33 D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to
34 ASTM C 840:
- 35 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
- 36 2. Level 4: At panel surfaces that will be exposed to view, including storage, electrical
37 and mechanical rooms, unless otherwise indicated.
- 38

- 1 **3.6 PROTECTION**
- 2 A. Protect adjacent surfaces from drywall compound and promptly remove from floors and
3 other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during
4 drywall application.
- 5 B. Protect installed products from damage from weather, condensation, direct sunlight,
6 construction, and other causes during remainder of the construction period.
- 7 C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
- 8 1. Indications that panels are wet or moisture damaged include, but are not limited to,
9 discoloration, sagging, or irregular shape.
- 10 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or
11 splotchy surface contamination and discoloration.

12 **END OF SECTION 09 2900**

1 **SECTION 09 6513 - RESILIENT BASE AND ACCESSORIES**

2 **PART 1 - GENERAL**

3 **1.1 RELATED DOCUMENTS**

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

6 **1.2 SUMMARY**

- 7 A. Section Includes:

- 8 1. Resilient base.
9 2. Resilient molding accessories.

10 **1.3 ACTION SUBMITTALS**

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

- 12 B. Samples: For each exposed product and for each color and texture specified, not less than
13 12 inches (300 mm) long.

14 **1.4 MAINTENANCE MATERIAL SUBMITTALS**

- 15 A. Furnish extra materials that match products installed and that are packaged with protective
16 covering for storage and identified with labels describing contents.

- 17 1. Furnish not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear
18 m) or fraction thereof, of each type, color, pattern, and size of resilient product
19 installed.

20 **1.5 DELIVERY, STORAGE, AND HANDLING**

- 21 A. Store resilient products and installation materials in dry spaces protected from the weather,
22 with ambient temperatures maintained within range recommended by manufacturer, but
23 not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

24 **1.6 FIELD CONDITIONS**

- 25 A. Maintain ambient temperatures within range recommended by manufacturer, but not less
26 than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive resilient
27 products during the following time periods:

- 28 1. 48 hours before installation.
29 2. During installation.
30 3. 48 hours after installation.

- 31 B. After installation and until Substantial Completion, maintain ambient temperatures within
32 range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than
33 95 deg F (35 deg C).

- 1 C. Install resilient products after other finishing operations, including painting, have been
2 completed.

3 **PART 2 - PRODUCTS**

4 **2.1 THERMOSET-RUBBER BASE**

- 5 A. Manufacturers: Subject to compliance with requirements, provide products indicated in the
6 Finish Legend in Drawings.

7 **2.2 RUBBER MOLDING ACCESSORY**

- 8 A. Manufacturers: Subject to compliance with requirements, provide products indicated in the
9 Finish Legend in Drawings.

10 B. Description: Rubber transition strips.

11 C. Profile and Dimensions: As indicated.

12 D. Locations: Provide rubber molding accessories in areas indicated.

13 E. Colors and Patterns: As indicated by manufacturer's designations and as selected by
14 Architect from full range of industry colors.
15

16 **PART 3 - EXECUTION**

17 **3.1 EXAMINATION**

- 18 A. Examine substrates, with Installer present, for compliance with requirements for maximum
19 moisture content and other conditions affecting performance of the Work.

20 1. Verify that finishes of substrates comply with tolerances and other requirements
21 specified in other Sections and that substrates are free of cracks, ridges,
22 depressions, scale, and foreign deposits that might interfere with adhesion of
23 resilient products.

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

25 1. Installation of resilient products indicates acceptance of surfaces and conditions.

26 **3.2 PREPARATION**

27 A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of
28 resilient products.

29 B. Concrete Substrates for Resilient Stair Accessories: Prepare horizontal surfaces according
30 to ASTM F 710.

31 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

- 1 2. Remove substrate coatings and other substances that are incompatible with
2 adhesives and that contain soap, wax, oil, or silicone, using mechanical methods
3 recommended by manufacturer. Do not use solvents.
- 4 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
5 Proceed with installation only after substrate alkalinity falls within range on pH scale
6 recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
- 7 4. Moisture Testing: Proceed with installation only after substrates pass testing
8 according to manufacturer's written recommendations, but not less stringent than the
9 following:
 - 10 a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed
11 with installation only after substrates have maximum moisture-vapor-emission
12 rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
 - 13 b. Perform relative humidity test using in situ probes according to ASTM F 2170.
14 Proceed with installation only after substrates have maximum 75 percent
15 relative humidity level.
- 16 C. Do not install resilient products until they are the same temperature as the space where
17 they are to be installed.
- 18 1. At least 48 hours in advance of installation, move resilient products and installation
19 materials into spaces where they will be installed.
- 20 D. Immediately before installation, sweep and vacuum clean substrates to be covered by
21 resilient products.

22 **3.3 RESILIENT BASE INSTALLATION**

- 23 A. Comply with manufacturer's written instructions for installing resilient base.
- 24 B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and
25 other permanent fixtures in rooms and areas where base is required.
- 26 C. Install resilient base in lengths as long as practical without gaps at seams and with tops of
27 adjacent pieces aligned.
- 28 D. Tightly adhere resilient base to substrate throughout length of each piece, with base in
29 continuous contact with horizontal and vertical substrates.
- 30 E. Do not stretch resilient base during installation.

31 **3.4 RESILIENT ACCESSORY INSTALLATION**

- 32 A. Comply with manufacturer's written instructions for installing resilient accessories.
- 33 B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates
34 throughout length of each piece. Install reducer strips at edges of floor covering that would
35 otherwise be exposed.

36 **3.5 CLEANING AND PROTECTION**

- 37 A. Comply with manufacturer's written instructions for cleaning and protecting resilient
38 products.

- 1 B. Perform the following operations immediately after completing resilient-product installation:
- 2 1. Remove adhesive and other blemishes from exposed surfaces.
- 3 C. Protect resilient products from mars, marks, indentations, and other damage from
- 4 construction operations and placement of equipment and fixtures during remainder of
- 5 construction period.
- 6 D. Cover resilient products subject to wear and foot traffic until Substantial Completion.
- 7
- 8 **END OF SECTION 09 6513**

1 **SECTION 09 6813 - TILE CARPETING**

2 **PART 1 - GENERAL**

3 **1.1 RELATED DOCUMENTS**

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

6 **1.2 SUMMARY**

- 7 A. Section includes modular carpet tile.
- 8 B. Related Requirements:
- 9 1. Section 024119 "Selective Demolition" for removing existing floor coverings.

10 **1.3 PREINSTALLATION MEETINGS**

- 11 A. Preinstallation Conference: Conduct conference at project site.
- 12 1. Review methods and procedures related to carpet tile installation including, but not
13 limited to, the following:
- 14 a. Review delivery, storage, and handling procedures.
- 15 b. Review ambient conditions and ventilation procedures.
- 16 Review subfloor preparation procedures.

17 **1.4 ACTION SUBMITTALS**

- 18 A. Product Data: For each type of product.
- 19 1. Include manufacturer's written data on physical characteristics, durability, and fade
20 resistance.
- 21 2. Include manufacturer's written installation recommendations for each type of
22 substrate.
- 23 B. Shop Drawings: For carpet tile installation, plans showing the following:
- 24 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations
25 where cutouts are required in carpet tiles.
- 26 2. Carpet tile type, color, and dye lot.
- 27 3. Type of subfloor.
- 28 4. Type of installation.
- 29 5. Pattern of installation.
- 30 6. Pattern type, location, and direction.
- 31 7. Pile direction.
- 32 8. Type, color, and location of insets and borders.
- 33 9. Type, color, and location of edge, transition, and other accessory strips.
- 34 10. Transition details to other flooring materials.

- 1 C. Samples: For each of the following products and for each color and texture required. Label
2 each Sample with manufacturer's name, material description, color, pattern, and
3 designation indicated on Drawings and in schedules.
- 4 1. Carpet Tile: Full-size Sample.
5 2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch long Samples.
- 6 D. Samples for Initial Selection: For each type of carpet tile.
- 7 1. Include Samples of exposed edge, transition, and other accessory stripping
8 involving color or finish selection.
- 9 E. Samples for Verification: For each of the following products and for each color and texture
10 required. Label each Sample with manufacturer's name, material description, color,
11 pattern, and designation indicated on Drawings and in schedules.
- 12 1. Carpet Tile: Full-size Sample.
13 2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch long Samples.
- 14 F. Product Schedule: For carpet tile. Use same designations indicated on Drawings.
- 15 G. Sustainable Product Certification: Provide ANSI/NSF 140 certification for carpet products.

16 **1.5 INFORMATIONAL SUBMITTALS**

- 17 A. Qualification Data: For Installer.
- 18 B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.
- 19 C. Sample Warranty: For special warranty.

20 **1.6 CLOSEOUT SUBMITTALS**

- 21 A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the
22 following:
- 23 1. Methods for maintaining carpet tile, including cleaning and stain-removal products
24 and procedures and manufacturer's recommended maintenance schedule.
25 2. Precautions for cleaning materials and methods that could be detrimental to carpet
26 tile.

27 **1.7 MAINTENANCE MATERIAL SUBMITTALS**

- 28 A. Furnish extra materials, from the same product run, that match products installed and that
29 are packaged with protective covering for storage and identified with labels describing
30 contents.
- 31 1. Carpet Tile: One box.

1 **1.8 QUALITY ASSURANCE**

2 A. Installer Qualifications: An experienced installer who is certified by the International
3 Certified Floorcovering Installers Association at the Commercial II certification level.

4 **1.9 DELIVERY, STORAGE, AND HANDLING**

5 A. Comply with CRI's "CRI Carpet Installation Standard."

6 **1.10 FIELD CONDITIONS**

7 A. Comply with CRI's "CRI Carpet Installation Standard" for temperature, humidity, and
8 ventilation limitations.

9 B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed
10 and weathertight, wet-work in spaces is complete and dry, and ambient temperature and
11 humidity conditions are maintained at levels planned for building occupants during the
12 remainder of the construction period.

13 C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry
14 to bond with adhesive and concrete slabs have pH range recommended by carpet tile
15 manufacturer.

16 D. Where demountable partitions or other items are indicated for installation on top of carpet
17 tiles, install carpet tiles before installing these items.

18 **1.11 WARRANTY**

19 A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of
20 carpet tile installation that fail in materials or workmanship within specified warranty period.

21 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic,
22 failure of substrate, vandalism, or abuse.

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

24 a. More than 10 percent edge raveling, snags, and runs.

25 b. Dimensional instability.

26 c. Excess static discharge.

27 d. Loss of tuft-bind strength.

28 e. Loss of face fiber.

29 f. Delamination.

30 3. Warranty Period: 10 years from date of Substantial Completion.

31 **PART 2 - PRODUCTS**

32 **2.1 CARPET TILE**

33 A. Products: Subject to compliance with requirements, provide products indicated in Finish
34 Legend on Drawings.

1 **2.2 INSTALLATION ACCESSORIES**

- 2 A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based
3 formulation provided or recommended by carpet tile manufacturer.
- 4 B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit
5 products and subfloor conditions indicated, that comply with flammability requirements for
6 installed carpet tile, and are recommended by carpet tile manufacturer for releasable
7 installation.
- 8 C. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown,
9 of height required to protect exposed edge of carpet, and of maximum lengths to minimize
10 running joints.

11 **PART 3 - EXECUTION**

12 **3.1 EXAMINATION**

- 13 A. Examine substrates, areas, and conditions, with Installer present, for compliance with
14 requirements for maximum moisture content, alkalinity range, installation tolerances, and
15 other conditions affecting carpet tile performance.
- 16 B. Examine carpet tile for type, color, pattern, and potential defects.
- 17 C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 033000
18 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale,
19 and foreign deposits.
- 20 1. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft.,
21 and perform no fewer than three tests in each installation area and with test areas
22 evenly spaced in installation areas.
- 23 a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation
24 only after substrates have maximum moisture-vapor-emission rate of 3 lb of
25 water/1000 sq. ft. in 24 hours.
- 26 b. Relative Humidity Test: Using in situ probes, ASTM F 2170. Proceed with
27 installation only after substrates have a maximum 80 percent relative humidity
28 level measurement.
- 29 c. Perform additional moisture tests recommended in writing by adhesive and
30 carpet tile manufacturers. Proceed with installation only after substrates pass
31 testing.
- 32 D. Wood Subfloors: Verify the following:
- 33 1. Underlayment over subfloor complies with requirements specified in Section 061600
34 "Sheathing."
- 35 2. Underlayment surface is free of irregularities and substances that may interfere with
36 adhesive bond or show through surface.
- 37 E. Metal Subfloors: Verify the following:

- 1 1. Underlayment surface is free of irregularities and substances that may interfere with
2 adhesive bond or show through surface.
- 3 F. Painted Subfloors: Perform bond test recommended in writing by adhesive manufacturer.
- 4 1. Access Flooring Systems: Verify the following:
5 2. Access floor substrate is compatible with carpet tile and adhesive if any.
6 3. Underlayment surface is flat, smooth, evenly planed, tightly jointed, and free of
7 irregularities, gaps greater than 1/8 inch, protrusions more than 1/32 inch, and
8 substances that may interfere with adhesive bond or show through surface.
- 9 G. Proceed with installation only after unsatisfactory conditions have been corrected.

10 **3.2 PREPARATION**

- 11 A. General: Comply with CRI's "Carpet Installation Standards" and with carpet tile
12 manufacturer's written installation instructions for preparing substrates indicated to receive
13 carpet tile.
- 14 B. Use trowelable leveling and patching compounds, according to manufacturer's written
15 instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level
16 cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch
17 unless more stringent requirements are required by manufacturer's written instructions.
- 18 C. Concrete Substrates: Remove coatings, including curing compounds, and other
19 substances that are incompatible with adhesives and that contain soap, wax, oil, or
20 silicone, without using solvents. Use mechanical methods recommended in writing by
21 adhesive and carpet tile manufacturers.
- 22 D. Metal Substrates: Clean grease, oil, soil and rust, and prime if recommended in writing by
23 adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand
24 aluminum surfaces, to remove metal oxides, immediately before applying adhesive.
- 25 E. Broom and vacuum clean substrates to be covered immediately before installing carpet
26 tile.

27 **3.3 INSTALLATION**

- 28 A. General: Comply with CRI's "CRI Carpet Installation Standard," Section 18, "Modular
29 Carpet" and with carpet tile manufacturer's written installation instructions.
- 30 B. Installation Method: As recommended in writing by carpet tile manufacturer.
- 31 C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- 32 D. Maintain pile-direction patterns recommended in writing by carpet tile manufacturer.
- 33 E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in
34 furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal
35 cut edges as recommended by carpet tile manufacturer.
- 36 F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions,
37 removable flanges, alcoves, and similar openings.

- 1 G. Maintain reference markers, holes, and openings that are in place or marked for future
2 cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining
3 marking device.
- 4 H. Install pattern per finish plan.
- 5 I. Access Flooring: Stagger joints of carpet tiles so carpet tile grid is offset from access
6 flooring panel grid. Do not fill seams of access flooring panels with carpet adhesive; keep
7 seams free of adhesive.

8 **3.4 CLEANING AND PROTECTION**

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

19 **END OF SECTION 09 6813**

1 **SECTION 09 9100 - PAINTING**

2 **PART 1 - GENERAL**

3 **1.1 RELATED DOCUMENTS**

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

6 **1.2 SUMMARY**

- 7 A. This Section includes surface preparation and field painting of exposed interior items and
8 surfaces.

- 9 1. Surface preparation, priming, and finish coats specified in this Section are in addition
10 to shop priming and surface treatment specified in other Sections.

- 11 2. Interior:

- 12 a. Gypsum Board: Paint the following gypsum board.

- 13 • All existing and new exposed gypsum board and as indicated on Drawings.
14 • Bulkheads/Soffits.

- 15
16
17 b. Galvanized metal and ferrous metal: Paint the following metal:

- 18 • New and existing door frames.
19 • All new miscellaneous steel exposed surfaces.
20

- 21 B. Paint exposed surfaces, except where these Specifications indicate that the surface or
22 material is not to be painted or is to remain natural. If an item or a surface is not
23 specifically mentioned, paint the item or surface the same as similar adjacent materials or
24 surfaces. If a color of finish is not indicated, Architect will select from standard colors and
25 finishes available.

- 26 1. Painting includes field painting of exposed bare and covered pipes and ducts,
27 hangers, exposed steel and iron supports, and surfaces of mechanical and electrical
28 equipment.

- 29 2. Paint electrical panel covers in corridors and all finished areas.

- 30 C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating
31 parts, and labels.

- 32 1. Prefinished items include the following factory-finished components:

- 33 a. Architectural woodwork.
34 b. Acoustical wall panels – unless stated otherwise.
35 c. Toilet enclosures.
36 d. Metal lockers.
37 e. Unit kitchens.

- 1 f. Finished mechanical and electrical equipment.
2 g. Light fixtures.
3 h. Prefinished masonry diffuser block units and diffuser brick.
- 4 2. Concealed surfaces include walls or ceilings in the following generally inaccessible
5 spaces:
- 6 a. Foundation spaces.
7 b. Furred areas.
8 c. Ceiling plenums.
9 d. Pipe spaces.
10 e. Duct shafts.
- 11 3. Finished metal surfaces include the following:
- 12 a. Anodized aluminum.
13 b. Stainless steel.
14 c. Chromium plate.
15 d. Copper and copper alloys.
16 e. Bronze and brass.
- 17 4. Operating parts include moving parts of operating equipment and the following:
- 18 a. Valve and damper operators.
19 b. Linkages.
20 c. Sensing devices
21 d. Motor and fan shafts.
- 22 5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment
23 name, identification, performance rating, or nomenclature plates.
- 24 D. Related Sections include the following:
- 25 1. Division 1 Section "Substitutions."
26 2. Division 9 Section "Gypsum Board" for surface preparation of gypsum board.

27 **1.3 DEFINITIONS**

- 28 A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
- 29 1. Flat refers to a lusterless or matte finish with a gloss range below 10 when
30 measured at an 60-degree meter
- 31 2. Eggshell refers to low-sheen finish with a gloss range between 5 and 20 when
32 measured at a 60-degree meter.
- 33 3. Satin – refer to low sheen finish with a gloss range between 15 and 35 when
34 measured at a 60 degree meter.
- 35 4. Semigloss refers to medium-sheen finish with a gloss range between 35 and 65
36 when measured at a 60-degree meter.
- 37 5. Full gloss refers to high-sheen finish with a gloss range more than 65 when
38 measured at a 60-degree meter.

1 **1.4 SUBMITTALS**

2 A. Product Data: For each paint system indicated. Include block fillers and primers.

3 1. Material List: An inclusive list of required coating materials. Indicate each material
4 and cross-reference specific coating, finish system, and application. Identify each
5 material by manufacturer's catalog number and general classification.

6 2. Manufacturer's Information: Manufacturer's technical information, including label
7 analysis and instructions for handling, storing, and applying each coating material.

8 B. Samples for Verification: For each color and material to be applied, with texture to
9 simulate actual conditions, on representative Samples of the actual substrate.

10 1. Provide (3) 4-by-6-inch paper samples for each color and finish.

11 2. Stained or Natural Wood: Provide (3) 4-by-8-inch samples of stained wood finish on
12 representative species of wood to be used.

13 C. Qualification Data: For Applicator.

14 D. Meeting notes from Pre-Construction Meeting.

15 **1.5 QUALITY ASSURANCE**

16 A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings
17 similar in material, design, and extent to those indicated for this Project, whose work has
18 resulted in applications with a record of successful in-service performance.

19 B. Source Limitations: Obtain block fillers and primers for each coating system from the same
20 manufacturer as the finish coats.

21 **1.6 DELIVERY, STORAGE, AND HANDLING**

22 A. Store materials not in use in tightly covered containers in a well-ventilated area at a
23 minimum ambient temperature of 45 deg F (7 deg C). Maintain storage containers in a
24 clean condition, free of foreign materials and residue.

25 1. Maintain containers in clean conditions, free of foreign materials and residue.

26 2. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and
27 waste daily. If necessary, add heating ventilation, fire protection and other
28 conditions for storage area on site.

29 **1.7 PROJECT CONDITIONS**

30 A. Apply waterborne paints only when temperatures of surfaces to be painted and
31 surrounding air are between 50 and 90 deg F (10 and 32 deg C).

32 B. Apply solvent-thinned paints only when temperatures of surfaces to be painted and
33 surrounding air are between 45 and 95 deg F (7 and 35 deg C).

34 C. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85
35 percent; or at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or
36 wet surfaces.

- 1 1. Painting may continue during inclement weather if surfaces and areas to be painted
2 are enclosed and heated within temperature limits specified by manufacturer during
3 application and drying periods.

4 **PART 2 - PRODUCTS**

5 **2.1 MANUFACTURERS**

6 A. Products: Subject to compliance with requirements, provide one of the products listed in
7 other Part 2 articles. Substitutions for alternative manufacturers or products will be
8 entertained in accordance with Specification Sections 00100 – Instructions to Bidders and
9 01630 – Substitutions and Product Options. Substitutions of any manufacturer or product
10 shall include written approval by the Architect.

11 B. Manufacturers' Names: Shortened versions (shown in parentheses) of the following
12 manufacturers' names are used in other Part 2 articles:

13 1. Sherwin-Williams Co. (Sherwin-Williams) **(Basis of Specification)**

14 a. Purdue University has developed a purchasing contract with Sherwin-
15 Williams. All projects, at all campuses, shall use Sherwin-Williams products.
16 All contractors bidding on work for Purdue University shall contact their local
17 Sherwin-Williams store to receive Purdue University negotiated pricing on
18 paint and related products. Identify all projects by Project Name and Project
19 Number when purchasing or receiving quotations for products.
20

21 **2.2 PAINT MATERIALS, GENERAL**

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

25 B. Material Quality: Provide manufacturer's best-quality paint material of the various coating
26 types specified that are factory formulated and recommended by manufacturer for
27 application indicated. Paint-material containers not displaying manufacturer's product
28 identification will not be acceptable.

29 C. All mil thickness indicated are for dry film thickness per coat of paint.

30 D. Colors: As required in Division 1 as indicated on the finish schedule if not scheduled. As
31 selected by Architect.

32 E. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and,
33 for interior paints and coatings applied at Project site, the following VOC limits, exclusive of
34 colorants added to a tint base, when calculated according to 40 CFR 59, subpart D (EPA
35 Method 24).

- 36 1. Flat Paints and Coatings: 50 g/L.
37 2. Nonflat Paints and Coatings: 150 g/L.
38 3. Dry-Fog Coatings: 400 g/L.
39 4. Primers, Sealers, and Undercoaters: 200 g/L.
40 5. Anticorrosive and Antirust Paints Applied to Ferrous Metals 250 g/L.
41 6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
42 7. Pretreatment Wash Primers: 420 g/L.

- 1 8. Floor Coatings: 100 g/L.
- 2 9. Shellacs, Clear: 730 g/L.
- 3 10. Shellacs, Pigmented: 550 g/LK.

4 **2.3 INTERIOR PRIMERS**

- 5 A. Interior Gypsum Board Primer: Provide the following finish or equal over interior gypsum
- 6 board.

- 7 1. SW – B28W02600 Pro Mar 200 Zero VOC Interior Latex Primer.

- 8 B. Galvanized and Ferrous Metals: Provide the following finish or equal over galvanized or
- 9 ferrous metals.

- 10 1. SW – B66W00001 DTM Acrylic Primer.

11 **2.4 INTERIOR INTERMEDIATE COATS**

- 12 A. Gypsum Board Wall: Provide the following finish or equal over interior gypsum board wall.

- 13 1. SW – K45W00151 Pro Industrial Pre Catalyzed Waterbased Epoxy, Eg-Shel.

- 14 B. Galvanized and Ferrous Metals: Provide the following finish or equal over galvanized or
- 15 ferrous metal.

- 16 1. SW – B66W00651 Pro Industrial High Performance Acrylic, Semi-Gloss.

17 **2.5 INTERIOR FINISH COATS**

- 18 A. Gypsum Board Wall: Provide the following finish or equal over interior gypsum board.

- 19 1. SW – K45W00151 Pro Industrial Pre Catalyzed Waterbased Epoxy, Eg-Shel.

- 20 B. Galvanized and Ferrous Metals Provide the following finish or equal over galvanized of
- 21 ferrous metals:

- 22 1. SW – B66W00651 Pro Industrial High Performance Acrylic, Semi-Gloss.

23 **PART 3 - EXECUTION**

24 **3.1 EXAMINATION**

- 25 A. Examine substrates, areas, and conditions, with Applicator present, for compliance with
- 26 requirements for paint application. Comply with procedures specified in PDCA P4.

- 27 1. Maximum moisture content of substrates when measured with an electronic
- 28 moisture meter as follows:

- 29 a. Concrete: 12 percent.
- 30 b. Masonry (Clay and CMU): 12 percent.
- 31 c. Wood: 15 percent.
- 32 d. Gypsum board: 12 percent.

- 1 e. Plaster: 12 percent.
- 2 2. Verify compatibility with and suitability of substrates, including compatibility with
3 existing finishes.
- 4 3. Begin finish application only after unsatisfactory conditions have been corrected and
5 surfaces are dry.
- 6 4. Begin application of finish system constitutes Contractor's acceptance of substrate
7 and conditions.
- 8 B. Coordination of Work: Review other Sections in which primers are provided to ensure
9 compatibility of the total system for various substrates. On request, furnish information on
10 characteristics of finish materials to ensure use of compatible primers.
- 11 1. Notify Architect about anticipated problems when using the materials specified over
12 substrates primed by others.

13 **3.2 PREPARATION**

- 14 A. Comply with manufacturer's written instructions and recommendations in "MPI
15 Architectural Painting Specification manual applicable to substrates indicated.
- 16 B. Remove plates, machined surfaces, and similar items already in place that are not to be
17 finished. If removal is impractical or impossible because of size or weight of item, provide
18 surface-applied protection before surface preparation and finishing.
- 19 1. After completing painting operations, reinstall items removed using workers skilled in
20 the trades involved. Remove surface-applied protection if any.
- 21 C. Surface Preparation: Clean and prepare surfaces to be painted according to
22 manufacturer's written instructions for each particular substrate condition and as specified.
- 23 1. Provide barrier coats over incompatible primers or remove and reprime.
- 24 2. Cementitious Materials: Prepare concrete, concrete unit masonry, cement plaster,
25 and mineral-fiber-reinforced cement panel surfaces to be painted. Remove
26 efflorescence, chalk, dust, dirt, grease, oils and release agents. Roughen as
27 required to remove glaze. If hardeners or sealers have been used to improve
28 curing, use mechanical methods or surface preparation.
- 29 a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
- 30 b. Determine alkalinity and moisture content of surfaces by performing
31 appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint
32 to blister and burn, correct this condition before application. Do not paint
33 surfaces if moisture content exceeds that permitted in manufacturer's written
34 instructions.
- 35 c. Clean concrete floors to be painted with a 5 percent solution of muriatic acid
36 or other etching cleaner. Flush the floor with clean water to remove acid,
37 neutralize with ammonia, rinse, allow to dry, and vacuum before painting.
- 38 D. Material Preparation: Mix and prepare paint materials according to manufacturer's written
39 instructions.
- 40 1. Maintain containers used in mixing and applying paint in a clean condition, free of
41 foreign materials and residue.

- 1 2. Stir material before application to produce a mixture of uniform density. Stir as
2 required during application. Do not stir surface film into material. If necessary,
3 remove surface film and strain material before using.
- 4 3. Use only thinners approved by paint manufacturer and only within recommended
5 limits.

- 6 E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when
7 multiple coats of same material are applied. Tint undercoats to match the color of the
8 finish coat, but provide sufficient differences in shade of undercoats to distinguish each
9 separate coat.

10 **3.3 APPLICATION**

- 11 A. General: Apply paint according to manufacturer's written instructions. Use applicators and
12 techniques best suited for substrate and type of material being applied.

13 1. Paint colors, surface treatments, and finishes are indicated in the paint schedules.
14 2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions
15 detrimental to formation of a durable paint film.
16 3. Provide finish coats that are compatible with primers used.
17 4. The term "exposed surfaces" includes areas visible when permanent or built-in
18 fixtures, grilles, convactor covers, covers for finned-tube radiation, and similar
19 components are in place. Extend coatings in these areas, as required, to maintain
20 system integrity and provide desired protection.
21 5. Paint surfaces behind movable equipment and furniture the same as similar
22 exposed surfaces. Before final installation of equipment, paint surfaces behind
23 permanently fixed equipment or furniture with prime coat only.
24 6. Paint interior surfaces of ducts with a flat, nonspecular white paint where visible
25 through registers or grilles.
26 7. Paint back sides of access panels and removable or hinged covers to match
27 exposed surfaces.
28 8. Finish interior of wall and base cabinets and similar field-finished casework to match
29 exterior.
30 9. Sand lightly between each succeeding enamel or varnish coat.

31 B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or
32 otherwise prepared for painting as soon as practicable after preparation and before
33 subsequent surface deterioration.

34 1. The number of coats and film thickness required are the same regardless of
35 application method. Do not apply succeeding coats until previous coat has cured as
36 recommended by manufacturer. If sanding is required to produce a smooth, even
37 surface according to manufacturer's written instructions, sand between applications.
38 2. If undercoats, stains, or other conditions show through final coat of paint, apply
39 additional coats until paint film is of uniform finish, color, and appearance. Give
40 special attention to ensure that edges, corners, crevices, welds, and exposed
41 fasteners receive a dry film thickness equivalent to that of flat surfaces.
42 3. Allow sufficient time between successive coats to permit proper drying. Do not
43 recoat surfaces until paint has dried to where it feels firm, and does not deform or
44 feel sticky under moderate thumb pressure, and until application of another coat of
45 paint does not cause undercoat to lift or lose adhesion.

46 C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other
47 applicators according to manufacturer's written instructions.

- 1 1. Brushes: Use brushes best suited for type of material applied. Use brush of
2 appropriate size for surface or item being painted.
- 3 2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as
4 recommended by manufacturer for material and texture required.
- 5 3. Spray Equipment: Use airless spray equipment with orifice size as recommended
6 by manufacturer for material and texture required.

- 7 D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's
8 recommended spreading rate to achieve dry film thickness indicated. Provide total dry film
9 thickness of the entire system as recommended by manufacturer.

- 10 E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to
11 items exposed in equipment rooms and occupied spaces.

- 12 F. Electrical items to be painted include, but are not limited to, the following:
 - 13 1. Panelboards in corridors
 - 14 2. Electrical equipment that is indicated to have a factory-primed finish for field
15 painting.

- 16 G. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete
17 coverage with pores filled.

- 18 H. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by
19 manufacturer, to material that is required to be painted or finished and that has not been
20 prime coated by others. Recoat primed and sealed surfaces where evidence of suction
21 spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through
22 or other defects due to insufficient sealing.

- 23 I. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a
24 smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness,
25 spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections
26 will not be acceptable.

- 27 J. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no
28 evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface
29 imperfections.

- 30 K. Completed Work: Match approved samples for color, texture, and coverage. Remove,
31 refinish, or repaint work not complying with requirements.

32 **3.4 FIELD QUALITY CONTROL**

- 33 A. Owner reserves the right to invoke the following test procedure at any time and as often as
34 Owner deems necessary during the period when paint is being applied:
 - 35 1. Owner may choose engage a qualified independent testing agency to sample paint
36 material being used. Samples of material delivered to Project will be taken,
37 identified, sealed, and certified in the presence of Contractor.
 - 38 2. Testing agency will perform appropriate tests for the following characteristics as
39 required by Owner:
 - 40 3. Owner may direct Contractor to stop painting if test results show material being used
41 does not comply with specified requirements. Contractor shall remove
42 noncomplying paint from Project site, pay for testing, and repaint surfaces previously

1 coated with the noncomplying paint. If necessary, Contractor may be required to
2 remove noncomplying paint from previously painted surfaces if, on repainting with
3 specified paint, the two coatings are incompatible.

4 **3.5 CLEANING**

5 A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other
6 discarded paint materials from Project site.

7 1. After completing painting, clean glass and paint-spattered surfaces. Remove
8 spattered paint by washing and scraping without scratching or damaging adjacent
9 finished surfaces.

10 **3.6 PROTECTION**

11 A. Protect work of other trades, whether being painted or not, against damage from painting.
12 Correct damage by cleaning, repairing or replacing, and repainting, as approved by
13 Architect.

14 B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting
15 operations, remove temporary protective wrappings provided by others to protect their
16 work.

17 1. After work of other trades is complete, touch up and restore damaged or defaced
18 painted surfaces. Comply with procedures specified in PDCA P1.

19 **END OF SECTION 09 9100**

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DIVISION 12

1 **SECTION 12 3200 - MANUFACTURED WOOD CASEWORK**

2
3
4 **PART 1 - GENERAL**

5 **1.1 RELATED DOCUMENTS**

- 6
7 A. Drawings and general provisions of the Contract, including General and Supplementary
8 Conditions and Division 01 Specification Sections, apply to this Section.
9

10 **1.2 SUMMARY**

- 11
12 A. Section Includes:

- 13
14 1. Plastic-laminate-faced wood cabinets of stock design.
15 2. Plastic-laminate and solid surface countertops installed with cabinets of stock
16 design.
17 3. Adjustable wall shelving and brackets.
18 4. Caulking of countertops.
19

- 20 B. Related Sections:

- 21
22 1. Division 06 Section "Miscellaneous Rough Carpentry" for wood blocking for
23 anchoring manufactured wood casework.
24 2. Division 09 Section "Non-Structural Metal Framing" for reinforcements in metal-
25 framed partitions for anchoring manufactured wood casework.
26 3. Division 09 Section "Resilient Base and Accessories" for resilient base applied to
27 manufactured wood casework.
28

29 **1.3 DEFINITIONS**

- 30
31 A. Exposed Portions of Cabinets: Surfaces visible when doors and drawers are closed,
32 including bottoms of cabinets more than 48 inches above floor, and surfaces visible in
33 open cabinets.
34

- 35 B. Semiexposed Portions of Cabinets: Surfaces behind opaque doors, such as interiors of
36 cabinets, shelves, dividers, interiors and sides of drawers, and interior faces of doors.
37 Tops of cases 78 inches or more above floor are defined as semiexposed.
38

- 39 C. Concealed Portions of Cabinets: Surfaces not usually visible after installation, including
40 sleepers, web frames, dust panels, and ends and backs that are placed directly against
41 walls or other cabinets.
42

- 43 D. Hardwood Plywood: A panel product composed of layers or plies of veneer, or of veneers
44 in combination with lumber core, hardboard core, MDF core, or particleboard core, joined
45 with adhesive, and faced both front and back with hardwood veneers.

46 **1.4 SUBMITTALS**

- 47
48 A. Product Data: For each type of product indicated. Include manufacturer's current catalog
49 of model numbers.
50

- 1 B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
2 Show fabrication details, including types and locations of hardware. Show installation
3 details, including field joints and filler panels. Indicate manufacturer's catalog numbers for
4 casework and **same plastic laminate designations used in Drawings. Shop Drawings**
5 **not complying with these requirements will be rejected.**
- 6 C. Samples for verification: Plastic laminate and solid surface materials.
- 7
- 8 D. Samples for Initial Selection: For PVC cabinet edge finishes submit chain set of full
9 offering of color samples.
- 10
- 11 E. Qualification Data: For qualified Installer.
- 12
- 13 F. Warranty: Sample of special warranty.

14 **1.5 QUALITY ASSURANCE**

- 15
- 16 A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody
17 by an FSC-accredited certification body.
- 18
- 19 B. Installer Qualifications: Manufacturer's authorized representative who is trained and
20 approved for installation of units required for this Project.
- 21
- 22 C. Source Limitations: Obtain manufactured wood casework from single source from single
23 manufacturer.
- 24
- 25 D. Quality Standard: Unless otherwise indicated, comply with requirements for modular
26 cabinets in AWI's "Architectural Woodwork Quality Standards."
- 27
- 28 E. Quality Standard: Unless otherwise indicated, comply with WI's "Manual of Millwork" for
29 Premium grade.
- 30
- 31 1. Product Designations: Drawings indicate manufactured wood casework
32 configurations by referencing WI design series numbering system as defined in WI's
33 "Manual of Millwork."
- 34
- 35 F. Product Designations: Drawings indicate sizes, configurations, and finish material of
36 manufactured wood casework by referencing designated manufacturer's catalog numbers.
37 Other manufacturers' casework of similar sizes and door and drawer configurations, of
38 same finish material, and complying with the Specifications may be considered. Refer to
39 Division 01 Section "Product Requirements."

40

41 **1.6 DELIVERY, STORAGE, AND HANDLING**

- 42
- 43 A. Deliver manufactured wood casework only after painting, utility roughing-in, and similar
44 operations that could damage, soil, or deteriorate casework have been completed in
45 installation areas. If casework must be stored in other than installation areas, store only in
46 areas where environmental conditions meet requirements specified in "Project Conditions"
47 Article.
- 48
- 49 B. Keep finished surfaces covered with polyethylene film or other protective covering during
50 handling and installation.
- 51

1 **1.7 PROJECT CONDITIONS**

- 2
- 3 A. Environmental Limitations: Do not deliver or install manufactured wood casework until
- 4 spaces are enclosed and weathertight, wet work in spaces is complete and dry, work
- 5 above ceilings is complete, and temporary HVAC system is operating and maintaining
- 6 ambient temperature and humidity conditions at occupancy levels during the remainder of
- 7 the construction period.
- 8
- 9 B. Field Measurements: Verify actual dimensions of construction contiguous with
- 10 manufactured wood casework by field measurements before fabrication.
- 11

12 **1.8 COORDINATION**

- 13
- 14 A. Coordinate layout and installation of framing and reinforcements in walls and partitions for
- 15 support of manufactured wood casework.
- 16

17 **1.9 WARRANTY**

- 18
- 19 A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or
- 20 replace components of manufactured wood casework that fail in materials or workmanship
- 21 for a period of three years.
- 22
- 23 1. Failures include, but are not limited to, the following:
- 24
- 25 a. Delamination of components or other failures of glue bond.
- 26 b. Warping of components.
- 27 c. Failure of operating hardware.
- 28 d. Deterioration of finishes.
- 29

30 **1.10 EXTRA MATERIALS**

- 31
- 32 A. Furnish complete touchup kit for each type and finish of manufactured wood casework
- 33 provided. Include scratch fillers, stains, finishes, and other materials necessary to perform
- 34 permanent repairs to damaged casework finish.
- 35
- 36 1. Deliver touch up kit to Owner.
- 37

38

39 **PART 2 - PRODUCTS**

40

41 **2.1 MANUFACTURERS**

- 42
- 43 A. Manufacturers: Subject to compliance with requirements, provide product indicated or
- 44 drawn on Drawings or comparable product by one of the following:
- 45 1. Plastic-Laminate-Faced Manufactured Casework:
- 46
- 47 a. LSI Casework.
- 48 b. Stevens Advantage.
- 49 c. TMI Systems Corporation.
- 50 d. Advanced Cabinet Systems.
- 51 e. Custom Casework that meets or exceed all specifications is acceptable.
- 52
- 53 2. Model numbers listed on drawings are basis of design products. Obtain casework from
- 54 single source and single manufacturer.

1 **2.2 CORE MATERIALS**

- 2
- 3 A. Cabinet components shall be industrial grade particleboard core 55 lb. materials meeting
- 4 ANSI A208.1 1993 standards as tested in accordance with ASTM D 1037-91A Standards.
- 5 B. Industrial grade particleboard core 55 lb. materials meeting ANSI A208.1 1973 shall be
- 6 used in all drawer components and as tested in accordance with ASTM D 1037-91A
- 7 standards.
- 8

9 **2.3 SURFACE MATERIALS**

- 10
- 11 A. Exposed exteriors shall be:
- 12

- 13 1. High pressure decorative plastic laminate, thermoset to core using catalyzed PVA
- 14 glue with a minimum average pressure of 90 PSI and average 180 degree F.
- 15 temperature. High pressure decorative plastic laminate shall meet NEMALD 3-1995,
- 16 VGS.028 specification standards.
- 17

- 18 B. Exposed doors and drawer fronts shall be:

- 19 1. High pressure decorative plastic laminate, thermoset to core using catalyzed PVA
- 20 glue with a minimum average pressure of 90 PSI and average 180 degree F.
- 21 temperature. High pressure decorative plastic laminate shall meet NEMALD 3-1995,
- 22 VGS.028 specification standards.
- 23

- 24 C. Unless otherwise noted, exposed interiors shall be permanently thermofused melamine
- 25 laminate, fused to core using a minimum average pressure of 320 PSI and average 320
- 26 degree F. temperature. Thermofused melamine laminate shall be tested against the high
- 27 pressure laminate NEMA LD 3-1995, VGS.028 specification standards (Warranted for life
- 28 against delamination).
- 29

- 30 D. Semi-exposed and concealed surfaces shall be prementally thermofused melamine
- 31 laminate or high pressure decorative plastic laminate cabinet liner, 0.020" thickness for
- 32 balanced construction. Thermofused melamine laminate shall be tested against the high
- 33 pressure laminate NEMA LD 3-1995, VGS0.28 specification standards
- 34

- 35 E. Exposed backs shall be:

- 36 1. High pressure decorative plastic laminate as indicated in Drawings, thermoset to
- 37 core using catalyzed PV glue with a minimum average pressure of 90 PSI and
- 38 average 180 degree F. temperature. High pressure decorative plastic laminate shall
- 39 meet NEMALD 3-1995, VGS.028 specification standards.

40 **2.4 EDGINGS**

- 41
- 42 A. Exposed exterior cabinet front edge shall be banded with a contrasting or matching Flat
- 43 Edge rigid 1 mm PVC extrusions resistant to chip, crack and high impact for additional
- 44 durability. Edging shall have a finish to match cabinet faces. Edgebanding shall be
- 45 applied with hot melt adhesive.

- 46 B. Door and drawer front edge shall be:
- 47

1 1. Edge with a contrasting or matching ridged PVC extrusion, 3MM (1/8") in thickness,
2 resistant to chip, crack and high impact for additional durability. Edging shall have a
3 satin finish. The 3MM thick edging shall be applied with hot melt adhesive and
4 shaped to provide radiused edges and radiused corners. Colors as selected from
5 manufacturers full range.

6 C. Adjustable shelves shall be banded with PVC extrusion, resistant to chip, crack and high
7 impact for additional durability. Edging shall have a satin finish. Edging shall be applied
8 with hot melt adhesive.

9 1. Flat Edge PVC edging shall be applied to four (4) edges of adjustable shelf.

10 D. All other interior components, including drawer, shall be banded with a Flat Edge PVC
11 extrusion, resistant to chip, crack and high impact for additional durability. Edging shall
12 have a satin finish. Edging to be machine applied with hot melt adhesive.

13

14 **2.5 COLOR SELECTIONS**

15

16 A. Exposed cabinet exteriors shall be:

17 1. High pressure decorative plastic laminate selections as indicated in Drawings.

18

19 B. Exposed doors and drawer fronts shall be:

20 1. High pressure decorative plastic laminate selections as indicated in Drawings.

21

22 C. Semi-exposed and concealed surfaces, including drawer box components, shall be
23 finished in either pearl or grey or frosty white, as selected from casework manufacturer's
24 standard interior color selections.

25

26 D. Exposed interior components, including both faces of shelves and interior face of backs:

27 1. To be pearl or grey or frosty white unless noted otherwise in Drawings.

28 E. Door and drawer front edge shall be:

29 1. 3MM thick PVC in contrasting or matching colors as selected by Architect.

30 F. Exposed front edge of cabinets, including exposed interior edges in Flat Edge PVC in
31 contrasting or matching colors as described in manufacturer's color guide, or commercial
32 match to selected exposed exterior color, based on availability.

33 G. Semi-exposed edges of cabinet components, including drawers, shall be either pearl or
34 grey or frosty white Flat Edge PVC.

35 H. Five knuckle hinges shall be available with brushed chrome finish.

36 I. Solid metal bent wire pulls shall be available in brushed chrome.

37

38

39

- 1 **2.6 HARDWARE**
2
3 A. Hinges shall be:
- 4 1. Heavy duty five knuckle style, with interlaying leaves capable of 270 degree swing.
5 Hinge shall be constructed of 0.090" minimum thickness steel with brushed chrome
6 epoxy finish, with non-removable pin. Doors less than 48" in height shall have two
7 (2) hinges per door. Doors exceeding 48" in height shall have three (3) hinges per
8 door.
9
- 10 B. Door Catches: Heavy duty spring loaded nylon roller catch. Catches must be compatible
11 or adjustable to meet ADA compliance of 5 lbs. pull. Each door shall have a single catch
12 mounted at the top. Doors over 48" high shall have a catch at both the top and bottom of
13 the door.
14
- 15 C. Pulls shall be:
- 16 1. Impact resistant injection molded bent wire, 4" length, available per color selection in
17 article 2.04.1.
18
- 19 D. Drawers and slide out shelves shall be suspended with bottom mount, side and bottom
20 attached nylon roller epoxy coated steel slides to ensure quiet, smooth operation, Lateral
21 stability is achieved through a special formed captive profile. Slides shall have 100 lb. load
22 rating, with both in and out drawer stop, 3" self-close feature and a side adjustable cam
23 allowing 3MM side to side alignment.
24
- 25 1. Provide full extension glides where noted in Drawings.
26
- 27 E. Drawers specially noted for file shall be full extension and file shall be suspended with
28 bottom mount, side and bottom attached nylon roller epoxy coated steel slides to ensure
29 quiet, smooth operation. Lateral stability is achieved through a special formed captive
30 profile. Slides shall have 150 lb. load, rating, with both in and out drawer stop, and 3" self-
31 close feature. File drawer shall include extruded top mounted molded side rails to accept
32 standard hanging file folders.
33
- 34 F. Shelf support clips shall be injection molded clear polycarbonate. Support clips shall
35 incorporate integral molded lock tabs to retain shelf from tipping or inadvertently being
36 lifted out. Support clip shall have 5MM diameter double pin engagement into precision
37 bored hole pattern in cabinet vertical members. Clips shall have a molded ridge which
38 provides pressure against edge of shelving to maintain positive pin engagement. Clip shall
39 be designed in such a manner to provide means for permanent attachment to shelf. Static
40 test load must exceed 200 lb. per clip.
41
- 42 G. Locks shall be cylinder type cast with 5 disc tumbler mechanism. Each lock shall be
43 provided with milled brass key and keying as specified below. Locks shall be provided as
44 shown in casework elevations in Drawings. Provide keys to Owner.
- 45 1. The locks shall be provided by the casework manufacturer and shall be their top of
46 the line.
47 2. Each cabinet in each area or room shall be keyed alike, each area or room shall be
48 keyed differently and with 4 master key for casework locks.
49

1 **2.7 COMPONENT DETAILS**

2 A. Adjustable Shelves: Shelves shall be 1" thick with leading edge of PVC. All shelves shall
3 be of #47 density particleboard core with surfaces as described in this section.

4 1. Adjustable mailbox shelves: 3/4" thick.

5 B. Number of adjustable shelves provided, unless indicated otherwise in the Drawings.

6 1. Base and Tall Cabinets:

- 7 a. 4 up to 72"
8 b. 1 up to 36"
9 c. 5 up to 84"
10 c. 3 up to 60"

11 2. Wall Hung Cabinets:

- 12 a. 2 up to 24"
13 b. 2 up to 30" and 36"
14 c. 3 up to 40"

15 C. Doors

16 1. Solid hinged doors shall be 3/4" thick material of balanced construction with surfaces
17 as described in this section. Doors 48" and less in length shall have two (2) hinges
18 per door. Doors over 48" in length shall have three (3) hinges per door.

19 D. Ends:

20 1. Cabinet ends shall be 3/4" thick panels of balanced construction. Exposed ends
21 shall be surfaced in accordance with "Exterior Surfaces," this section. Unexposed
22 ends shall be surfaced with plastic laminate material to provide stable and balanced
23 panels.

24 E. Bottoms and Tops:

- 25 1. Base and tall cabinet bottoms and tops shall be 3/4" thick panels splined doweled of
26 balanced construction.
27 2. Wall cabinet bottoms and tops shall be full 1" thick panels of spline doweled of
28 balanced construction.

29 F. Backs:

- 30 1. Fixed cabinets, in applications where the back is unexposed, shall have 3/8" thick
31 back panels, with mounting rail concealed behind back. Back panels shall be set
32 3/4" from rear edge of cabinet to allow for hang rails glued to back side and
33 mechanically fastened to end panels and scribing to walls. Interior back shall be
34 surfaced as specified in "Interior Surfaces," this section, with unexposed back
35 surfaced to provide a balanced panel.
36 2. Exposed backs of fixed cabinets shall be 3/4" thick panels of balanced construction,
37 grooved to receive bottom and top panels, doweled to cabinet ends. Angle clips
38 shall be used inside cabinets.

- 1 G. Toe Kicks shall be 3/4" thick material and 4" high separate, water resistant exterior grade
2 plywood, no cabinet body components shall extend directly to floor, and set back 3" from
3 front edge of cabinet.
4
5 1. Toe kick shall be mechanically fastened to the cabinet bottom and ends, to become
6 an integral part of the cabinet structure.
- 7 H. Drawers:
- 8 1. Fronts, 3/4" thick industrial grade 55 lb. particle board with high pressure plastic
9 laminate on exposed faces. Unexposed faces shall be laminated with thermofused
10 resin.
- 11 2. Body, 1/2" thick Formica Pearl #934 colored hardboard for sides and back.
12
13 a. Corner joints shall be dadoed to receive front and back, glued and pinned
14 together.
15
16 3. Bottom, 1/4" thick Formica Pearl #934 colored polyester laminated hardboard
17

18 2.8 CONSTRUCTION

- 19
20 A. Cabinet parts shall be accurately machined and bored for premium grade quality joinery
21 construction utilizing automatic machinery to ensure consistent sizing of modular
22 components. Interior tops, interior bottoms and internal cabinet components, such as fixed
23 horizontals and rails, shall be joined using 8MM diameter industrial grade hardwood
24 dowels. These parts are glued and clamped under pressure during assembly to secure
25 joints and ensure cabinet squareness.
26
27 B. Cabinet ends shall be bored to receive 8MM industrial grade hardwood, laterally fluted
28 dowels, with chamfered ends. Cabinet ends shall be prepared to receive adjustable shelf
29 hardware at 32MM (approximately 1 1/4") centers. Door hinges and drawer slides shall be
30 machine drilled to maintain vertical and horizontal alignment of components. Inset grooving
31 with chamfer shall be machined 3/4" from edge to accept the 1/4" back. Base and tall units
32 shall have one-piece end panels continuous to floor for added load capabilities.
- 33 C. Tops and bottoms shall be joined to cabinet ends using a minimum of six (6) dowels at
34 each joint for twenty-four (24) inch deep cabinets and a minimum of four (4) dowels at each
35 joint for twelve (12) inch deep cabinets. All dowels to be industrial grade hardwood,
36 laterally fluted, with chamfered ends and 8MM in diameter. Top of base cabinets will be full
37 depth. Inset grooving with chamfer shall be machined 3/4" from rear edge to accept the
38 1/4" back.
- 39 D. Vertical dividers shall be bored to receive adjustable shelf hardware at 32MM
40 (approximately 1 1/4") centers. Dividers shall be joined to tops and bottoms with 8MM
41 diameter hardwood dowels.
- 42 E. Frame rails shall be joined to ends with 8MM diameter hardwood dowels.
- 43 F. Mounting rails shall be fully concealed behind backs. Rails shall be 3/4" thick and fastened
44 to cabinet ends with 8MM hardwood dowels. Wall and tall cabinets shall incorporate two
45 mounting rails. Wall cabinets shall have rails positioned at top and bottom. Tall cabinets
46 shall have rails positioned at top and intermediate locations. Base units shall have one rail
47 positioned in the upper back area

- 1 G. Back shall be glued and continuously trapped in top, bottom and ends of cabinets.
- 2 H. Drawer corner joints shall be interlocking dowel pin design. Hardwood dowel pins 8MM
3 diameter shall be inserted into drawer fronts and backs to fit into machined hole patterns in
4 drawer sides. Bottoms shall be trapped into grooves on all four sides, glued and
5 mechanically fastened. Drawers shall be suspended on slides as described in article
6 2.05.E

7 **2.9 WORK SURFACES**

- 8 A. Plastic Laminate Countertops shall be surfaces with general purpose horizontal grade
9 laminate meeting requirements NEMA standard LD3-1991. Cores of 46# density particle
10 board. All exposed edges to be covered with same laminate as top surface. Overall top
11 shall be uniform thickness to be 1-1/4" thick minimum.

- 12 1. Tops shall contain a full radius (bullnose) leading edge and integrally covered
13 backsplash.

- 14 B. Back and end splashes shall be surfaces with same laminate as top. Core shall be #47
15 density particle board providing 3/4" finished risers. Backsplashes shall be 4" unless
16 indicated otherwise.

- 17 1. Fixed cabinet bases when installed in a run of cabinets shall have a continuous top.
18 Continuous tops when requiring splice joints shall be jointed with a combination of
19 splines or dowels for alignment and tight-joint fasteners as required to make a uniform
20 and gapless joint.

- 21 C. Solid-Surfacing-Material Countertops

- 22 1. Solid-Surfacing-Material Thickness: 1/2 inch (13 mm).
23 2. Colors, Patterns, and Finishes: Provide materials and products that result in colors
24 of solid-surfacing material complying with the following requirements:

- 25 a. See Finish Legend in Drawings.

- 26
27
28 3. Fabricate tops in one piece, unless otherwise indicated. Comply with solid-
29 surfacing-material manufacturer's written recommendations for adhesives, sealers,
30 fabrication, and finishing.

- 31 a. Fabricate tops with integral backsplash and loose side-splash for field
32 application.

- 33
34 4. Drill holes in countertops for plumbing fittings and fixtures.

35 **2.10 WALL SHELVING, BRACKETS AND STANDARDS**

- 36 A. Plastic Laminate Faced Shelving: Shop bonded to both sides of particleboard. Sand
37 surfaces to which plastic laminate is to be bonded.

- 38 1. Shelf Thickness: 3/4 inch.
39 2. Edge Treatment: 1 mm PVC on all 4 sides to match top and bottom face.

- 40 B. Adjustable Shelf Supports: Heavy duty grade zinc-plated steel standards and shelf
41 brackets.

- 1 C. Provide in depths and lengths indicated in Drawings.

2
3 **PART 3 - EXECUTION**

4
5 **3.1 CASEWORK INSTALLATION**

- 6 A. Fabricate casework to dimensions, profiles, and details indicated on drawings.
- 7
8
9 1. Cut openings in countertops for sinks, unless as indicated on plumbing drawings, or
10 other items required. Cut to size from template furnished by supplier of items.
11
- 12 B. Assemble units in shop in as large components as practicable to minimize field cutting and
13 jointing.
14
- 15 C. Protect casework during transit, delivery, storage and handling to prevent damage, soiling
16 and deterioration.
17
- 18 D. Deliver casework, when painting, wet work, grinding and similar operations which could
19 damage, soil or deteriorate casework have been completed. If casework must be stored,
20 store only in areas meeting requirements specified for installation areas.
21
- 22 E. Installation: Installer shall be experienced in this type of work and capable of the highest
23 quality of workmanship. Field applied laminate fascias shall not be permitted unless
24 approved by Owner/Architect.
25
- 26 F. Conditioning: Install casework when required temperature and relative humidity have
27 been stabilized and will be maintained in installation areas.
28
- 29 G. Install plumb, level, true and straight with no distortions. Shim as required using
30 concealed shims. Where casework abuts other finished work, scribe and cut for accurate
31 fit. Before making cutouts, drill pilot holes at corners.
32
- 33 H. Anchor casework securely in place with concealed (when doors and drawers are closed)
34 fasteners, anchored into structural support members of wall construction. Comply with
35 manufacturer's instructions for support of units.
36
- 37 I. Attach countertops securely to base units. Spline and glue joints in countertops; provide
38 concealed mechanical clamping of joint. Provide cutouts for fixtures and appliances as
39 indicated; smooth cut edges and coat with waterproof coating or adhesive.
- 40 J. Caulking of tops backsplashes and sidesplashes to be by installer of casework. Care
41 should be taken to remove excess caulk from adjoining surfaces and shall be of approved
42 color.
43
- 44 K. Complete hardware installation and adjust doors and drawers for proper operation.
- 45
46 1. End cabinets placed against corners where they tee into other cabinets or obstacles
47 shall be provided with chain or bracket stops on the inside of the doors to prevent
48 the door or door handles from hitting the obstruction.
- 49 L. Repair or remove and replace defective work as directed upon completion of installation.
- 50
51 M. Adjust all door catches, drawer slides, etc. after installation to provide proper operation.
52

1 N. Clean exposed and semi-exposed surface, touch-up as required and remove and refinish
2 damaged or soiled areas.

3 O. Protection: Protect and maintain conditions necessary to ensure that work will be without
4 damage or deterioration at time of acceptance.

5

6 **3.2 CLEANING AND PROTECTING**

7

8 A. Repair or remove and replace defective work as directed on completion of installation.

9

10 B. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled
11 areas to match original factory finish, as approved by Architect.

12

13 C. Protection: Provide 6-mil plastic or other suitable water-resistant covering over countertop
14 surfaces. Tape to underside of countertop at a minimum of 48 inches o.c. Remove
15 protection at Substantial Completion.

16 **END OF SECTION 12 3200**

17

1
2

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1 **SECTION 12 3661 – SOLID SURFACE COUNTERTOPS**

2 **PART 1 - GENERAL**

3 **1.1 RELATED DOCUMENTS**

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

6 **1.2 SUMMARY**

- 7 A. Section includes:

- 8 1. Solid-surface-material countertops.
9 2. Supports installed with solid surfacing countertops.
10 3. Grommets and wire management installed with simulated stone and solid surfacing
11 countertops.

- 12 B. Related Sections:

- 13 1. Division 6 “Miscellaneous Rough Carpentry”.

14 **1.3 SUBMITTALS**

- 15 A. Product Data: Manufacturer’s specifications and literature to evidence compliance with
16 these specifications.

- 17 B. Shop Drawings: Show dimensioned plans and elevations, large-scale details, attachment
18 devices, and other components. Show locations and sizes of cutouts and holes for
19 plumbing fixtures, accessories and other items installed in countertops.

- 20 C. Samples for Verification: For solid-surfacing material, 3 inches square, showing color and
21 pattern selected labeled with Architect’s designations.

22 **1.4 QUALITY ASSURANCE**

- 23 A. Installer Qualifications: An experienced installer who has completed countertops similar in
24 material, design, and extent to that indicated for this Project and whose work has resulted
25 in construction with a record of successful in-service performance.

- 26 B. Fabricator Qualifications: A firm experienced in producing countertops similar to that
27 indicated for this Project and with a successful in-service performance, as well as sufficient
28 production capacity to produce required units.

- 29 C. Fire-Test-Response Characteristics: Provide materials and products with specified fire-
30 test-response characteristics as determined by testing identical products per test method
31 indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities
32 having jurisdiction.
33

1 **1.5 PROJECT CONDITIONS**

2 A. Environmental Limitations: Do not deliver or install countertops until building is enclosed,
3 wet work is complete, and HVAC system is operating and maintaining temperature and
4 relative humidity at occupancy levels during the remainder of the construction period.

5 B. Field Measurements: Where countertops are indicated to fit to other construction, verify
6 dimensions of other construction by field measurements before fabrication and indicate
7 measurements on Shop Drawings. Coordinate fabrication schedule with construction
8 progress to avoid delaying the Work.

9 1. Established Dimensions: Where field measurements cannot be made without
10 delaying the Work, establish dimensions and proceed with fabrication without field
11 measurements. Provide allowance for trimming at site, and coordinate construction
12 to ensure that actual dimensions correspond to established dimensions.

13 **1.6 WARRANTY**

14 A. Special Warranty: Submit written warranty on labor and material executed by
15 manufacturer, covering failure of solid surfacing countertops within warranty period. This
16 warranty shall be in addition to, and not limitation of, other rights Owner may have against
17 Contractor under Contract Documents.

18 1. Warranty period for solid surfacing countertops is 10 years after date of Substantial
19 Completion.

20 **PART 2 - PRODUCTS**

21 **2.1 MATERIALS**

22 A. Solid-Surfacing Material: Homogenous solid sheets of filled plastic resin complying with
23 material and performance requirements in ANSI Z124.3, for Type 5 or Type 6, without a
24 precoated finish.

25 1. Thickness: 1/2 inch unless otherwise indicated.

26 2. Fire hazard classification: ASMT E 84, Class 1.

27 a. Flame Spread Index: 25.

28 b. Smoke Developed: 30.

29 3. Color and pattern: As indicated in Finish Legend in Drawings.

30 B. Accessories: Provide joint adhesives and other items required for a complete installation.

31 C. Sealant: Mildew resistant silicone sealant specified in Division 07 Section "Joint Sealants."

32 **2.2 ACCESSORIES**

33 A. Pop-Up Power Grommets in Countertops.

- 1 1. Product: Subject to compliance with requirements, provide small pop-up power
2 grommet (2 Power) PCS36A/EE by Doug Mockett & Company, Inc. or approved
3 equal.
- 4 2. Color: Satin Aluminum.
- 5 B. Steel “L-Shaped” support brackets: Sized and spaced to support 200 lb. without deflection.
- 6 1. Product: RAKKS, size as required or approved equal.

7 **2.3 FABRICATION**

- 8 A. Accurately cut holes and drill countertop panels to receive plumbing, fixtures, soap
9 dispensers and other accessories. Obtain field measurements prior to fabrication and
10 maintain minimum clearance at walls.
- 11 B. Fabricate tops and sills in one piece with shop-applied backsplashes and edges where
12 unless applicable otherwise indicated. Comply with solid-surfacing-material manufacturer’s
13 written recommendations for adhesives, sealers, fabrication, and finishing.

14 **PART 3 - EXECUTION**

15 **3.1 EXAMINATION**

- 16 A. Examine substrate surfaces to receive solid surfacing countertops and associated work
17 and conditions under which work will be installed. **Do not proceed with work until**
18 **unsatisfactory conditions have been reported to Architect in writing and corrected in**
19 **a manner acceptable to installer.** Starting work within a particular area will be construed
20 as installer’s acceptance of surface conditions.

21 **3.2 PREPARATION**

- 22 A. Prepare substrate surfaces to insure adequate installation, in accordance with the Contract
23 Documents and approved Shop Drawings, or manufacturer’s requirements.
- 24 B. Protect adjacent areas or surfaces from damage as a result of the work of this Section.

25 **3.3 INSTALLATION**

- 26 A. Install in accordance with manufacturer’s latest published requirements, specifications,
27 details and approved Shop Drawings.
 - 28 1. Align adjacent solid-surfacing-material countertops and form seams to comply with
29 manufacturer’s written recommendations using adhesive in color to match
30 countertop.
 - 31 2. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
 - 32 3. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation
33 from a straight line.
 - 34 4. Seal edges of cutouts in particleboard subtops by saturating with varnish.
 - 35 5. Caulk space between countertop and wall with sealant specified in Division 07
36 Section “Joint Sealants.”

1 B. Attachment: Secure countertop to sub framing supports with silicone adhesive in
2 accordance with manufacturer's recommendations.

3 C. Solid Surfacing Joints: Prepare ends and edges of pieces to be joined according to the
4 manufacturer's recommendations for position and angle of butted joint. Lightly sand and
5 thoroughly clean to remove dirt and grease. Join pieces with adhesive clamped until fully
6 cured. Buff and sand to produce a smooth uniform seamless surface.

7 D. Joints to Other Substrates: Apply sealant and compress to form bond with surfaces and
8 tool sealant surface to clean, straight lines.

9 **3.4 ADJUSTING AND CLEANING**

10 A. Repair damaged and defective surfaces, where possible, to eliminate functional and visual
11 defects; where not possible to repair, replace material.

12 B. Clean solid surface material on exposed and semi-exposed surfaces. Touch up shop-
13 applied finishes to restore damaged or soiled areas.

14 **END OF SECTION 12 3661**

DIVISION 21

Section 21 1313 - Wet-Pipe Sprinkler Systems

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Pipes, fittings, and specialties.
 - 2. Sprinklers.

1.02 DEFINITIONS

- A. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175-psig maximum.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For wet-pipe sprinkler systems.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Include diagrams for power, signal, and control wiring.
- C. Delegated-Design Submittal: For wet-pipe 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.

1.04 INFORMATIONAL SUBMITTALS

- A. 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. Compressed air piping.
 - 3. HVAC hydronic piping.
 - 4. Items penetrating finished ceiling include the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
- B. Qualification Data: For qualified Installer and professional engineer.
- C. Design Data:
 - 1. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.
- D. Welding certificates.

- E. Field Test Reports:
 - 1. 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."
 - 2. Fire-hydrant flow test report.
 - F. Field quality-control reports.
- 1.05 CLOSEOUT SUBMITTALS
- A. Operation and Maintenance Data: For wet-pipe sprinkler systems and specialties to include in emergency, operation, and maintenance manuals.
- 1.06 MAINTENANCE MATERIAL SUBMITTALS
- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. 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.
- 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. Welding Qualifications: Qualify procedures and operators according to 2010 ASME Boiler and Pressure Vessel Code.
- 1.08 FIELD CONDITIONS
- A. Interruption of Existing Sprinkler Service: Do not interrupt sprinkler service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sprinkler service according to requirements indicated:
 - 1. Notify Owner no fewer than two days in advance of proposed interruption of sprinkler service.
 - 2. Do not proceed with interruption of sprinkler service without Owner's written permission.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:
 - 1. NFPA 13.
- B. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.
- C. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 4000 "Quality Requirements," to design wet-pipe sprinkler systems.
 - 1. Sprinkler system design shall be approved by authorities having jurisdiction.
 - a. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.
 - 2. Maximum Protection Area per Sprinkler: According to UL listing.
- D. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.

2.02 STEEL PIPE AND FITTINGS

- A. Standard-Weight, Black-Steel Pipe: ASTM A 53/A 53M, Type E, Grade B. Pipe ends may be factory or field formed to match joining method.
- B. Schedule 10, Black-Steel Pipe: ASTM A 135/A 135M or ASTM A 795/A 795M, Schedule 10 in NPS 5 and smaller; and NFPA 13-specified wall thickness in NPS 6 to NPS 10, plain end.
- C. Malleable- or Ductile-Iron Unions: UL 860.
- D. Cast-Iron Flanges: ASME 16.1, Class 125.
- E. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.
 - 1. Pipe-Flange Gasket Materials: EPDM rubber gasket.
 - a. Class 125 and Class 250, Cast-Iron, Flat-Face Flanges: Full-face gaskets.
 - b. Class 150 and Class 300, Ductile-Iron or -Steel, Raised-Face Flanges: Ring-type gaskets.
 - 2. Metal, Pipe-Flange Bolts and Nuts: Carbon steel unless otherwise indicated.
- F. Grooved-Joint, Steel-Pipe Appurtenances:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anvil International.
 - b. Tyco Fire Products LP.
 - c. Victaulic Company.
 - 2. Pressure Rating: 175-psig minimum.

3. Painted Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting, with dimensions matching steel pipe.
4. 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 SPRINKLER PIPING SPECIALTIES

A. Branch Outlet Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anvil International.
 - b. Tyco Fire Products LP.
 - c. Victaulic Company.
2. Standard: UL 213.
3. Pressure Rating: 175-psig minimum.
4. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
5. Type: Mechanical-tee and -cross fittings.
6. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
7. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
8. Branch Outlets: Grooved, plain-end pipe, or threaded.

B. Flexible Sprinkler Hose Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. FlexHead Industries, Inc.
2. Standard: UL 1474 and FM 1637.
3. Type: Flexible 304 stainless-steel hose for connection to sprinkler, and with 6-inch wide bracket for connection to ceiling grid using snap-on clips and tamper resistant screws.
4. Pressure Rating: 175-psig minimum.
5. Size: Same as connected piping, for sprinkler.

2.04 SPRINKLERS

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

1. Globe Fire Sprinkler Corporation.
2. Reliable Automatic Sprinkler Co., Inc. (The).
3. Tyco Fire Products LP.
4. Victaulic Company.
5. Viking Corporation.

B. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."

C. Pressure Rating for Automatic Sprinklers: 175-psig minimum.

- D. Automatic Sprinklers with Heat-Responsive Element:
 - 1. Nonresidential Applications: UL 199.
 - 2. 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.
- E. Sprinkler Finishes: Painted white.
- F. 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: Painted white steel, two piece, semi-recessed with 1-inch vertical adjustment.

PART 3 - EXECUTION

3.01 PIPING INSTALLATION

- A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated on approved working plans.
 - 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.
 - 2. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.
- B. Piping Standard: Comply with NFPA 13 requirements for installation of sprinkler piping.
- C. Install seismic restraints on piping. Comply with NFPA 13 requirements for seismic-restraint device materials and installation.
- 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 sprinkler piping with drains for complete system drainage.
- H. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13. In seismic-rated areas, refer to Section 21 0548 "Vibration and Seismic Controls for Fire-Suppression Piping and Equipment."
- I. Fill sprinkler system piping with water.

- J. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 21 0517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."
- K. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 21 0517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."
- L. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 21 0518 "Escutcheons for Fire-Suppression Piping."

3.02 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. 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.
- G. Steel-Piping, Pressure-Sealed Joints: Join lightwall steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.
- H. 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.
- I. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.03 SPRINKLER INSTALLATION

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

- B. Install sprinklers into flexible, sprinkler hose fittings, and install hose into bracket on ceiling grid and anchor with screws that use tamper resistant heads.

3.04 IDENTIFICATION

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

3.05 FIELD QUALITY CONTROL

- A. Perform the following 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.
 6. Coordinate with fire-pump tests. Operate as required.
 7. Verify that equipment hose threads are same as local fire department equipment.
- B. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.06 CLEANING

- A. Clean dirt and debris from sprinklers.
- B. Only sprinklers with their original factory finish are acceptable. Remove and replace any sprinklers that are painted or have any other finish than their original factory finish.

3.07 PIPING SCHEDULE

- A. Piping between Fire Department Connections and Check Valves: Galvanized, standard-weight steel pipe with threaded ends, cast-iron threaded fittings, and threaded joints.
- B. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.
- C. Standard-pressure, wet-pipe sprinkler system, NPS 2 and smaller, shall be the following:
 1. Standard-weight, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
 2. Standard-weight, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.

- D. Standard-pressure, wet-pipe sprinkler system, NPS 2-1/2 to NPS 8, shall be one of the following:
1. Standard-weight, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
 2. Standard-weight, black-steel pipe with cut-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 3. Schedule 10 or hybrid black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

3.08 SPRINKLER SCHEDULE

- A. Use sprinkler types in subparagraphs below for the following applications:
1. Rooms with Suspended Ceilings: Semi-Recessed sprinklers.
- B. Provide sprinkler types in subparagraphs below with finishes indicated.
1. Recessed Sprinklers: Painted white, with painted white escutcheon.

END OF SECTION 21 1313

DIVISION 22

Section 22 0100 - Plumbing Common Requirements

PART 1 - GENERAL

1.1 SUMMARY

- A. Submittal and Shop Drawing Requirements.
- B. Use of Engineer's Drawings and CAD files.


PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 Submittal and Shop Drawing Requirements.

- A. All submittals for this division shall be provided in electronic format. Hard copies shall not be submitted without prior approval from the Engineer. Files may be submitted via email, FTP site, or on CDROM and will be returned as electronic PDF files that are digitally signed and locked.
- B. Acceptable file formats for electronic files includes:
 - 1. Adobe Acrobat PDF files.
 - 2. Autodesk AutoCad DWG, DXF, or DWF files.
 - 3. Microsoft Excel XLS or XLSX files.
 - 4. Microsoft Word DOC or DOCX files.
 - 5. Microsoft Visio VSD files.
- C. Files shall be reviewed by the submitting contractor and be annotated with marks indicating the specific models, options, and accessories being supplied. Submitting contractor must include a stamp or graphic indicating that they have reviewed the submittal for accuracy, completeness, and list the specification section or drawing reference for each submittal.
- D. Do not combine specification sections into a single submittal package. Each specification section must have its own submittal.
- E. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittal if deemed necessary.
 - 1. Allow 10 calendar days from the date of receipt of the submittal by Engineer for initial review.
 - 2. Allow 10 calendar days from the date of receipt for each resubmittal to re-process and review.
 - 3. No extension to the contract time will be authorized due to failure to transmit submittals sufficiently in advance of the Work to permit processing.
- F. Submittals must contain the following items at a minimum:
 - 1. Transmittal/cover sheet listing:

- a. Project Name
 - b. Contractor's Name, Address, Phone, and Email address.
 - c. Equipment Supplier/Representative Name, Address, Phone, and Email address.
 - d. Date of submission.
 - e. Specification section title and number for the submittal.
 2. Each submittal must include detailed engineering data for the specific products that will be used in conjunction with the project. General catalogs are not acceptable. Supplier/contractor shall highlight or make indication as to which items specifically will be used. Include the following items at a minimum:
 - a. Model number of product.
 - b. Capacity of equipment.
 - c. Dimensional drawing of the product showing all rough-in locations, wiring connections, piping connections, and duct connections.
 - d. Show all minimum service clearances required for an installed unit.
 - e. Weight of product with any requirements for support and hanging devices.
 - f. Electrical wiring diagram showing all line voltage and control wiring within the equipment. Indicate the point of connection of all field installed wiring that is required.
 - g. Include warranty certificate listing the terms of the warranty.
- G. Engineer's Action.
1. The Engineer shall review shop drawings only for conformance with the design concept of the Project and with the information given in the Contract Documents. The Engineer's review of a separate item shall not indicate review of an assembly in which the item functions.
 2. The Engineer's review of shop drawings shall not relieve the Contractor of responsibility for any deviation from the requirements or the Contract Documents unless the Contractor has informed the Engineer in writing of such deviation at the time of submission in letter form. Notations on the submittal do not constitute informing the Engineer. The Engineer's action shall not relieve the Contractor from responsibility for errors or omissions in the shop drawings.
 3. Notations and remarks added to shop drawings by the Engineer are to insure compliance to Drawings and Specifications and do not imply a requested or approved change to contract cost. Should the Engineer's notations and remarks result in a change to the contract cost, it is the responsibility of the Contractor to advise the Engineer accordingly prior to performance of the work in question. If work that has been changed by the Engineer's review comments is performed without notifying the Engineer and the Owner of additional costs, any additional cost for the work shall be the sole responsibility of the Contractor.
 4. Should deviations, discrepancies, or conflicts between shop drawings and the Contract Documents be discovered, either prior to or after review, the Contract Documents shall control and be followed.
- H. Action Stamp.
1. The Engineer will stamp each submittal with a uniform, self-explanatory action stamp indicating the required action by the Contractor:

Commission No.	Shop Drawing Review
Spec. Sections:	Review No. 1
<input type="checkbox"/> REVIEWED & RELEASED	
<input type="checkbox"/> REVIEWED & RELEASED WITH CORRECTIONS	
<input type="checkbox"/> REVISE & RESUBMIT	
<input type="checkbox"/> REJECTED	
<input type="checkbox"/> NO ACTION REQUIRED	
<input type="checkbox"/> SEE TRANSMITTAL FOR NOTES	
<p>Reviewing is only for conformance with the design intent of the project and compliance with the information given in the Contract Documents. Corrections or comments made on the shop drawings during this review do not relieve Contractor from compliance with the requirements of the plans and specifications. Acceptance of a specific item shall not include acceptance of an assembly of which the item is a component. Contractor is solely responsible for: dimensions to be confirmed and correlated at the jobsite; information that pertains solely to the fabrication processes or to techniques and procedures of construction; manufacturer's instructions, industry standards, and for coordination of the work with all trades.</p>	
Reviewed by:	Date:
Primary Engineering, Inc	

- a. Final Unrestricted Release: Work may proceed, provided it complies with the contract documents, when submittal is returned with the following:
 - 1) "Reviewed and Released".
- b. Final, but Restricted Release: Work may proceed, provided it complies with the contract documents, notations and corrections as provided, when the submittal is returned with the following:
 - 1) "Reviewed and Released with Corrections".
- c. Revise and Resubmit: Do not proceed with work. Revise submittal in accordance with notations thereon and resubmit without delay to obtain a different action marking. Do not allow submittals with the following marking (or unmarked submittals) to be used in connection with performance of the work:
 - 1) "Revise and Resubmit".
 - 2) "Rejected".
- d. Other Action: Where a submittal is primarily for information purposes, special processing or activity, the submittal will be returned, marked "No Action Taken".

Use of Engineer's Drawing and CAD Files.

- I. The bid documents prepared by the Engineer are the property of the Engineer and shall not be copied without approval in writing from the Engineer.
- J. At the contractor's request, the Engineer will provide electronic copies of the source CAD files to the contractor for their convenience in preparation of shop drawings and submittals related to the project with the following terms and conditions;
 1. Electronic files are prepared using a variety of software tools that includes AutoCAD, Revit, Design Master, Excel, and various calculation tools. The Engineer makes no representation as to the compatibility of these files with your hardware or software configuration.

2. Data contained within these electronic files are part of our Instruments of Service and shall not be used by anyone other than the intended recipient for any other purpose than as a convenience in the preparation of shop drawings for the reference project. Any other use by you or others will be at your sole risk without liability or legal exposure to the Engineer. Recipient shall agree to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against the Engineer, it's officers, directors, employees, agents, or sub-consultants, that may arise out of or in connection with your use of these electronic files.
3. The recipient shall, to the fullest extent permitted by law, indemnify and hold the Engineer harmless against all damages, liabilities or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from your use of these electronic files.
4. These files are not construction documents. Differences may exist between the electronic files and corresponding hard-copy construction documents. The Engineer makes no representation regarding the accuracy or completeness of the files you receive. In the event a conflict arises between the signed or sealed hard copy construction documents prepared by the Engineer and the electronic files, the signed or sealed hard copy documents shall govern.
5. The recipient is responsible for verifying and coordinating all field measurements, field conditions, and systems onsite with your work and other contractors for the project.
6. Because electronic files can be modified, unintentionally or otherwise, the Engineer reserves the right to remove all indicia of ownership and/or involvement from each electronic file.
7. A service fee of \$100 per electronic file shall be remitted to us along with a signed copy of a release prior to delivery of the electronic files. This fee is to cover processing time to prepare the files by binding reference drawings, removing proprietary information, and formatting the files as directed.
8. Under no circumstances shall delivery of the electronic files for use by you be deemed a sale by us, and we make no warranties, either express or implied, of merchantability and fitness for any particular purpose. In no event shall the Engineer be held liable for any loss or profit or any consequential damages as a result of your use of the files.
9. Any party requesting use of these files must do so by submitting a written request describing what files are needed and what the intended use will be.

END OF SECTION 22 0100

Section 22 0518 - Escutcheons For Plumbing Piping

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 1. Escutcheons.
 2. Floor plates.

1.02 DEFINITIONS

- A. Existing Piping to Remain: Existing piping that is not to be removed and that is not otherwise indicated to be removed and salvaged, or removed and reinstalled.

1.03 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. BrassCraft Manufacturing Co.; a Masco company.
 2. Dearborn Brass.
 3. Jones Stephens Corp.
 4. Mid-America Fittings, Inc.
 5. ProFlo; a Ferguson Enterprises, Inc. brand.

2.02 ESCUTCHEONS

- A. One-Piece, Steel Type: With polished, chrome-plated finish and setscrew fastener.
- B. Split-Plate, Stamped-Steel Type: With polished, chrome-plated finish; concealed hinge; and spring-clip fasteners.

2.03 FLOOR PLATES

- A. Split Floor Plates: Cast brass with concealed hinge.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.
 - 1. Escutcheons for New Piping and Relocated Existing Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep pattern.
 - b. Chrome-Plated Piping: One-piece steel with polished, chrome-plated finish.
 - c. Insulated Piping: One-piece steel with polished, chrome-plated finish.
 - d. Bare Piping at Wall, Ceiling, and Floor Penetrations in Finished Spaces: One-piece steel with polished, chrome-plated finish.
- C. Install floor plates for piping penetrations of equipment-room floors.
- D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. New Piping and Relocated Existing Piping: One-piece, floor plate.
 - 2. Existing Piping: Split floor plate.

3.02 FIELD QUALITY CONTROL

- A. Using new materials, replace broken and damaged escutcheons and floor plates.

END OF SECTION 22 0518

Section 22 0523.12 - Ball Valves For Plumbing Piping

PART 1 - General

1.01 SUMMARY

- A. Section Includes:
1. Bronze ball valves.

1.02 DEFINITIONS

- A. CWP: Cold working pressure.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of valve.
1. Certification that products comply with NSF 61 Annex G and NSF 372.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
1. Protect internal parts against rust and corrosion.
 2. Protect threads, flange faces, and soldered ends.
 3. Set ball valves open to minimize exposure of functional surfaces.
- 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.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS FOR VALVES

- A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
- B. ASME Compliance:
1. ASME B1.20.1 for threads for threaded end valves.
 2. ASME B16.18 for solder-joint connections.
 3. ASME B31.9 for building services piping valves.
- C. NSF Compliance: NSF 61 Annex G and NSF 372 for valve materials for potable-water service.
- D. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.

- E. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- F. Valve Sizes: Same as upstream piping unless otherwise indicated.
- G. Valve Actuator Types:
 - 1. Gear Actuator: For quarter-turn valves NPS 4 and larger.
 - 2. Handlever: For quarter-turn valves smaller than NPS 4.
- H. Valves in Insulated Piping:
 - 1. Include 2-inch stem extensions.
 - 2. Extended operating handles of nonthermal-conductive material and protective sleeves that allow operation of valves without breaking vapor seals or disturbing insulation.
 - 3. Memory stops that are fully adjustable after insulation is applied.

2.02 BRONZE BALL VALVES

- A. Bronze Ball Valves, Two-Piece with Full Port and Stainless-Steel Trim:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Apollo Valves; Conbraco Industries, Inc.
 - b. Hammond Valve.
 - c. Milwaukee Valve Company.
 - d. NIBCO INC.
 - 2. Description:
 - a. Standard: MSS SP-110.
 - b. CWP Rating: 600 psig.
 - c. Body Design: Two piece.
 - d. Body Material: Bronze.
 - e. Ends: Threaded or soldered.
 - f. Seats: PTFE.
 - g. Stem: Stainless steel.
 - h. Ball: Stainless steel, vented.
 - 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.
- E. Install valve tags. Comply with requirements in Section 22 0553 "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

3.03 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

- A. If valves with specified CWP ratings are unavailable, the same types of valves with higher CWP ratings may be substituted.
- B. Select valves 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.

END OF SECTION 22 0523

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Section 22 0719 - Plumbing Piping Insulation

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes insulating the following plumbing piping services:
 - 1. Domestic cold-water piping.
 - 2. Domestic hot-water piping.
 - 3. Supplies and drains for handicap-accessible lavatories and sinks.
 - 4. Sanitary drains used for cooling condensate drains above grade.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied, if any).
- B. Environmental Submittals:
 - 1. Product Data: For adhesives and sealants, documentation including printed statement of VOC content and chemical components.
 - 2. Laboratory Test Reports: For adhesives and sealants, documentation indicating that product complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 - 3. Documentation of non-formaldehyde containing materials.

1.03 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.
- C. Field quality-control reports.

1.04 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing 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 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.

- B. Comply with the following applicable standards and other requirements specified for miscellaneous components:
 - 1. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.06 COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 22 0529 "Hangers and Supports for Plumbing Piping and Equipment."
- B. Coordinate clearance requirements with piping Installer for piping 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.

1.07 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. 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 "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, formaldehyde, or mercury compounds.
- C. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- D. Flexible Elastomeric Insulation: EPDM Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C117, C518, Type I for tubular materials.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Aeroflex USA, Inc.; Aerocel EPDM.
 - b. Armacell; UT Solaflex EPDM.
 - 2. Properties:

- a. K-value: 0.25 (Btu-in/sq.ft.-hr-deg F) at 75 deg F mean temperature.
 - b. Service temperature: -70 deg F to 257 deg F without drying or hardening.
 - c. Water vapor permeability: 0.08 perm-inch per ASTM C355.
 - d. UV weather resistance: ASTM G23 standard requiring no additional coatings or jacket.
 - e. Flammability, Smoke Density: 25/50 per ASTM 84.
- E. Mineral-Fiber, Preformed Pipe Insulation:
1. Products: Subject to compliance with requirements, provide the following:
 - a. Johns Manville; Micro-Lok.
 - b. Knauf Insulation; 1000-Degree Pipe Insulation with ECOSE.
 2. Type I, 850 Deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 3. Provide with PVC jacket continuous in all spaces that are not concealed above ceilings.

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.
- B. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
1. Products: Subject to compliance with requirements, provide the following:
 - a. Aeroflex USA, Inc.; Aero seal.
 - b. Armacell LLC; Armaflex 520 Adhesive.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-75.
 2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
 - b. Eagle Bridges - Marathon Industries; 225.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.
 - d. Mon-Eco Industries, Inc.; 22-25.
 2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile

Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

- D. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.
 - b. Eagle Bridges - Marathon Industries; 225.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-20.
 - d. Mon-Eco Industries, Inc.; 22-25.
 2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. PVC Jacket Adhesive: Compatible with PVC jacket.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Corning Corporation; 739, Dow Silicone.
 - b. Johns Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
 - c. P.I.C. Plastics, Inc.; Welding Adhesive.
 - d. Speedline Corporation; Polyco VP Adhesive.
 2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.03 LAGGING ADHESIVES

- A. Description: Comply with MIL-A-3316C, Class I, Grade A, and shall be compatible with insulation materials, jackets, and substrates.
1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-50 AHV2.
 - b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-36.
 - c. Vimasco Corporation; 713 and 714.
 3. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.
 4. Service Temperature Range: 0 to plus 180 deg F.
 5. Color: White.

2.04 SEALANTS

A. Joint Sealants:

1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Permanently flexible, elastomeric sealant.
3. Service Temperature Range: Minus 100 to plus 300 deg F.
4. Color: White or gray.
5. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
6. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. FSK and Metal Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
 - b. Eagle Bridges - Marathon Industries; 405.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.
 - d. Mon-Eco Industries, Inc.; 44-05.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: Aluminum.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: White.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.05 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
 2. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.06 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. ABI, Ideal Tape Division; 428 AWF ASJ.
 - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
 - c. Compac Corporation; 104 and 105.
 - d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
 2. Width: 3 inches.
 3. Thickness: 11.5 mils.
 4. Adhesion: 90 ounces force/inch in width.
 5. Elongation: 2 percent.
 6. Tensile Strength: 40 lbf/inch in width.
 7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. ABI, Ideal Tape Division; 491 AWF FSK.
 - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
 - c. Compac Corporation; 110 and 111.
 - d. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW/SQ.
 2. Width: 3 inches.
 3. Thickness: 6.5 mils.
 4. Adhesion: 90 ounces force/inch in width.
 5. Elongation: 2 percent.
 6. Tensile Strength: 40 lbf/inch in width.
 7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
1. Verify that systems to be insulated have been tested and are free of defects.
 2. Verify that surfaces to be insulated are clean and dry.
- B. 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 an 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.

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 piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of 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, according to insulation material manufacturer's written instructions, 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, staple, and seal patches similar to butt joints.
- P. For above-ambient services, do not install insulation to the following:
1. Vibration-control devices.
 2. Testing agency labels and stamps.
 3. Nameplates and data plates.
 4. Cleanouts.

3.04 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
1. Seal penetrations with flashing sealant.

2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
 4. Seal jacket to roof flashing with flashing sealant.
- B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- C. 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 Section 07 8413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.
- D. Insulation Installation at Floor Penetrations:
1. Pipe: Install insulation continuously through floor penetrations.
 2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 07 8413 "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. 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 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

- A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- B. Insulation Installation on Pipe Flanges:
 - 1. Install 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 sheet insulation of same thickness as pipe insulation.
 - 4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- C. Insulation Installation on Pipe Fittings and Elbows:
 - 1. Install mitered sections of pipe insulation.
 - 2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- D. Insulation Installation on Valves and Pipe Specialties:
 - 1. Install preformed valve covers manufactured of same material as pipe insulation when available.
 - 2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. 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.
 - 4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.07 INSTALLATION OF MINERAL-FIBER INSULATION

- A. Insulation Installation on Straight Pipes and Tubes:
 - 1. Secure each layer of preformed pipe 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 surfaces, secure laps with outward clinched staples at 6 inches o.c.
 - 4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, 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 mineral-fiber blanket 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.
 2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.
- D. Insulation Installation on Valves and Pipe Specialties:
1. Install preformed sections of same material as straight segments of pipe insulation when available.
 2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
 3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 4. Install insulation to flanges as specified for flange insulation application.

3.08 FINISHES

- A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 09 9113 "Exterior Painting" and Section 09 9123 "Interior Painting."
- B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.
- C. Do not field paint aluminum or stainless-steel jackets.

3.09 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.10 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. All insulation must meet or exceed code requirements and ASHRAE 90.1 – 2007 listed requirements.

- C. 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.

3.11 INDOOR PIPING INSULATION SCHEDULE

- A. Domestic Cold, Hot, and Recirculated Water:
1. NPS 1 and Smaller: Insulation shall be one of the following:
 - a. Flexible Elastomeric: 1/2 inch thick.
 - b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch thick with PVC field installed jacket where exposed to view.
 2. NPS 1-1/4 and Larger: Insulation shall be one of the following:
 - a. Flexible Elastomeric: 1 inch thick.
 - b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick with PVC field installed jacket where exposed to view.
- B. Floor Drains, Traps, and Sanitary Drain Piping within 20 Feet of Drain Receiving Condensate and Equipment Drain Water below 60 Deg F:
1. All Pipe Sizes: Insulation shall be the following:
 - a. Flexible Elastomeric: 3/4 inch thick.
 - b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick with PVC field installed jacket where exposed to view.
- C. Hot Service Drains:
1. All Pipe Sizes: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe, Type I or II: 1 inch thick.
- D. Hot Service Vents:
1. All Pipe Sizes: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe, Type I or II: 1 inch thick.

END OF SECTION 22 0719

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Section 22 1119 - Domestic Water Piping Specialties

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Vacuum breakers.
 - 2. Water-hammer arresters.
 - 3. Flexible connectors.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For domestic water piping specialties.
 - 1. Include diagrams for power, signal, and control wiring.

1.03 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.04 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

- A. Potable-water piping and components shall comply with NSF 61 Annex G and NSF 14. Mark "NSF-pw" on plastic piping components.

2.02 PERFORMANCE REQUIREMENTS

- A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig unless otherwise indicated.

2.03 VACUUM BREAKERS

- A. Hose-Connection Vacuum Breakers:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Apollo Valves; Conbraco Industries, Inc.
 - b. Legend Valve & Fitting, Inc.
 - c. Watts; a Watts Water Technologies company.
 - d. Woodford Manufacturing Company.
 - e. Zurn Industries, LLC.

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: Chrome or nickel plated.

B. Pressure Vacuum Breakers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Apollo Valves; Conbraco Industries, Inc.
 - b. FEBCO.
 - c. Watts; a Watts Water Technologies company.
 - d. Zurn Industries, LLC.
2. Standard: ASSE 1020.
3. Operation: Continuous-pressure applications.
4. Pressure Loss: 5 psig maximum, through middle third of flow range.
5. Accessories:
 - a. Valves: Ball type, on inlet and outlet.

2.04 WATER-HAMMER ARRESTERS

A. Water-Hammer Arresters <Insert drawing designation if any>:

1. Standard: ASSE 1010 or PDI-WH 201.
2. Type: Copper tube with piston.
3. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

2.05 SPECIALTY VALVES

- A. Comply with requirements for general-duty metal valves in Section 22 0523.12 "Ball Valves for Plumbing Piping," Section 22 0523.13 "Butterfly Valves for Plumbing Piping," Section 22 0523.14 "Check Valves for Plumbing Piping," and Section 22 0523.15 "Gate Valves for Plumbing Piping."

2.06 FLEXIBLE CONNECTORS

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

1. Flex-Hose Co., Inc.
2. Flexicraft Industries.
3. Hispan Precision Products, Inc.
4. Metraflex Company (The).

B. Bronze-Hose Flexible Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.

1. Working-Pressure Rating: Minimum 200 psig.
2. End Connections NPS 2 and Smaller: Threaded copper pipe or plain-end copper tube.
3. End Connections NPS 2-1/2 and Larger: Flanged copper alloy.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.
 - 1. Locate backflow preventers in same room as connected equipment or system.
 - 2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe-to-floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are unacceptable for this application.
 - 3. Do not install bypass piping around backflow preventers.
- B. Install temperature-actuated, water mixing valves with check stops or shutoff valves on inlets and with shutoff valve on outlet.
 - 1. Install cabinet-type units recessed in or surface mounted on wall as specified.
- C. Install water-hammer arresters in water piping according to PDI-WH 201.

3.02 CONNECTIONS

- A. Comply with requirements for ground equipment in Section 26 0526 "Grounding and Bonding for Electrical Systems."
- B. Fire-retardant-treated-wood blocking is specified in Section 26 0519 "Low-Voltage Electrical Power Conductors and Cables" for electrical connections.

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.
- 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 Section 22 0553 "Identification for Plumbing Piping and Equipment."

3.04 FIELD QUALITY CONTROL

- A. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.
- B. Prepare test and inspection reports.

3.05 ADJUSTING

- A. Set field-adjustable pressure set points of water pressure-reducing valves.

- B. Set field-adjustable flow set points of balancing valves.
- C. Set field-adjustable temperature set points of temperature-actuated, water mixing valves.

END OF SECTION 22 1119

Section 22 1316 - Sanitary Waste And Vent Piping

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Hubless, cast-iron soil pipe and fittings.
 - 2. Specialty pipe fittings.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For hubless, single-stack drainage system. Include plans, elevations, sections, and details.

1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans and elevations, or Building Information Model (BIM) drawn to scale, showing items described in this Section and coordinated with all building trades.
- B. Seismic Qualification Certificates: For waste and vent piping, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Detailed description of piping anchorage devices on which the certification is based and their installation requirements.
- C. Field quality-control reports.

1.4 FIELD CONDITIONS

- A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service in accordance with requirements indicated:
 - 1. Notify Owner no fewer than two days in advance of proposed interruption of sanitary waste service.
 - 2. Do not proceed with interruption of sanitary waste service without Owner's written permission.

1.5 WARRANTY

- A. Listed manufacturers to provide labeling and warranty of their respective products.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Components and installation are capable of withstanding the following minimum working pressure unless otherwise indicated:
 - 1. Soil, Waste, and Vent Piping: 10 ft. head of water.
 - 2. Waste, Force-Main Piping: 50 psig.

2.2 PIPING MATERIALS

- A. Piping materials to bear label, stamp, or other markings of specified testing agency.
- B. 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.

2.3 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

- A. Acceptable Manufacturers, subject to compliance:
 - 1. Charlotte Pipe.
 - 2. Tyler Pipe.
- B. Pipe and Fittings:
 - 1. Marked with CISPI collective trademark.
 - 2. ASTM A888 or CISPI 301.
- C. Heavy-Duty, Hubless-Piping Couplings:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ANACO-Husky; SD4000.
 - b. Ideal-Tridon; Heavy Duty HD.
 - c. Mission Rubber Company, LLC; Heavyweight.
 - 2. Standards: ASTM C1277 and ASTM C1540.
 - 3. Description: 304 Stainless steel shield with 304 stainless steel bands and tightening devices; and ASTM C564, rubber sleeve with integral, center pipe stop. Provide a minimum of (4) bands per coupling with (2) on each pipe segment. Clamp bands shall be rated for 80 in-lbs of torque with 5/16" hex-head drive and shall be attached to shield with pins to provide proper spacing of bands.

2.4 SPECIALTY PIPE FITTINGS

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems.

1. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations.
 2. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- E. Install piping to permit valve servicing.
- F. Install piping at indicated slopes.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Install piping to allow application of insulation.
- J. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends.
1. 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.
 2. Use long-turn, double Y-branch, and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe.
 - a. Straight tees, elbows, and crosses may be used on vent lines.
 3. Do not change direction of flow more than 90 degrees.
 4. Use proper size of standard increasers and reducers if pipes of different sizes are connected.
 - a. Reducing size of waste piping in direction of flow is prohibited.
- K. Install soil and waste and vent piping at the following minimum slopes unless otherwise indicated:
1. Building Sanitary Waste: Two percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
- L. Install cast-iron soil piping in accordance with 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 in accordance with ASTM A674 or AWWA C105/A 21.5.
- M. Plumbing Specialties:

- a. Comply with requirements for backwater valves specified in Section 22 1319 "Sanitary Waste Piping Specialties."
 2. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary waste gravity-flow piping.
 - a. Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping.
 - b. Comply with requirements for cleanouts specified in Section 22 1319 "Sanitary Waste Piping Specialties."
 3. Install drains in sanitary waste gravity-flow piping.
 - a. Comply with requirements for drains specified in Section 22 1319 "Sanitary Waste Piping Specialties."
- N. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- O. Install sleeves for piping penetrations of walls, ceilings, and floors.
 1. Comply with requirements for sleeves specified in Section 22 0517 "Sleeves and Sleeve Seals for Plumbing Piping."
- P. Install sleeve seals for piping penetrations of concrete walls and slabs.
 1. Comply with requirements for sleeve seals specified in Section 22 0517 "Sleeves and Sleeve Seals for Plumbing Piping."
- Q. Install escutcheons for piping penetrations of walls, ceilings, and floors.
 1. Comply with requirements for escutcheons specified in Section 22 0518 "Escutcheons for Plumbing Piping."
- ### 3.2 JOINT CONSTRUCTION
- A. Hubless, Cast-Iron Soil Piping Coupled Joints:
 1. Join hubless, cast-iron soil piping in accordance with CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.
- ### 3.3 INSTALLATION OF HANGERS AND SUPPORTS
- A. Install hangers for cast-iron soil piping, with maximum horizontal spacing and minimum rod diameters, to comply with MSS SP-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.
- ### 3.4 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 waste and vent piping to the following:
 1. Plumbing Fixtures: Connect waste 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 waste and vent piping in sizes indicated, but not smaller than required by plumbing code.
- D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.
- E. Make connections in accordance with 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.
- 3.5 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 waste and vent piping in accordance with 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.
 - a. 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 waste and vent piping until it has been tested and approved.
 - a. Expose work that was covered or concealed before it was tested.
 3. Roughing-in Plumbing Test Procedure: Test waste and vent piping except outside leaders on completion of roughing-in.
 - a. Close openings in piping system and fill with water to point of overflow, but not less than 10 ft. head of water.
 - b. From 15 minutes before inspection starts to completion of inspection, water level must not drop.
 - c. 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.

- a. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1 inch wg.
- b. Use U-tube or manometer inserted in trap of water closet to measure this pressure.
- c. Air pressure must remain constant without introducing additional air throughout period of inspection.
- d. 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.

3.6 CLEANING AND PROTECTION

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect sanitary waste and vent piping 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.
- D. Repair damage to adjacent materials caused by waste and vent piping installation.

3.7 PIPING SCHEDULE

- A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.
- B. Aboveground, soil, vent, and waste piping NPS 4-8 and smaller are to be any of the following:
 1. Hubless, cast-iron soil pipe and fittings; heavy-duty hubless-piping couplings; and coupled joints.

END OF SECTION 22 1316

Section 22 1319.13 - Sanitary Drains

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Floor drains.

1.2 DEFINITIONS

- A. HDPE: High-density polyethylene.
- B. PE: Polyethylene.
- C. PP: Polypropylene.
- D. PVC: Polyvinyl chloride.

1.3 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 DRAIN ASSEMBLIES

- A. Sanitary drains shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 14 for plastic sanitary piping specialty components.

2.2 FLOOR DRAINS

- A. Cast-Iron Floor Drains:

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

- ~~2-a.~~ Jay R. Smith Mfg Co; a division of Morris Group International.
- ~~3-b.~~ Josam Company.
- ~~4-c.~~ Zurn Industries, LLC.

~~5-2.~~ Standard: ASME A112.6.3.

~~6-3.~~ Body Material: Gray iron.

~~7-4.~~ Seepage Flange: Required.

~~8-5.~~ Top or Strainer Material: Nickel bronze.

~~9-6.~~ Top of Body and Strainer Finish: Nickel bronze.

~~10-7.~~ Trap Material: Cast iron.

~~11-8.~~ Trap Pattern: Deep-seal P-trap.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. 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.
 - 3. Install floor-drain flashing collar or flange, so no leakage occurs between drain and adjoining flooring.
 - a. Maintain integrity of waterproof membranes where penetrated.
 - 4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

3.2 CONNECTIONS

- A. Comply with requirements in Section 22 1316 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.

3.3 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 1319.13

Section 22 1319 - Sanitary Waste Piping Specialties

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Cleanouts.
 - 2. Miscellaneous sanitary drainage piping specialties.

1.2 DEFINITIONS

- A. ABS: Acrylonitrile butadiene styrene.
- B. PVC: Polyvinyl chloride.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
 - 1. Show fabrication and installation details for frost-resistant vent terminals.

1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For sanitary waste piping specialties to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTIONS

- A. Sanitary waste piping specialties shall bear label, stamp, or other markings of specified testing agency.

- B. Comply with NSF 14 for plastic sanitary waste piping specialty components.

2.2 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

- A. Floor-Drain, Trap-Seal Insert:

1. Manufacturers: Provide product from one of the following.
 - a. Rectorseal, Sure Seal.
 - b. JR Smith. Quad Close.
 - c. Josam. Trap Seal Insert.
 - d. Zurn. ZShield.
2. Description: HDPE housing with silicone rubber diaphragm and EPDM sealing gasket. Elastomeric hinged closure to allow water to drain while preventing evaporation of trap and sewer gases from escaping.
3. Approvals:
 - a. ICC-ES: PMG-1070.
 - b. IAPMO: C-4165.
 - c. ASSE: 1072.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. 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, 18" above floor elevation.
- B. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.
- C. Install floor-drain, trap-seal inserts on all area floor drains.
 1. Size: Same as floor drain inlet.

3.2 PIPING CONNECTIONS

- A. Comply with requirements in Section 22 1316 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment, to allow service and maintenance.

3.3 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 1319

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Section 22 4216.16 - Commercial Sinks

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Utility sinks.
 - 2. Sink faucets.
 - 3. Supply fittings.
 - 4. Waste fittings.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for sinks.
 - 2. Include rated capacities, operating characteristics and furnished specialties and accessories.

1.03 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories.

1.04 CLOSEOUT SUBMITTALS

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

PART 2 - PRODUCTS

2.01 UTILITY SINKS

- A. Utility Sinks: Stainless steel, counter mounted.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Elkay Manufacturing Co.
 - b. Just Manufacturing.
 - 2. Fixture:
 - a. Standard: ASME A112.19.3/CSA B45.4.
 - b. Type: Ledge back.
 - c. Metal Thickness: 18 Gauge.
 - 3. Supply Fittings:
 - a. Standard: ASME A112.18.1/CSA B125.1.
 - b. Supplies: Chrome-plated brass compression stop with inlet connection matching water-supply piping type and size.
 - 1) Operation: Loose key.
 - 2) Risers: NPS 1/2, ASME A112.18.6, braided or corrugated stainless-steel flexible hose.

4. Waste Fittings:
 - a. Standard: ASME A112.18.2/CSA B125.2.
 - b. Trap(s):
 - 1) Size: NPS 1-1/2.
 - 2) Material: Chrome-plated, two-piece, cast-brass trap and ground-joint swivel elbow with 0.032-inch-thick brass tube to wall; and chrome-plated brass or steel wall flange.
 - 3) Material: Stainless-steel, two-piece trap and swivel elbow with 0.012-inch-thick stainless-steel tube to wall; and stainless-steel wall flange.

2.02 SINK FAUCETS

- A. NSF Standard: Comply with NSF/ANSI 61 Annex G, "Drinking Water System Components - Health Effects," for faucet-spout materials that will be in contact with potable water.
- B. Sink Faucets: Manual type, two-lever-handle mixing valve.
 1. Commercial, Solid-Brass Faucets.
 - a. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1) Chicago Faucets; Geberit Company.
 - 2) Delta Faucet Company.
 - 3) T&S Brass and Bronze Works, Inc.
 2. Standard: ASME A112.18.1/CSA B125.1.
 3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and sink receptor.
 4. Body Material: Commercial, solid brass.
 5. Finish: Chrome plated.
 6. Handle(s): Lever.

2.03 SUPPLY FITTINGS

- A. NSF Standard: Comply with NSF/ANSI 61 Annex G, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.
- B. Standard: ASME A112.18.1/CSA B125.1.
- C. Supply Piping: Chrome-plated brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated brass or stainless-steel wall flange.
- D. Supply Stops: Chrome-plated brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.
- E. Operation: Loose key.
- F. Risers:
 1. NPS 1/2.
 2. ASME A112.18.6, braided or corrugated stainless-steel flexible hose.

2.04 WASTE FITTINGS

- A. Standard: ASME A112.18.2/CSA B125.2.
- B. Drain: Grid type with NPS 1-1/2 offset and straight tailpiece.
- C. Trap:
 - 1. Size: NPS 1-1/2.
 - 2. Material: Chrome-plated, two-piece, cast-brass trap and ground-joint swivel elbow with 0.032-inch-thick brass tube to wall; and chrome-plated brass or steel wall flange.

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 sink installation.
- B. Examine walls, floors, and counters for suitable conditions where sinks will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install sinks level and plumb according to roughing-in drawings.
- B. Install supports, affixed to building substrate, for wall-hung sinks.
- C. Install accessible wall-mounted sinks at handicapped/elderly mounting height according to ICC/ANSI A117.1.
- D. Install water-supply piping with stop on each supply to each sink faucet.
 - 1. Exception: Use ball valves if supply stops are not specified with sink. Comply with valve requirements specified in Section 22 0523.12 "Ball Valves for Plumbing Piping".
 - 2. Install stops in locations where they can be easily reached for operation.
- E. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 22 0518 "Escutcheons for Plumbing Piping."
- F. Seal joints between sinks and counters, floors, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 07 9200 "Joint Sealants."

3.03 CONNECTIONS

- A. Connect sinks with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- B. Comply with water piping requirements specified in Section 22 1116 "Domestic Water Piping."
- C. Comply with soil and waste piping requirements specified in Section 22 1316 "Sanitary Waste and Vent Piping."

3.04 ADJUSTING

- A. Operate and adjust sinks and controls. Replace damaged and malfunctioning sinks, fittings, and controls.
- B. Adjust water pressure at faucets to produce proper flow.

3.05 CLEANING AND PROTECTION

- A. After completing installation of sinks, inspect and repair damaged finishes.
- B. Clean sinks, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.
- C. Provide protective covering for installed sinks and fittings.
- D. Do not allow use of sinks for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 4216

DIVISION 23

Section 23 3113 - Metal Ducts

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Single-wall rectangular ducts and fittings.
2. Single-wall round ducts and fittings.
3. Sheet metal materials.
4. Sealants and gaskets.
5. Hangers and supports.

B. Related Sections:

1. Section 23 0593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Section 23 3300 "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.02 PERFORMANCE REQUIREMENTS

A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.

B. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of the following products:

1. Liners and adhesives.
2. Sealants and gaskets.

B. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Factory- and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
4. Elevation of top of ducts.
5. Dimensions of main duct runs from building grid lines.
6. Fittings.
7. Reinforcement and spacing.
8. Seam and joint construction.
9. Penetrations through fire-rated and other partitions.
10. Equipment installation based on equipment being used on Project.

11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
 12. Hangers and supports, including methods for duct and building attachment and vibration isolation.
- C. Delegated-Design Submittal:
1. Sheet metal thicknesses.
 2. Joint and seam construction and sealing.
 3. Reinforcement details and spacing.
 4. Materials, fabrication, assembly, and spacing of hangers and supports.
- 1.04 INFORMATIONAL SUBMITTALS
- A. Welding certificates.
 - B. Field quality-control reports.
- 1.05 QUALITY ASSURANCE
- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
 - B. Welding Qualifications: Qualify procedures and personnel according to the following:
 1. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
 - C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."
 - D. ASHRAE/IES Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

PART 2 - PRODUCTS

2.01 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.02 SINGLE-WALL ROUND DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.03 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G90.
 - 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.
- D. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
 - 1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.
- E. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.04 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Water-Based Joint and Seam Sealant:
 - 1. Application Method: Brush on.
 - 2. Solids Content: Minimum 65 percent.
 - 3. Shore A Hardness: Minimum 20.
 - 4. Water resistant.
 - 5. Mold and mildew resistant.
 - 6. VOC: Maximum 75 g/L (less water).
 - 7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
 - 8. Service: Indoor or outdoor.
 - 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
- C. Flanged Joint Sealant: Comply with ASTM C 920.
 - 1. General: Single-component, acid-curing, silicone, elastomeric.
 - 2. Type: S.
 - 3. Grade: NS.
 - 4. Class: 25.
 - 5. Use: O.
- D. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.
- E. Round Duct Joint O-Ring Seals:
 - 1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg static-pressure class, positive or negative.
 - 2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
 - 3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.05 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
- B. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- C. Trapeze and Riser Supports:
 - 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.

PART 3 - EXECUTION

3.01 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- C. Install ducts in maximum practical lengths.
- D. Install ducts with fewest possible joints.
- E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- K. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

3.02 INSTALLATION OF EXPOSED DUCTWORK

- A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.
- B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.
- C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.

- D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.
- E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.03 DUCT SEALING

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- B. Seal ducts at a minimum to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":
 - 1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - 2. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.
 - 3. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class B.
 - 4. Conditioned Space, Exhaust Ducts: Seal Class B.
 - 5. Conditioned Space, Return-Air Ducts: Seal Class C.

3.04 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - 1. Where practical, install concrete inserts before placing concrete.
 - 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 - 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
 - 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
 - 5. Do not use powder-actuated concrete fasteners for seismic restraints.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.

- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.05 CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Section 23 3300 "Air Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.06 PAINTING

- A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Section 09 9113 "Exterior Painting" and Section 09 9123 "Interior Painting."
- B. All ducts exposed to view shall be constructed of 'paint-grip' duct with surface preparation to accept field paint.

3.07 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Leakage Tests:
 - 1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
 - 2. Test the following systems:
 - a. Ducts with a Pressure Class Higher Than 3-Inch wg: Test representative duct sections, selected by Architect from sections installed, totaling no less than 25 percent of total installed duct area for each designated pressure class.
 - b. Exhaust Ducts with a Pressure Class of 2-Inch wg or Higher: Test representative duct sections, selected by Architect from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.
 - 3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
 - 4. Test for leaks before applying external insulation.
 - 5. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
 - 6. Give seven days' advance notice for testing.
- C. Duct System Cleanliness Tests:
 - 1. Visually inspect duct system to ensure that no visible contaminants are present.

2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness according to "Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."
 - a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.
 - D. Duct system will be considered defective if it does not pass tests and inspections.
 - E. Prepare test and inspection reports.
- 3.08 START UP
- A. Air Balance: Comply with requirements in Section 23 0593 "Testing, Adjusting, and Balancing for HVAC."
- 3.09 DUCT SCHEDULE
- A. Fabricate ducts with galvanized sheet steel except as otherwise indicated and as follows:
 - B. Supply Ducts:
 1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:
 - a. Pressure Class: Positive 2-inch wg.
 - b. Minimum SMACNA Seal Class: B.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12.
 - C. Intermediate Reinforcement:
 1. Galvanized-Steel Ducts: Galvanized steel Galvanized steel or carbon steel coated with zinc-chromate primer.
 - D. Elbow Configuration:
 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
 - a. Velocity 1000 fpm or Lower:
 - 1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
 - 2) Mitered Type RE 4 without vanes.
 - b. Velocity 1000 to 1500 fpm:
 - 1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
 - c. Velocity 1500 fpm or Higher:
 - 1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.

- 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
 2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
 - a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
 3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."
 - a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
 - 1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
 - 2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
 - 3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
 - 4) Radius-to Diameter Ratio: 1.5.
 - b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
 - c. Round Elbows, 14 Inches and Larger in Diameter: Standing seam.
- E. Branch Configuration:
 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."
 - a. Rectangular Main to Rectangular Branch: 45-degree entry.
 - b. Rectangular Main to Round Branch: Spin in.
 2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.
 - a. Velocity 1000 fpm or Lower: 90-degree tap.
 - b. Velocity 1000 to 1500 fpm: Conical tap.
 - c. Velocity 1500 fpm or Higher: 45-degree lateral.

END OF SECTION 23 3113

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Section 23 3300 - Air Duct Accessories

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Manual volume dampers.
 - 2. Flexible connectors.
 - 3. Duct accessory hardware.
- B. Related Requirements:
 - 1. Section 23 3346 "Flexible Ducts" for insulated and non-insulated flexible ducts.

1.02 ACTION SUBMITTALS

- A. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.
 - 1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:
 - a. Special fittings.
 - b. Manual volume damper installations.

1.03 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from Installers of the items involved.
- B. Source quality-control reports.

1.04 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.01 ASSEMBLY DESCRIPTION

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless

otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.02 MATERIALS

- A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G90.
 - 2. Exposed-Surface Finish: Mill phosphatized.
- B. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- C. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.03 MANUAL VOLUME DAMPERS

- A. Standard, Steel, Manual Volume Dampers:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Warming and Ventilating; a Mestek Architectural Group company.
 - b. McGill AirFlow LLC.
 - c. Pottorff.
 - d. Ruskin Company.
 - e. Vent Products Co., Inc.
 - 2. Standard leakage rating.
 - 3. Suitable for horizontal or vertical applications.
 - 4. Frames:
 - a. Frame: Hat-shaped, 0.094-inch-thick, galvanized sheet steel.
 - b. Mitered and welded corners.
 - c. Flanges for attaching to walls and flangeless frames for installing in ducts.
 - 5. Blades:
 - a. Multiple or single blade.
 - b. Parallel- or opposed-blade design.
 - c. Stiffen damper blades for stability.
 - d. Galvanized-steel, 0.064 inch thick.
 - 6. Blade Axles: Galvanized steel.
 - 7. Bearings:
 - a. Molded synthetic.
 - b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
 - 8. Tie Bars and Brackets: Galvanized steel.
- B. Damper Hardware:
 - 1. 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.

2. Include center hole to suit damper operating-rod size.
3. Include elevated platform for insulated duct mounting.

2.04 DUCT ACCESSORY HARDWARE

- 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 and of length to suit duct-insulation thickness.
- B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
- C. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
 1. Install steel volume dampers in steel ducts.
- D. Set dampers to fully open position before testing, adjusting, and balancing.
- E. Install test holes at fan inlets and outlets and elsewhere as indicated.
- F. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
 1. On both sides of duct coils.
 2. At each change in direction and at maximum 50-foot spacing.
 3. Control devices requiring inspection.
 4. Elsewhere as indicated.
- G. Install access doors with swing against duct static pressure.
- H. Access Door Sizes:
 1. One-Hand or Inspection Access: 8 by 5 inches.
 2. Two-Hand Access: 12 by 6 inches.
 3. Head and Hand Access: 18 by 10 inches.
 4. Head and Shoulders Access: 21 by 14 inches.
 5. Body Access: 25 by 14 inches.
 6. Body plus Ladder Access: 25 by 17 inches.

- I. Label access doors according to Section 23 0553 "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.
- J. Install flexible connectors to connect ducts to equipment.
- K. For fans developing static pressures of 5-inch wg and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.
- L. Connect terminal units to supply ducts directly.
- M. Install duct test holes where required for testing and balancing purposes.
- N. Install thrust limits at centerline of thrust, symmetrical on both sides of equipment. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch movement during start and stop of fans.

3.02 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Operate dampers to verify full range of movement.
 - 2. Inspect locations of access doors and verify that purpose of access door can be performed.
 - 3. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
 - 4. Inspect turning vanes for proper and secure installation.
 - 5. Operate remote damper operators to verify full range of movement of operator and damper.

END OF SECTION 23 3300

Section 23 3713.23 - Registers And Grilles

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Adjustable blade face grilles.
 - 2. Fixed face grilles.
- B. Related Requirements:
 - 1. Section 23 3300 "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to registers and grilles.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
 - 2. Register and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

1.03 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Ceiling suspension assembly members.
 - 2. Method of attaching hangers to building structure.
 - 3. Size and location of initial access modules for acoustical tile.
 - 4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
 - 5. Duct access panels.
- B. Source quality-control reports.

PART 2 - PRODUCTS

2.01 REGISTERS

- A. Fixed Face Register:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anemostat Products; a Mestek company.
 - b. Carnes Company.
 - c. Price Industries.
 - d. Titus.
 - e. Tuttle & Bailey.

2. Material: Steel.
3. Finish: Baked enamel, white.
4. Frame: 1 inch wide.
5. Accessory: Filter.

2.02 SOURCE QUALITY CONTROL

- A. Verification of Performance: Rate registers and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas where registers and grilles are installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install registers and grilles level and plumb.
- B. Outlets and Inlets Locations: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install registers and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.03 ADJUSTING

- A. After installation, adjust registers and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 23 3713

DIVISION 26

Section 26 0100 - Electrical Common Requirements

PART 1 - GENERAL

1.1 SUMMARY

- A. Submittal and Shop Drawing Requirements.
- B. Use of Engineer's Drawings and CAD files.

1.2 SUMMARY

- A. Section Includes:
 - 1. Electrical equipment coordination and installation.
 - 2. Common electrical installation requirements
- B. Division 26 contractor shall Provide and Install the following list for Division 27:
 - 1. Penetrations through Floors, Walls, Foundations etc.
 - 2. Sleeves in Floors, Walls, Foundations etc.
 - 3. Fire Blocking of Penetrations and Sleeves on the exterior.
 - 4. Backboxes.
 - 5. Surface Raceways.
 - 6. Conduit.
 - 7. Cabling routed in Exposed Ceiling Areas, Walls, below Grade shall be in conduit.
 - 8. Cable Trays in ER and TR's. (Refer to drawings)
 - 9. Coordinate pathways with Division 27 prior to installation.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.4 COORDINATION

- A. Coordinate arrangement, mounting, and support of electrical 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.


PART 2 - PRODUCTS

PART 3 - EXECUTION

3.1 SUBMITTAL AND SHOP DRAWING REQUIREMENTS.

- A. All submittals for this division shall be provided in electronic format. Hard copies shall not be submitted without prior approval from the Engineer. Files may be submitted via email, FTP site, or on CDROM and will be returned as electronic PDF files that are digitally signed and locked.
- B. Acceptable file formats for electronic files includes:
 - 1. Adobe Acrobat PDF files.
 - 2. Autodesk AutoCad DWG, DXF, or DWF files.
 - 3. Microsoft Excel XLS or XLSX files.
 - 4. Microsoft Word DOC or DOCX files.
 - 5. Microsoft Visio VSD files.
- C. Files shall be reviewed by the submitting contractor and be annotated with marks indicating the specific models, options, and accessories being supplied. Submitting contractor must include a stamp or graphic indicating that they have reviewed the submittal for accuracy, completeness, and list the specification section or drawing reference for each submittal.
- D. Do not combine specification sections into a single submittal package. Each specification section must have its own submittal.
- E. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittal if deemed necessary.
 - 1. Allow 10 calendar days from the date of receipt of the submittal by Engineer for initial review.
 - 2. Allow 10 calendar days from the date of receipt for each resubmittal to re-process and review.
 - 3. No extension to the contract time will be authorized due to failure to transmit submittals sufficiently in advance of the Work to permit processing.
- F. Submittals must contain the following items at a minimum:
 - 1. Transmittal/cover sheet listing:
 - a. Project Name
 - b. Contractor's Name, Address, Phone, and Email address.
 - c. Equipment Supplier/Representative Name, Address, Phone, and Email address.
 - d. Date of submission.
 - e. Specification section title and number for the submittal.
 - 2. Each submittal must include detailed engineering data for the specific products that will be used in conjunction with the project. General catalogs are not acceptable. Supplier/contractor shall highlight or make indication as to which items specifically will be used. Include the following items at a minimum:
 - a. Model number of product.
 - b. Capacity of equipment.

- c. Dimensional drawing of the product showing all rough-in locations, wiring connections, piping connections, and duct connections.
 - d. Show all minimum service clearances required for an installed unit.
 - e. Weight of product with any requirements for support and hanging devices.
 - f. Electrical wiring diagram showing all line voltage and control wiring within the equipment. Indicate the point of connection of all field installed wiring that is required.
 - g. Include warranty certificate listing the terms of the warranty.
- G. Engineer's Action.
1. The Engineer shall review shop drawings only for conformance with the design concept of the Project and with the information given in the Contract Documents. The Engineer's review of a separate item shall not indicate review of an assembly in which the item functions.
 2. The Engineer's review of shop drawings shall not relieve the Contactor of responsibility for any deviation from the requirements or the Contract Documents unless the Contractor has informed the Engineer in writing of such deviation at the time of submission in letter form. Notations on the submittal do not constitute informing the Engineer. The Engineer's action shall not relieve the Contractor from responsibility for errors or omissions in the shop drawings.
 3. Notations and remarks added to shop drawings by the Engineer are to insure compliance to Drawings and Specifications and do not imply a requested or approved change to contract cost. Should the Engineer's notations and remarks result in a change to the contract cost, it is the responsibility of the Contractor to advise the Engineer accordingly prior to performance of the work in question. If work that has been changed by the Engineer's review comments is performed without notifying the Engineer and the Owner of additional costs, any additional cost for the work shall be the sole responsibility of the Contractor.
 4. Should deviations, discrepancies, or conflicts between shop drawings and the Contract Documents be discovered, either prior to or after review, the Contract Documents shall control and be followed.
- H. Action Stamp.
1. The Engineer will stamp each submittal with a uniform, self-explanatory action stamp indicating the required action by the Contractor:

Commission No.	<i>Shop Drawing Review</i>
Spec. Sections:	Review No. 1
<input type="checkbox"/> REVIEWED & RELEASED	
<input type="checkbox"/> REVIEWED & RELEASED WITH CORRECTIONS	
<input type="checkbox"/> REVISE & RESUBMIT	
<input type="checkbox"/> REJECTED	
<input type="checkbox"/> NO ACTION REQUIRED	
<input type="checkbox"/> SEE TRANSMITTAL FOR NOTES	
<p>Reviewing is only for conformance with the design intent of the project and compliance with the information given in the Contract Documents. Corrections or comments made on the shop drawings during this review do not relieve Contractor from compliance with the requirements of the plans and specifications. Acceptance of a specific item shall not include acceptance of an assembly of which the item is a component. Contractor is solely responsible for: dimensions to be confirmed and correlated at the jobsite; information that pertains solely to the fabrication processes or to techniques and procedures of construction; manufacturer's instructions, industry standards, and for coordination of the work with all trades.</p>	
Reviewed by:	Date:
<i>Primary Engineering, Inc</i>	

- a. Final Unrestricted Release: Work may proceed, provided it complies with the contract documents, when submittal is returned with the following:
 - 1) "Reviewed and Released".
- b. Final, but Restricted Release: Work may proceed, provided it complies with the contract documents, notations and corrections as provided, when the submittal is returned with the following:
 - 1) "Reviewed and Released with Corrections".
- c. Revise and Resubmit: Do not proceed with work. Revise submittal in accordance with notations thereon and resubmit without delay to obtain a different action marking. Do not allow submittals with the following marking (or unmarked submittals) to be used in connection with performance of the work:
 - 1) "Revise and Resubmit".
 - 2) "Rejected".
- d. Other Action: Where a submittal is primarily for information purposes, special processing or activity, the submittal will be returned, marked "No Action Required".

3.2 USE OF ENGINEER'S DRAWING AND CAD FILES.

- A. The bid documents prepared by the Engineer are the property of the Engineer and shall not be copied without approval in writing from the Engineer.
- B. At the contractor's request, the Engineer will provide electronic copies of the source CAD files to the contractor for their convenience in preparation of shop drawings and submittals related to the project with the following terms and conditions;
 1. Electronic files are prepared using a variety of software tools that includes AutoCAD, Revit, Design Master, Excel, and various calculation tools. The Engineer makes no representation as to the compatibility of these files with your hardware or software configuration.

2. Data contained within these electronic files are part of our Instruments of Service and shall not be used by anyone other than the intended recipient for any other purpose than as a convenience in the preparation of shop drawings for the reference project. Any other use by you or others will be at your sole risk without liability or legal exposure to the Engineer. Recipient shall agree to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against the Engineer, it's officers, directors, employees, agents, or sub-consultants, that may arise out of or in connection with your use of these electronic files.
3. The recipient shall, to the fullest extent permitted by law, indemnify and hold the Engineer harmless against all damages, liabilities or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from your use of these electronic files.
4. These files are not construction documents. Differences may exist between the electronic files and corresponding hard-copy construction documents. The Engineer makes no representation regarding the accuracy or completeness of the files you receive. In the event a conflict arises between the signed or sealed hard copy construction documents prepared by the Engineer and the electronic files, the signed or sealed hard copy documents shall govern.
5. The recipient is responsible for verifying and coordinating all field measurements, field conditions, and systems onsite with your work and other contractors for the project.
6. Because electronic files can be modified, unintentionally or otherwise, the Engineer reserves the right to remove all indicia of ownership and/or involvement from each electronic file.
7. A service fee of \$100 per electronic file shall be remitted to us along with a signed copy of a release prior to delivery of the electronic files. This fee is to cover processing time to prepare the files by binding reference drawings, removing proprietary information, and formatting the files as directed.
8. Under no circumstances shall delivery of the electronic files for use by you be deemed a sale by us, and we make no warranties, either express or implied, of merchantability and fitness for any particular purpose. In no event shall the Engineer be held liable for any loss or profit or any consequential damages as a result of your use of the files.
9. Any party requesting use of these files must do so by submitting a written request describing what files are needed and what the intended use will be.

3.3 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1.
- B. Refer to drawings for mounting heights.
- 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 electrical 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.

3.4 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical 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 26 0100

Section 26 0519 - Low-Voltage Electrical Power Conductors And Cables

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Copper building wire rated 600 V or less.
 - 2. Connectors, splices, and terminations rated 600 V and less.

1.2 DEFINITIONS

- A. VFC: Variable-frequency controller.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: Indicate type, use, location, and termination locations.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer's authorized service representative.
- B. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA.
 - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

- A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Alpha Wire Company.
 - 2. Belden Inc.
 - 3. Encore Wire Corporation.
 - 4. General Cable Technologies Corporation.
 - 5. Okonite Company (The).
 - 6. Southwire Company.
- C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
 2. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- D. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.
- E. Conductor Insulation:
1. Type THHN and Type THWN-2: Comply with UL 83.
 2. Type THW and Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
 3. Type XHHW-2: Comply with UL 44.

2.2 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. #10 AWG and smaller conductor joints shall be made using "Scotchlock", "Wire nut" or equal (copper sleeves are not acceptable). Fixture wiring connections:
1. Lights: Wiring connections within fluorescent fixture channel, #12AWG wire to #18AWG ballast wire, may be made using Kleinhuis "P-NUT" push-on butt connector, Cat. #2003/2.5/3 (stranded wire must be tinned prior to installation) or vinyl covered spring devices, "Scotchlock", "Wire nut", installed per manufacturer's recommendations, or approved equal.
 2. Motors (480V or less): For #10 AWG and smaller conductors - provide taped connector eye lug of motor lead to looped input conductors, using machine bolt/nut arrangement to facilitate rapid disconnecting.
 3. All other connections in fixtures shall be made using vinyl covered spring device, "Scotchlock", "Wire nut", installed per manufacturer's recommendations or an approved equal.
 4. Connections under screw head terminals; solid conductors shall have formed eyes; stranded conductors shall have an approved nylon compression terminal as T & B "Sta-Kon" or approved equal.
 5. Connection on receptacles can be back wired if receptacle is provided with a screw and clamp feature

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Branch Circuits: Copper. Solid or Stranded for No. 12 AWG and smaller; stranded for No. 10 AWG and larger. Do not mix solid and stranded conductors.
- B. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Exposed Branch Circuits, Including in Crawlspace: Type THHN/THWN-2, single conductors in raceway.
- B. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.
- C. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 26 05 33 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. 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.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.
- F. Support cables according to Section 26 05 29 "Hangers and Supports for Electrical Systems."

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than un-spliced conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.5 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 26 05 53 "Identification for Electrical Systems."

- B. Identify each spare conductor at each end with identity number and location of other end of conductor and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 05 44 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.7 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 07 84 13 "Penetration Firestopping."

3.8 FIELD QUALITY CONTROL

- A. Perform tests and inspections with the assistance of a factory-authorized service representative.
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
 - a. .
 - 2. Perform each of the following visual and electrical tests:
 - a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
 - b. Test bolted connections for high resistance using one of the following:
 - 1) A low-resistance ohmmeter.
 - 2) Calibrated torque wrench.
 - 3) Thermographic survey.
 - c. Inspect compression-applied connectors for correct cable match and indentation.
 - d. Inspect for correct identification.
 - e. Inspect cable jacket and condition.
 - f. Insulation-resistance test on each conductor for ground and adjacent conductors. Apply a potential of 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable for a one-minute duration.
 - g. Continuity test on each conductor and cable.
 - h. Uniform resistance of parallel conductors.
- B. Cables will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports to record the following:
 - 1. Procedures used.
 - 2. Results that comply with requirements.
 - 3. Results that do not comply with requirements, and corrective action taken to achieve compliance with requirements.

END OF SECTION 26 0519

Section 26 0526 - Grounding And Bonding For Electrical Systems

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes grounding and bonding systems and equipment.

1.2 ACTION SUBMITTALS

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

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency and testing agency's field supervisor.
- B. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Certified by NETA.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Burndy; Part of Hubbell Electrical Systems.
 2. ERICO International Corporation.
 3. Galvan Industries, Inc.; Electrical Products Division, LLC.
 4. Harger Lightning & Grounding.
 5. ILSCO.
 6. O-Z/Gedney; a brand of Emerson Industrial Automation.
 7. Robbins Lightning, Inc.
 8. SIEMENS Industry, Inc.; Energy Management Division.

9. Thomas & Betts Corporation; A Member of the ABB Group.

2.3 CONDUCTORS

- A. Insulated Conductors: Copper or tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 1. Solid Conductors: ASTM B 3.
 2. Stranded Conductors: ASTM B 8.
 3. Tinned Conductors: ASTM B 33.
 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
 5. Bonding Conductor: No. 4, stranded conductor.
 6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.4 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Cable-to-Cable Connectors: Compression type, copper or copper alloy.
- C. Conduit Hubs: Mechanical type, terminal with threaded hub.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid or stranded conductor for No. 10 AWG and smaller, and stranded conductors for No. 8 AWG and larger unless otherwise indicated.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.

3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
 1. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.

- C. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install tinned bonding jumper to bond across flexible duct connections to achieve continuity.
- D. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.
 - 1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
 - 2. Make connections with clean, bare metal at points of contact.
 - 3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
 - 4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
 - 5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

3.4 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 - 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 - 3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells, and at individual ground rods. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.
- B. Grounding system will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.
- D. Report measured ground resistances that exceed the following values:
 - 1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 510 ohms.
- E. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 26 0526

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Section 26 0529 - Hangers And Supports For Electrical Systems

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel slotted support systems.
2. Conduit and cable support devices.
3. Support for conductors in vertical conduit.
4. Structural steel for fabricated supports and restraints.
5. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
6. Fabricated metal equipment support assemblies.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
 - a. Slotted support systems, hardware, and accessories.
 - b. Clamps.
 - c. Hangers.
 - d. Sockets.
 - e. Eye nuts.
 - f. Fasteners.
 - g. Anchors.
 - h. Saddles.
 - i. Brackets.
 - j. Include rated capacities and furnished specialties and accessories.

B. Shop Drawings: For fabrication and installation details for electrical hangers and support systems.

1. Hangers. Include product data for components.
2. Slotted support systems.
3. Equipment supports.
4. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

C. Delegated-Design Submittal: For hangers and supports for electrical systems.

1. Include design calculations and details of hangers.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.4 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
1. AWS D1.1/D1.1M.
 2. AWS D1.2/D1.2M.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design hanger and support system.
1. .

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch-diameter holes at a maximum of 8 inches o.c. in at least one surface.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit; a part of Atkore International.
 - b. B-line, an Eaton business.
 - c. ERICO International Corporation.
 - d. Flex-Strut Inc.
 - e. G-Strut.
 - f. Thomas & Betts Corporation; A Member of the ABB Group.
 - g. Unistrut; Part of Atkore International.
 2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
 3. Material for Channel, Fittings, and Accessories: Galvanized steel.
 4. Channel Width: 1-5/8 inches.
 5. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 6. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 7. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.
- D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.

- E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened portland cement concrete, 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) B-line, an Eaton business.
 - 2) Hilti, Inc.
 - 3) ITW Ramset/Red Head; Illinois Tool Works, Inc.
 - 4) MKT Fastening, LLC.
 2. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
 3. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
 4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 5. Toggle Bolts: Stainless-steel springhead type.
 6. Hanger Rods: Threaded steel.

2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Section 05 50 00 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:
1. NECA 1.
 2. NECA 101.
 3. NECA 102.
- B. Comply with requirements in Section 07 84 13 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.
- C. Comply with requirements for raceways and boxes specified in Section 26 05 33 "Raceways and Boxes for Electrical Systems."
- D. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and RMC as scheduled in NECA 1, where its Table 1 lists

maximum spacings that are less than those stated in NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

- E. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with single-bolt conduit clamps using spring friction action for retention in support channel.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.
- B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
 - 5. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
 - 6. To Light Steel: Sheet metal screws.
 - 7. 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.
- D. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Section 05 50 00 "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- 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 0529

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Section 26 0533 - Raceways And Boxes For Electrical Systems

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Metal conduits and fittings.
 - 2. Auxiliary gutters.
 - 3. Surface raceways.
 - 4. Boxes, enclosures, and cabinets.
- B. Related Requirements:
 - 1. Section 07 84 13 "Penetration Firestopping" for firestopping at conduit and box entrances.

1.2 DEFINITIONS

- A. GRC: Galvanized rigid steel conduit.
- B. IMC: Intermediate metal conduit.

1.3 ACTION SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.4 INFORMATIONAL SUBMITTALS

- A. Source quality-control reports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

- A. Metal Conduit:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AFC Cable Systems; a part of Atkore International.
 - b. Allied Tube & Conduit; a part of Atkore International.
 - c. Calconduit.
 - d. Opti-Com Manufacturing Network, Inc (OMNI).
 - e. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - f. Patriot Aluminum Products, LLC.
 - g. Republic Conduit.

2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. GRC: Comply with ANSI C80.1 and UL 6.
4. IMC: Comply with ANSI C80.6 and UL 1242.
5. EMT: Comply with ANSI C80.3 and UL 797.
6. FMC: Comply with UL 1; zinc-coated steel or aluminum.
7. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

B. Metal Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AFC Cable Systems; a part of Atkore International.
 - b. Allied Tube & Conduit; a part of Atkore International.
 - c. Anamet Electrical, Inc.
 - d. Electri-Flex Company.
 - e. NEC, Inc.
 - f. Opti-Com Manufacturing Network, Inc (OMNI).
 - g. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - h. Patriot Aluminum Products, LLC.
2. Comply with NEMA FB 1 and UL 514B.
3. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
4. Fittings, General: Listed and labeled for type of conduit, location, and use.
5. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
6. Fittings for EMT:
 - a. Material: Steel.
 - b. Type: Setscrew.
7. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.

- C. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 AUXILIARY GUTTERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. B-line, an Eaton business.
 2. Hoffman; a brand of Pentair Equipment Protection.
 3. MonoSystems, Inc.
 4. Square D.
- B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 12 unless otherwise indicated, and sized according to NFPA 70.

- C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Finish: Manufacturer's standard enamel finish.

2.3 SURFACE RACEWAYS

- A. Listing and Labeling: Surface raceways and tele-power poles shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Surface Metal Raceways: Galvanized steel with snap-on covers complying with UL 5. Manufacturer's standard enamel finish in color selected by Architect.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Wiremold / Legrand.
- C. Surface Nonmetallic Raceways: Two- or three-piece construction, complying with UL 5A, and manufactured of rigid PVC with texture and color selected by Architect from manufacturer's standard colors. Product shall comply with UL 94 V-0 requirements for self-extinguishing characteristics.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Wiremold / Legrand.

2.4 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Crouse-Hinds, an Eaton business.
 - 2. EGS/Appleton Electric.
 - 3. Erickson Electrical Equipment Company.
 - 4. Hoffman; a brand of Pentair Equipment Protection.
 - 5. Hubbell Incorporated.
 - 6. Hubbell Incorporated; Wiring Device-Kellems.
 - 7. O-Z/Gedney; a brand of Emerson Industrial Automation.
- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.
- E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

- F. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- G. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.
- H. Gangable boxes are prohibited.
- I. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 12 with continuous-hinge cover with flush latch unless otherwise indicated.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - 2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- J. Cabinets:
 - 1. NEMA 250, Type 12 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.
 - 6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Indoors: Apply raceway products as specified below unless otherwise indicated:
 - 1. Exposed, Not Subject to Physical Damage 2" and smaller: EMT.
 - 2. Exposed, Not Subject to Physical Damage larger than 2": GRC.
 - 3. Exposed and Subject to Severe Physical Damage: GRC. Raceway locations include the following:
 - a. Loading dock.
 - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
 - c. Mechanical rooms.
 - 4. Concealed in Ceilings and Interior Walls and Partitions 2" and smaller: EMT.
 - 5. Concealed in Ceilings and Interior Walls and Partitions larger than 2": IMC
 - 6. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 - 7. Damp or Wet Locations: GRC.
 - 8. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.
- B. Minimum Raceway Size for EMT, GRC, IMC, PVC: 3/4-inch trade size.
- C. Minimum Raceway Size for LFMC, FMC: 1/2-inch trade size.

- D. Minimum Raceway Size for fixture whips: 3/8-inch trade size.
- E. Raceway Fittings: Compatible with raceways and suitable for use and location.
 - 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 - 2. EMT: Use setscrew, steel fittings. Comply with NEMA FB 2.10.
 - 3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- F. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.
- G. Install surface raceways only where indicated on Drawings.

3.2 INSTALLATION

- A. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for hangers and supports.
- B. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- C. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- D. Complete raceway installation before starting conductor installation.
- E. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.
- G. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.
- H. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- I. Support conduit within 12 inches of enclosures to which attached.
- J. Stub-Ups to Above Recessed Ceilings:
 - 1. Use EMT, IMC, or RMC for raceways.
 - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

- K. 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.
- L. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- M. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- N. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- O. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- P. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- Q. Surface Raceways:
 - 1. Install surface raceway with a minimum 2-inch radius control at bend points.
 - 2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- R. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.
- S. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
 - 1. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
 - 2. Where otherwise required by NFPA 70.
- T. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 36 inches for equipment subject to vibration, noise transmission, or movement; and for transformers and motors and 72 inches of flexible conduit for recessed and semirecessed luminaires, .
 - 1. Use LFMC in damp or wet locations subject to severe physical damage.
 - 2. Use LFMC in damp or wet locations not subject to severe physical damage.

- U. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to bottom of box unless otherwise indicated.
- V. Horizontally separate boxes mounted on opposite sides of walls, so they are not in the same vertical channel.
- W. Locate boxes so that cover or plate will not span different building finishes.
- X. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- Y. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 05 44 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.4 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 07 84 13 "Penetration Firestopping."

3.5 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 2. Repair damage to paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 26 0533

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Section 26 0544 - Sleeves And Sleeve Seals For Electrical Raceways And Cabling

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
 - 2. Grout.
 - 3. Silicone sealants.
- B. Related Requirements:
 - 1. Section 07 84 13 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.2 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Wall Sleeves:
 - 1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
 - 2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral water-stop unless otherwise indicated.
- B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

2.2 SILICONE SEALANTS

- A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
- B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.
- B. Comply with NEMA VE 2 for cable tray and cable penetrations.
- C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
 - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
 - a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 07 92 00 "Joint Sealants."
 - b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
 - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 3. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.
 - 4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
- D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
 - 1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.

END OF SECTION 26 0544

Section 26 0553 - Identification For Electrical Systems

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Color and legend requirements for raceways, conductors, and warning labels and signs.
 - 2. Labels.
 - 3. Bands and tubes.
 - 4. Tapes and stencils.
 - 5. Tags.
 - 6. Signs.
 - 7. Cable ties.
 - 8. Paint for identification.
 - 9. Fasteners for labels and signs.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for electrical identification products.
- B. Identification Schedule: For each piece of electrical equipment and electrical system components to be an index of nomenclature for electrical equipment and system components used in identification signs and labels. Use same designations indicated on Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with NFPA 70.
- B. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- 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.
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 COLOR AND LEGEND REQUIREMENTS

- A. Raceways and Cables Carrying Circuits at 600 V or Less:

1. Black letters on an orange field.
 2. Legend: Indicate voltage and system or service type.
- B. Color-Coding for Phase- and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.
1. Color shall be factory applied.
 2. Colors for 208/120-V Circuits:
 - a. Phase A: Black
 - b. Phase B: Red
 - c. Phase C: Blue
 - d. Phase A Neutral: White with black strip
 - e. Phase B Neutral: White with red strip
 - f. Phase C Neutral: White with blue strip
 - g. Switch Leg Return: Yellow
 - h. Switch Travelers: Orange
- C. Warning Label Colors:
1. Identify system voltage with black letters on an orange background.
- D. Warning labels and signs shall include, but are not limited to, the following legends:
1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
 2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."
- E. Equipment Identification Labels:
1. Black letters on a white field.

2.3 LABELS

- A. Self-Adhesive Wraparound Labels: Preprinted, 3-mil-thick, vinyl flexible label with acrylic pressure-sensitive adhesive.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brady Corporation.
 - b. Ideal Industries, Inc.
 - c. LEM Products Inc.
 - d. Panduit Corp.
 - e. Seton Identification Products.
 2. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
 3. Marker for Labels: Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.
- B. Self-Adhesive Labels: Vinyl, thermal, transfer-printed, 3-mil-thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brady Corporation.
 - b. Ideal Industries, Inc.
 - c. LEM Products Inc.
 - d. Marking Services, Inc.
 - e. Panduit Corp.
 - f. Seton Identification Products.
2. Minimum Nominal Size:
 - a. 1-1/2 by 6 inches for raceway and conductors.
 - b. 3-1/2 by 5 inches for equipment.
 - c. As required by authorities having jurisdiction.

2.4 BANDS AND TUBES

- A. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameter and shrunk to fit firmly. Full shrink recovery occurs at a maximum of 200 deg F. Comply with UL 224.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brady Corporation.
 - b. Panduit Corp.

2.5 TAPES AND STENCILS

- A. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mils thick by 1 to 2 inches wide; compounded for outdoor use.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brady Corporation.
 - b. Carlton Industries, LP.
 - c. emedco.
 - d. Marking Services, Inc.
- B. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch.

2.6 TAGS

- A. Nonmetallic Preprinted Tags: Polyethylene tags, 0.023 inch thick, color-coded for phase and voltage level, with factory printed permanent designations; punched for use with self-locking cable tie fastener.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brady Corporation.
 - b. Carlton Industries, LP.
 - c. LEM Products Inc.
 - d. Marking Services, Inc.
 - e. Panduit Corp.

f. Seton Identification Products.

B. Write-on Tags:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Carlton Industries, LP.
 - b. LEM Products Inc.
 - c. Seton Identification Products.
2. Polyester Tags: 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment.
3. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
4. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.7 SIGNS

A. Laminated Acrylic or Melamine Plastic Signs:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brady Corporation.
 - b. Carlton Industries, LP.
 - c. Marking Services, Inc.
2. Engraved legend.
3. Thickness:
 - a. For signs up to 20 sq. in., minimum 1/16 inch thick.
 - b. For signs larger than 20 sq. in., 1/8 inch thick.
 - c. Engraved legend with black letters on white face.
 - d. Self-adhesive.
 - e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.8 CABLE TIES

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

1. HellermannTyton.
2. Ideal Industries, Inc.
3. Marking Services, Inc.
4. Panduit Corp.

B. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 Deg F according to ASTM D 638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black, except where used for color-coding.

- C. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch.
 - 2. Tensile Strength at 73 Deg F according to ASTM D 638: 12,000 psi.
 - 3. Temperature Range: Minus 40 to plus 185 deg F.
 - 4. Color: Black.

- D. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.
 - 1. Minimum Width: 3/16 inch.
 - 2. Tensile Strength at 73 Deg F according to ASTM D 638: 7000 psi.
 - 3. UL 94 Flame Rating: 94V-0.
 - 4. Temperature Range: Minus 50 to plus 284 deg F.
 - 5. Color: Black.

2.9 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).

- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.2 INSTALLATION

- A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

- B. Install identifying devices before installing acoustical ceilings and similar concealment.

- C. Verify identity of each item before installing identification products.

- D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

- E. Apply identification devices to surfaces that require finish after completing finish work.

- F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.

- G. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.
 - 1. Secure tight to surface of conductor, cable, or raceway.
- H. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
- I. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.
- J. Accessible Fittings for Raceways: Identify the covers of each junction and pull box of the following systems with the wiring system legend and system voltage. System legends shall be as follows:
 - 1. "POWER."
- K. Vinyl Wraparound Labels:
 - 1. Secure tight to surface of raceway or cable at a location with high visibility and accessibility.
 - 2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.
- L. Self-Adhesive Wraparound Labels: Secure tight to surface at a location with high visibility and accessibility.
- M. Self-Adhesive Labels:
 - 1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
 - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high label; where two lines of text are required, use labels 2 inches high.
- N. Heat-Shrink, Preprinted Tubes: Secure tight to surface at a location with high visibility and accessibility.
- O. Marker Tapes: Secure tight to surface at a location with high visibility and accessibility.
- P. Self-Adhesive Vinyl Tape: Secure tight to surface at a location with high visibility and accessibility.
- Q. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.
- R. Nonmetallic Preprinted Tags:
 - 1. Place in a location with high visibility and accessibility.
 - 2. Secure using plenum-rated cable ties.
- S. Write-on Tags:
 - 1. Place in a location with high visibility and accessibility.
 - 2. Secure using plenum-rated cable ties.

- T. Laminated Acrylic or Melamine Plastic Signs:
 - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
 - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high sign; where two lines of text are required, use labels 2 inches high.

- U. Cable Ties: General purpose, for attaching tags, except as listed below:
 - 1. Outdoors: UV-stabilized nylon.
 - 2. In Spaces Handling Environmental Air: Plenum rated.

3.3 IDENTIFICATION SCHEDULE

- A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

- B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

- C. Accessible Raceways, 600 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive raceway labels.
 - 1. Locate identification 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.

- D. Accessible Fittings for Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive labels containing the wiring system legend and system voltage. System legends shall be as follows:
 - 1. "POWER."

- E. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use self-adhesive vinyl tape to identify the phase.
 - 1. Locate identification 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.

- F. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive labels with the conductor or cable designation, origin, and destination.

- G. Control-Circuit Conductor Termination Identification: For identification at terminations, provide self-adhesive labels with the conductor designation.

- H. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.

- I. Auxiliary Electrical Systems Conductor Identification: Self-adhesive vinyl tape that is uniform and consistent with system used by manufacturer for factory-installed connections.
 - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.

- J. Instructional Signs: Self-adhesive labels, including the color code for grounded and ungrounded conductors.

- K. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive labels.
 - 1. Apply to exterior of door, cover, or other access.
 - 2. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:
 - a. Power-transfer switches.
 - b. Controls with external control power connections.
 - c. Arc-flash analysis should be performed by qualified personnel, with labels printed or made for each piece of equipment and should comply with NFPA 70E and Section 26 05 74 "Overcurrent Protective Device Arch-Flash Study." Retain "Delegated-Design Submittal" Paragraph in "Action Submittals" Article if Contractor is responsible for arc-flash analysis.

- L. Operating Instruction Signs: Laminated acrylic or melamine plastic signs.

- M. Equipment Identification Labels:
 - 1. Indoor Equipment: Laminated acrylic or melamine plastic sign.
 - 2. Equipment to Be Labeled:
 - a. Enclosures and electrical cabinets.
 - b. Access doors and panels for concealed electrical items.
 - c. Remote-controlled switches, dimmer modules, and control devices.

END OF SECTION 26 0553

Section 26 2726 - Wiring Devices

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Straight-blade convenience.
 - 2. GFCI receptacles.
 - 3. Toggle switches.
 - 4. Wall-box dimmers.
 - 5. Wall plates.

1.2 DEFINITIONS

- A. Abbreviations of Manufacturers' Names:
 - 1. Hubbell: Hubbell Incorporated: Wiring Devices-Kellems.
 - 2. Leviton: Leviton Mfg. Company, Inc.
 - 3. Pass & Seymour: Pass& Seymour/Legrand.
- B. BAS: Building automation system.
- C. EMI: Electromagnetic interference.
- D. GFCI: Ground-fault circuit interrupter.
- E. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- F. RFI: Radio-frequency interference.
- G. SPD: Surge protective device.
- H. UTP: Unshielded twisted pair.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

PART 2 - PRODUCTS

2.1 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.
- C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
 - 1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
 - 2. Devices shall comply with the requirements in this Section.
- D. Devices for Owner-Furnished Equipment:
 - 1. Receptacles: Match plug configurations.
 - 2. Cord and Plug Sets: Match equipment requirements.
- E. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 STRAIGHT-BLADE RECEPTACLES

- A. Duplex Convenience Receptacles: 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Hubbell Incorporated; Wiring Device-Kellems; HBL5351 (single), HBL5352 (duplex).
 - b. Leviton Manufacturing Co., Inc.; 5891 (single), 5352 (duplex).
 - c. Pass & Seymour/Legrand (Pass & Seymour); 5361 (single), 5362 (duplex).

2.3 GFCI RECEPTACLES

- A. General Description:
 - 1. 125 V, 20 A, straight blade, feed-through type.
 - 2. Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, UL 943 Class A, and FS W-C-596.
 - 3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.
- B. Duplex GFCI Convenience Receptacles:
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Hubbell Incorporated; Wiring Device-Kellems; 8300
 - b. Leviton Manufacturing Co., Inc.; 7899.
 - c. Pass & Seymour/Legrand (Pass & Seymour); 2095.

2.4 TOGGLE SWITCHES

- A. Comply with NEMA WD 1, UL 20, and FS W-S-896.
- B. Switches, 120/277 V, 20 A:
 - 1. Single Pole:
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Hubbell Incorporated; Wiring Device-Kellems; HBL1221.
 - 2) Leviton Manufacturing Co., Inc.; 1221-2.
 - 3) Pass & Seymour/Legrand (Pass & Seymour); CSB20AC1.
 - 2. Two Pole:
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Hubbell Incorporated; Wiring Device-Kellems; HBL1222.
 - 2) Leviton Manufacturing Co., Inc.; 1222-2.
 - 3) Pass & Seymour/Legrand (Pass & Seymour); CSB20AC2.
 - 3. Three Way:
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Hubbell Incorporated; Wiring Device-Kellems; HBL1223.
 - 2) Leviton Manufacturing Co., Inc.; 1223-2.
 - 3) Pass & Seymour/Legrand (Pass & Seymour); CSB20AC3.
 - 4. Four Way:
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Hubbell Incorporated; Wiring Device-Kellems; HBL1224.
 - 2) Leviton Manufacturing Co., Inc.; 1224-2.
 - 3) Pass & Seymour/Legrand (Pass & Seymour); CSB20AC4.

2.5 WALL PLATES

- A. Single and combination types shall match corresponding wiring devices.
 - 1. Plate-Securing Screws: Metal with head color to match plate finish.
 - 2. Material for Finished Spaces: Smooth, high-impact thermoplastic.
 - 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 and damp locations.
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

2.6 FINISHES

- A. Device Color:
 - 1. Wiring Devices Connected to Normal Power System: Ivory
- B. Wall Plate Color: For plastic covers, match device color.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
- B. Coordination with Other Trades:
 - 1. Protect installed devices and their boxes. 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 boxes.
 - 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 - 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 - 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
 - 1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
 - 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 - 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
 - 4. Existing Conductors:
 - a. Cut back and pigtail or replace all damaged conductors.
 - b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pig-tailing existing conductors is permitted, provided the outlet box is large enough.
- D. Device Installation:
 - 1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
 - 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
 - 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
 - 4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
 - 5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
 - 6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
 - 7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.

8. Tighten unused terminal screws on the device.
 9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.
- E. Receptacle Orientation:
1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.
- F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
- G. Dimmers:
1. Install dimmers within terms of their listing.
 2. Verify that dimmers used for fan-speed control are listed for that application.
 3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.
- H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.
- I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.
- 3.2 GFCI RECEPTACLES
- A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.
- 3.3 IDENTIFICATION
- A. Comply with Section 26 05 53 "Identification for Electrical Systems."
- B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.
- 3.4 FIELD QUALITY CONTROL
- A. Test Instruments: Use instruments that comply with UL 1436.
- B. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- C. Perform the following tests and inspections:
1. Test Instruments: Use instruments that comply with UL 1436.
 2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

- D. Tests for Convenience Receptacles:
1. Line Voltage: Acceptable range is 105 to 132 V.
 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
 3. Ground Impedance: Values of up to 2 ohms are acceptable.
 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 5. Using the test plug, verify that the device and its outlet box are securely mounted.
 6. 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.
- E. Wiring device will be considered defective if it does not pass tests and inspections.

END OF SECTION 26 2726

Section 26 2816 - Enclosed Switches And Circuit Breakers

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fusible switches.
 - 2. Nonfusible switches.
 - 3. Enclosures.

1.2 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
 - 1. Enclosure types and details for types other than NEMA 250, Type 1.
 - 2. Current and voltage ratings.
 - 3. Short-circuit current ratings (interrupting and withstand, as appropriate).
 - 4. Include evidence of a nationally recognized testing laboratory (NRTL) listing for series rating of installed devices.
 - 5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
- B. Shop Drawings: For enclosed switches and circuit breakers.
 - 1. Include plans, elevations, sections, details, and attachments to other work.
 - 2. Include wiring diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals.
 - 1. In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," include the following:

- a. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
 2. Fuse Pullers: Two for each size and type.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Accredited by NETA.
 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
 2. Altitude: Not exceeding 6600 feet.

1.9 COORDINATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

1.10 WARRANTY

- A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.
 1. Warranty Period: One year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- D. Comply with NFPA 70.

2.2 FUSIBLE SWITCHES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Siemens Industry, Inc.; <product name or designation> or a comparable product by one of the following:
 - 1. General Electric Company.
 - 2. Square D; by Schneider Electric.
- B. Type HD, Heavy Duty:
 - 1. Single throw.
 - 2. Three pole.
 - 3. 240 and 600-V ac.
 - 4. 1200 A and smaller.
 - 5. UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate [specified] [indicated] fuses.
 - 6. Lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
 - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - 3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
 - 4. Auxiliary Contact Kit: Two NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Refer to Drawings for contact rating(s).
 - 5. Hookstick Handle: Allows use of a hookstick to operate the handle.
 - 6. Lugs: Mechanical type, suitable for number, size, and conductor material.
 - 7. Service-Rated Switches: Labeled for use as service equipment.

2.3 NONFUSIBLE SWITCHES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Siemens Industry, Inc.; <product name or designation> or a comparable product by one of the following:
 - 1. General Electric Company.
 - 2. Square D; by Schneider Electric.
- B. Type HD, Heavy Duty, Three Pole, Single Throw, 240 and 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Auxiliary Contact Kit: Two NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Refer to Drawings for contact rating(s).
5. Hookstick Handle: Allows use of a hookstick to operate the handle.
6. Lugs: Mechanical type, suitable for number, size, and conductor material.
7. Service-Rated Switches: Labeled for use as service equipment.

2.4 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
- B. Enclosure Finish: The enclosure shall be finished with gray baked enamel paint, electrodeposited on cleaned, phosphatized steel (NEMA 250 Type 1) gray baked enamel paint, electrodeposited on cleaned, phosphatized galvanized steel (NEMA 250 Types 3R, 12), and a brush finish on Type 304 stainless steel (NEMA 250 Type 4-4X stainless steel). Refer to Drawings for enclosure type.
- C. Conduit Entry: NEMA 250 Types 4, 4X, and 12 enclosures shall contain no knockouts.
- D. Operating Mechanism: The circuit-breaker operating handle shall be externally operable with the operating mechanism being an integral part of the box, not the cover. The cover interlock mechanism shall have an externally operated override. The override shall not permanently disable the interlock mechanism, which shall return to the locked position once the override is released. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.
- E. Enclosures designated as NEMA 250 Type 4, 4X stainless steel shall have a dual cover interlock mechanism to prevent unintentional opening of the enclosure cover when the circuit breaker is ON and to prevent turning the circuit breaker ON when the enclosure cover is open.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 1. Commencement of work shall indicate Installer's acceptance of the areas and conditions as satisfactory.

3.2 PREPARATION

- A. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
1. Notify Engineer and Owner no fewer than seven days in advance of proposed interruption of electric service.
 2. Indicate method of providing temporary electric service.
 3. Do not proceed with interruption of electric service without Engineer's written permission.
 4. Comply with NFPA 70E.

3.3 ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS

- A. Enclosed Switches and Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.
1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
 2. Outdoor Locations: NEMA 250, Type 3R.
 3. Kitchen or Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
 4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
 5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

3.4 INSTALLATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- C. Temporary Lifting Provisions: Remove temporary lifting of eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- D. Install fuses in fusible devices.
- E. Comply with NFPA 70 and NECA 1.

3.5 IDENTIFICATION

- A. Comply with requirements in Section 26 05 53 "Identification for Electrical Systems."
1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.6 FIELD QUALITY CONTROL

- A. Tests and Inspections for Switches:

1. Visual and Mechanical Inspection:
 - a. Inspect physical and mechanical condition.
 - b. Inspect anchorage, alignment, grounding, and clearances.
 - c. Verify that the unit is clean.
 - d. Verify blade alignment, blade penetration, travel stops, and mechanical operation.
 - e. Verify that fuse sizes and types match the Specifications and Drawings.
 - f. Verify that each fuse has adequate mechanical support and contact integrity.
 - g. Verify that operation and sequencing of interlocking systems is as described in the Specifications and shown on the Drawings.
 - h. Verify correct phase barrier installation.
 - i. Verify lubrication of moving current-carrying parts and moving and sliding surfaces.
2. Electrical Tests:
 - a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
 - b. Measure contact resistance across each switchblade fuseholder. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
 - c. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
 - d. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.

3.7 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly and lubricate as recommended by manufacturer.

END OF SECTION 26 2816

Section 26 5119 - Led Interior Lighting

PART 1 - GENERAL

1.1 SUMMARY

- A. Refer to fixture schedule.

1.2 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating.
- E. LED: Light-emitting diode.
- F. Lumen: Measured output of lamp and luminaire, or both.
- G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Arrange in order of luminaire designation.
 - 2. Include data on features, accessories, and finishes.
 - 3. Include physical description and dimensions of luminaires.
 - 4. Include emergency lighting units, including batteries and chargers.
 - 5. Include life, output (lumens, CCT, and CRI), and energy-efficiency data.
 - 6. Photometric data and adjustment factors based on laboratory tests, complying with IES "Lighting Measurements Testing and Calculation Guides" for each luminaire type. The adjustment factors shall be for lamps and accessories identical to those indicated for the luminaire as applied in this Project IES LM-80.
 - a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
 - b. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.
- B. Product Schedule: For luminaires. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing laboratory providing photometric data for luminaires.

- B. Product Certificates: For each type of luminaire.
- C. Product Test Reports: For each type of luminaire, for tests performed by manufacturer and witnessed by a qualified testing agency.
- D. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.
 - 1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

1.6 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.
- B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient Lighting Products, and complying with the applicable IES testing standards.
- C. Provide luminaires from a single manufacturer for each luminaire type.
- D. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

1.8 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
- B. Warranty Period: Five year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Ambient Temperature: 41 to 104 deg F.
 - 1. Relative Humidity: Zero to 95 percent.

- B. Altitude: Sea level to 1000 feet.

2.2 LUMINAIRE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
 - 1. Label shall include the following lamp characteristics:
 - a. "USE ONLY" and include specific lamp type.
 - b. Lamp diameter, shape, size, wattage, and coating.
 - c. CCT and CRI.
- C. Recessed luminaires shall comply with NEMA LE 4.
- D. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.
- E. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

2.3 EMERGENCY LED POWER UNIT

- A. Manufacturer: Subject to compliance requirements, provide products by one of the following:
 - 1. Philips Bodine
 - 2. Iota
 - 3. Tridonic
- B. Internal Type: Self-contained, modular, battery-inverter unit, factory mounted within luminaire body and compatible with driver. Comply with UL 924.
 - 1. Emergency Connection: Operate module(s) at full lumen output. Connect unswitched circuit to battery-inverter unit and switched circuit to luminaire driver.
 - 2. Test Push Button and Indicator Light: Visible and accessible without opening luminaire or entering ceiling space.
 - 3. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - 4. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 - 5. Battery: Sealed, maintenance-free, nickel-cadmium type.
 - 6. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.
 - 7. Self -Diagnostic – Battery operated exit signs shall be equipped with a self-diagnostic feature that includes a 30-day test and annual 90-minute discharge test or testing as directed by the manufacturer. Both tests are to be fully automatic.

2.4 MATERIALS

- A. Metal Parts:
 - 1. Free of burrs and sharp corners and edges.
 - 2. Sheet metal components shall be steel unless otherwise indicated.
 - 3. Form and support to prevent warping and sagging.
- B. Steel:
 - 1. ASTM A 36/A 36M for carbon structural steel.
 - 2. ASTM A 568/A 568M for sheet steel.
- C. Stainless Steel:
 - 1. 1. Manufacturer's standard grade.
 - 2. 2. Manufacturer's standard type, ASTM A 240/240 M.
- D. Galvanized Steel: ASTM A 653/A 653M.
- E. Aluminum: ASTM B 209.

2.5 METAL FINISHES

- A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

2.6 LUMINAIRE SUPPORT

- A. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.
- C. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, 12 gage.
- D. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.
- E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 TEMPORARY LIGHTING

- A. New Fixtures shall not be used for temporary fixtures. Contractor shall provide temporary lighting as required for all trades.

3.3 INSTALLATION

- A. Comply with NECA 1.
- B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- C. Install lamps in each luminaire.
- D. Supports:
 - 1. Sized and rated for luminaire weight.
 - 2. Able to maintain luminaire position after cleaning and relamping.
 - 3. Provide support for luminaire without causing deflection of ceiling or wall.
 - 4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.
- E. Flush-Mounted Luminaires:
 - 1. Secured to outlet box.
 - 2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
 - 3. Trim ring flush with finished surface.
- F. Wall-Mounted Luminaires:
 - 1. Attached to structural members in walls.
 - 2. Do not attach luminaires directly to gypsum board.
- G. Suspended Luminaires:
 - 1. Ceiling Mount:
 - a. Two 5/32-inch- diameter aircraft cable supports adjustable to.
 - b. Pendant mount with 5/32-inch- diameter aircraft cable supports adjustable to 10 feet in length.
 - c. Hook mount.
 - 2. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
 - 3. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.

4. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and tubing or rod wire support for suspension for each unit length of luminaire chassis, including one at each end.
5. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

H. Ceiling-Grid-Mounted Luminaires:

1. Secure to any required outlet box.
2. Secure luminaire to the luminaire opening using approved fasteners in a minimum of four locations, spaced near corners of luminaire.
3. Use approved devices and support components to connect luminaire to ceiling grid and building structure in a minimum of four locations, spaced near corners of luminaire.

- I. Comply with requirements in Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

3.4 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."

3.5 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.

- B. Luminaire will be considered defective if it does not pass operation tests and inspections.

- C. Prepare test and inspection reports.

3.6 STARTUP SERVICE

- A. Comply with requirements for startup specified in Section 26 09 43.16 "Addressable-Luminaire Lighting Controls."

- B. Comply with requirements for startup specified in Section 26 09 43.23 "Relay-Based Lighting Controls."

3.7 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.

1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

END OF SECTION 26 5119

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DIVISION 27

Section 27 0100 - Communications Common Requirements

PART 1 - GENERAL

1.1 SUMMARY

- A. Submittal and Shop Drawing Requirements.
- B. Use of Engineer's Drawings and CAD files.


PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SUBMITTAL AND SHOP DRAWING REQUIREMENTS.

- A. All submittals for this division shall be provided in electronic format. Hard copies shall not be submitted without prior approval from the Engineer. Files may be submitted via email, FTP site, or on CDROM and will be returned as electronic PDF files that are digitally signed and locked.
- B. Acceptable file formats for electronic files includes:
 - 1. Adobe Acrobat PDF files.
 - 2. Autodesk AutoCad DWG, DXF, or DWF files.
 - 3. Microsoft Excel XLS or XLSX files.
 - 4. Microsoft Word DOC or DOCX files.
 - 5. Microsoft Visio VSD files.
- C. Files shall be reviewed by the submitting contractor and be annotated with marks indicating the specific models, options, and accessories being supplied. Submitting contractor must include a stamp or graphic indicating that they have reviewed the submittal for accuracy, completeness, and list the specification section or drawing reference for each submittal.
- D. Do not combine specification sections into a single submittal package. Each specification section must have its own submittal.
- E. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittal if deemed necessary.
 - 1. Allow 10 calendar days from the date of receipt of the submittal by Engineer for initial review.
 - 2. Allow 10 calendar days from the date of receipt for each resubmittal to re-process and review.
 - 3. No extension to the contract time will be authorized due to failure to transmit submittals sufficiently in advance of the Work to permit processing.
- F. Submittals must contain the following items at a minimum:
 - 1. Transmittal/cover sheet listing:

- a. Project Name
 - b. Contractor's Name, Address, Phone, and Email address.
 - c. Equipment Supplier/Representative Name, Address, Phone, and Email address.
 - d. Date of submission.
 - e. Specification section title and number for the submittal.
 2. Each submittal must include detailed engineering data for the specific products that will be used in conjunction with the project. General catalogs are not acceptable. Supplier/contractor shall highlight or make indication as to which items specifically will be used. Include the following items at a minimum:
 - a. Model number of product.
 - b. Capacity of equipment.
 - c. Dimensional drawing of the product showing all rough-in locations, wiring connections, piping connections, and duct connections.
 - d. Show all minimum service clearances required for an installed unit.
 - e. Weight of product with any requirements for support and hanging devices.
 - f. Electrical wiring diagram showing all line voltage and control wiring within the equipment. Indicate the point of connection of all field installed wiring that is required.
 - g. Include warranty certificate listing the terms of the warranty.
- G. Engineer's Action.
1. The Engineer shall review shop drawings only for conformance with the design concept of the Project and with the information given in the Contract Documents. The Engineer's review of a separate item shall not indicate review of an assembly in which the item functions.
 2. The Engineer's review of shop drawings shall not relieve the Contractor of responsibility for any deviation from the requirements or the Contract Documents unless the Contractor has informed the Engineer in writing of such deviation at the time of submission in letter form. Notations on the submittal do not constitute informing the Engineer. The Engineer's action shall not relieve the Contractor from responsibility for errors or omissions in the shop drawings.
 3. Notations and remarks added to shop drawings by the Engineer are to insure compliance to Drawings and Specifications and do not imply a requested or approved change to contract cost. Should the Engineer's notations and remarks result in a change to the contract cost, it is the responsibility of the Contractor to advise the Engineer accordingly prior to performance of the work in question. If work that has been changed by the Engineer's review comments is performed without notifying the Engineer and the Owner of additional costs, any additional cost for the work shall be the sole responsibility of the Contractor.
 4. Should deviations, discrepancies, or conflicts between shop drawings and the Contract Documents be discovered, either prior to or after review, the Contract Documents shall control and be followed.
- H. Action Stamp.
1. The Engineer will stamp each submittal with a uniform, self-explanatory action stamp indicating the required action by the Contractor:

Commission No.	<i>Shop Drawing Review</i>
Spec. Sections:	Review No. 1
<input type="checkbox"/> REVIEWED & RELEASED	
<input type="checkbox"/> REVIEWED & RELEASED WITH CORRECTIONS	
<input type="checkbox"/> REVISE & RESUBMIT	
<input type="checkbox"/> REJECTED	
<input type="checkbox"/> NO ACTION REQUIRED	
<input type="checkbox"/> SEE TRANSMITTAL FOR NOTES	
<p>Reviewing is only for conformance with the design intent of the project and compliance with the information given in the Contract Documents. Corrections or comments made on the shop drawings during this review do not relieve Contractor from compliance with the requirements of the plans and specifications. Acceptance of a specific item shall not include acceptance of an assembly of which the item is a component. Contractor is solely responsible for: dimensions to be confirmed and correlated at the jobsite; information that pertains solely to the fabrication processes or to techniques and procedures of construction; manufacturer's instructions, industry standards, and for coordination of the work with all trades.</p>	
Reviewed by:	Date:
<i>Primary Engineering, Inc</i>	

- a. Final Unrestricted Release: Work may proceed, provided it complies with the contract documents, when submittal is returned with the following:
 - 1) "Reviewed and Released".
- b. Final, but Restricted Release: Work may proceed, provided it complies with the contract documents, notations and corrections as provided, when the submittal is returned with the following:
 - 1) "Reviewed and Released with Corrections".
- c. Revise and Resubmit: Do not proceed with work. Revise submittal in accordance with notations thereon and resubmit without delay to obtain a different action marking. Do not allow submittals with the following marking (or unmarked submittals) to be used in connection with performance of the work:
 - 1) "Revise and Resubmit".
 - 2) "Rejected".
- d. Other Action: Where a submittal is primarily for information purposes, special processing or activity, the submittal will be returned, marked "No Action Taken".

3.2 USE OF ENGINEER'S DRAWING AND CAD FILES.

- A. The bid documents prepared by the Engineer are the property of the Engineer and shall not be copied without approval in writing from the Engineer.
- B. At the contractor's request, the Engineer will provide electronic copies of the source CAD files to the contractor for their convenience in preparation of shop drawings and submittals related to the project with the following terms and conditions;
 1. Electronic files are prepared using a variety of software tools that includes AutoCAD, Revit, Design Master, Excel, and various calculation tools. The Engineer makes no representation as to the compatibility of these files with your hardware or software configuration.

2. Data contained within these electronic files are part of our Instruments of Service and shall not be used by anyone other than the intended recipient for any other purpose than as a convenience in the preparation of shop drawings for the reference project. Any other use by you or others will be at your sole risk without liability or legal exposure to the Engineer. Recipient shall agree to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against the Engineer, it's officers, directors, employees, agents, or sub-consultants, that may arise out of or in connection with your use of these electronic files.
3. The recipient shall, to the fullest extent permitted by law, indemnify and hold the Engineer harmless against all damages, liabilities or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from your use of these electronic files.
4. These files are not construction documents. Differences may exist between the electronic files and corresponding hard-copy construction documents. The Engineer makes no representation regarding the accuracy or completeness of the files you receive. In the event a conflict arises between the signed or sealed hard copy construction documents prepared by the Engineer and the electronic files, the signed or sealed hard copy documents shall govern.
5. The recipient is responsible for verifying and coordinating all field measurements, field conditions, and systems onsite with your work and other contractors for the project.
6. Because electronic files can be modified, unintentionally or otherwise, the Engineer reserves the right to remove all indicia of ownership and/or involvement from each electronic file.
7. A service fee of \$100 per electronic file shall be remitted to us along with a signed copy of a release prior to delivery of the electronic files. This fee is to cover processing time to prepare the files by binding reference drawings, removing proprietary information, and formatting the files as directed.
8. Under no circumstances shall delivery of the electronic files for use by you be deemed a sale by us, and we make no warranties, either express or implied, of merchantability and fitness for any particular purpose. In no event shall the Engineer be held liable for any loss or profit or any consequential damages as a result of your use of the files.
9. Any party requesting use of these files must do so by submitting a written request describing what files are needed and what the intended use will be.

END OF SECTION 27 0100

Section 27 0528 - Pathways For Communications Systems

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Metal conduits and fittings.
 - 2. Nonmetallic surface pathways.
 - 3. Hooks.

1.2 DEFINITIONS

- A. GRC: Galvanized rigid conduit.
- B. IMC: Intermediate metal conduit.

1.3 ACTION SUBMITTALS

- A. Product data for the following:
 - 1. Surface pathways
 - 2. Wireways and fittings.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

- A. Description: Metal raceway of circular cross section with manufacturer-fabricated fittings.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Allied Tube & Conduit; a part of Atkore International.
 - 2. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - 3. Republic Conduit.
 - 4. Thomas & Betts Corporation; A Member of the ABB Group.
 - 5. Western Tube and Conduit Corporation.
 - 6. Wheatland Tube Company.
- C. General Requirements for Metal Conduits and Fittings:
 - 1. Listed and labeled as defined in NFPA 70, by a nationally recognized testing laboratory, and marked for intended location and application.
 - 2. Comply with TIA-569-D.
- D. EMT: Comply with ANSI C80.3 and UL 797.
- E. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
 - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.

2. Fittings for EMT:
 - a. Material: Steel.
 - b. Type: Set screw.
3. Expansion Fittings: PVC or steel to match conduit type, complying with UL-467, rated for environmental conditions where installed, and including flexible external bonding jumper.

2.2 SURFACE NONMETALLIC PATHWAYS:

- A. Refer to drawings for surface nonmetallic pathways.
- B. Finish: Texture and color selected by Architect from manufacturer's standard colors.
- C. Product shall comply with UL 94 V-0 requirements for self-extinguishing characteristics.
- D. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- E. Comply with TIA-569-D.

2.3 HOOKS

- A. Description: Prefabricated sheet metal cable supports for telecommunications cable.
- B. Manufacturers: Subject to compliance with requirements, provide products by the following:
 1. Panduit Corp.
- C. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- D. Comply with TIA-569-D.
- E. J shape.

PART 3 - EXECUTION

3.1 PATHWAY APPLICATION

- A. Indoors: Apply pathway products as specified below unless otherwise indicated:
 1. Exposed, Not Subject to Physical Damage: EMT.
 2. Exposed, Not Subject to Severe Physical Damage: EMT.
 3. Exposed and Subject to Severe Physical Damage: IMC. Pathway locations include the following:
 - a. Loading dock.
 - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
 - c. Mechanical rooms.
 - d. Gymnasiums
 4. Concealed in Ceilings and Interior Walls and Partitions: EMT.

- 5. Damp or Wet Locations: GRC.
- B. Minimum Pathway Size: 1-inch trade size for copper and aluminum cables.
- C. Pathway Fittings: Compatible with pathways and suitable for use and location.
 - 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 - 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
 - 3. EMT: Use set-screw, steel fittings. Comply with NEMA FB 2.10.
- D. Install surface pathways only where indicated on Drawings.

3.2 INSTALLATION

- A. Comply with the following standards for installation requirements except where requirements on Drawings or in this Section are stricter:
 - 1. NECA 1.
 - 2. NECA/BICSI 568.
 - 3. TIA-569-D.
 - 4. NECA 101
- B. Comply with NFPA 70 limitations for types of pathways allowed in specific occupancies and number of floors.
- C. Comply with requirements in Section 07 84 13 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.
- D. Comply with requirements in Section 27 05 29 "Hangers and Supports for Communications Systems" for hangers and supports.
- E. Comply with requirements in Section 27 05 44 "Sleeves and Sleeve Seals for Communications Pathways and Cabling" for sleeves and sleeve seals for communications.
- F. Keep pathways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and steam piping.
- G. Complete pathway installation before starting conductor installation.
- H. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- I. Install no more than the equivalent of two 90-degree bends in any pathway run. Support within 12 inches of changes in direction. Utilize long radius ells for all optical-fiber cables.

- J. Conceal rigid conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- K. Support conduit within 12 inches of enclosures to which attached.
- L. Stub-ups to Above Recessed Ceilings:
 - 1. Use EMT, IMC, or RMC for pathways.
 - 2. Use a conduit bushing. Arlington or owner approved.
- M. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install insulated bushings on conduits terminated with locknuts.
- N. Install pathways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus one additional quarter-turn.
- O. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure, to assure a continuous ground path.
- P. Cut conduit perpendicular to the length. For conduits of 2-inch trade size and larger, use roll cutter or a guide to ensure cut is straight and perpendicular to the length.
- Q. Install pull wires in all pathways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Secure pull wire, so it cannot fall into conduit. Cap pathways designated as spare alongside pathways in use.
- R. Surface Pathways:
 - 1. Install surface pathway for surface telecommunications outlet boxes only where indicated on Drawings.
 - 2. Install surface pathway with a minimum 2-inch radius control at bend points.
 - 3. Secure surface pathway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight pathway section. Support surface pathway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- S. Hooks:
 - 1. Size to allow a minimum of 25 percent future capacity without exceeding design capacity limits.
 - 2. Shall be supported by dedicated support wires. Do not use ceiling grid support wire or support rods.
 - 3. Hook spacing shall allow no more than 6 inches of slack. The lowest point of the cables shall be no less than 6 inches adjacent to ceilings, mechanical ductwork and fittings, luminaires, power conduits, power and telecommunications outlets, and other electrical and communications equipment.
 - 4. Space hooks no more than 5 feet o.c.
 - 5. Provide a hook at each change in direction.

- T. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements.
 - U. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surface to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.
 - V. Horizontally separate boxes mounted on opposite sides of walls, so they are not in the same vertical channel.
 - W. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
 - X. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- 3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR COMMUNICATIONS PENETRATIONS
- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 27 05 44 "Sleeves and Sleeve Seals for Communications Pathways and Cabling."
- 3.4 FIRESTOPPING
- A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 07 84 13 "Penetration Firestopping."
- 3.5 PROTECTION
- A. Protect coatings, finishes, and cabinets from damage or deterioration.
 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 27 0528

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Section 27 0529 - Hangers And Supports For Communications Systems

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel slotted support systems for communication raceways.
2. Conduit and cable support devices.
3. Structural steel for fabricated supports and restraints.
4. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
 - a. Slotted support systems, hardware, and accessories.
 - b. Clamps.
 - c. Hangers.
 - d. Sockets.
 - e. Eye nuts.
 - f. Fasteners.
 - g. Anchors.
 - h. Saddles.
 - i. Brackets.
2. Include rated capacities and furnished specialties and accessories.

B. Shop Drawings: For fabrication and installation details for communications hangers and support systems.

1. Steel slotted-channel systems.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.4 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M.
2. AWS D1.2/D1.2M.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design hanger and support system.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch-diameter holes at a maximum of 8 inches o.c. in at least one surface.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit; a part of Atkore International.
 - b. B-line, an Eaton business.
 - c. ERICO International Corporation.
 - d. Flex-Strut Inc.
 - e. G-Strut.
 - f. Thomas & Betts Corporation; A Member of the ABB Group.
 - g. Unistrut; Part of Atkore International.
 2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
 3. Material for Channel, Fittings, and Accessories: Galvanized steel.
 4. Channel Width: 1-5/8 inches.
 5. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 6. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 7. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Conduit and Cable Support Devices: Steel and malleable-iron clamps, hangers, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- C. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.
- 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 portland cement 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; Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
 - 4) Simpson Strong-Tie Co., Inc.

2. Mechanical-Expansion Anchors: Insert-wedge-type stainless steel for use in hardened portland cement concrete, 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) B-line, an Eaton business.
 - 2) Hilti, Inc.
 - 3) ITW Ramset/Red Head; Illinois Tool Works, Inc.
 - 4) MKT Fastening, LLC.
3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: Stainless-steel springhead type.
7. Hanger Rods: Threaded steel.

2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Section 05 50 00 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:
 1. NECA 1.
 2. NECA/BICSI 568.
 3. TIA-569-D.
 4. NECA 101
- B. Comply with requirements in Section 07 84 13 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.
- C. Comply with requirements for pathways specified in Section 27 05 28 "Pathways for Communications Systems."
- D. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMTs, IMCs, and RMCs as scheduled in NECA 1, where its Table 1 lists maximum spacings that are less than those stated in NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

- E. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with single-bolt conduit clamps, using spring friction action for retention in support channel.

3.2 SUPPORT INSTALLATION

- A. 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.
- B. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten communications items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Use approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Use expansion anchor fasteners.
 - 5. Instead of expansion anchors, powder-actuated-driven threaded studs, provided with lock washers and nuts, may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
 - 6. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
 - 7. To Light Steel: Sheet metal screws.
 - 8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
- C. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Section 05 50 00 "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor communications materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas, and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 27 0529

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Section 27 0553 - Identification For Communications Systems

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Labels.
 - 2. Tapes.
 - 3. Signs.
 - 4. Cable ties.
 - 5. Fasteners for labels and signs.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for communications identification products.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with NFPA 70 and TIA 606-B.
- B. Comply with ANSI Z535.4 for safety signs and labels.
- C. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

2.2 LABELS

- A. Copper Horizontal Cable Labels in TRs and behind faceplates.
 - 1. Panduit #S100X150VAC, 1.0" wide x 1.5" length, white, print-on vinyl label or Owner approved equal.
- B. Faceplates Labels at the PIC Location
 - 1. Panduit #T038X000VPC-BK, 0.38" height, black lettering on white vinyl tape or Owner approved equal.
- C. Patch Panel Labels in TRs
 - 1. Panduit #C061X030FJC, 0.61" wide x 0.30" height, one-port identifier, white, adhesive, polyolefin label or Owner approved equal.
- D. Cables shall be labeled with self-laminating marking tape, Panduit LS8 labeler or Owner approved equal labeling system.
 - 1. Size of letters and numbers shall be no less than 5/16" high by 1/8" wide.

- E. Horizontal voice and data cables at the BDF/IDF end cables shall be labeled with the information indicating termination of the opposite end of the cables.
1. This shall include room location and jack designation.
 2. Place label on a visible part of cable within 12" of termination point for ease of identification after termination.
 3. All faceplate labeling shall be labeled left to right, top to bottom. A specific voice line shall always be labeled last in the series, unless a TV jack is present in which case the voice jack shall precede the TV jack. Examples: At the BDF/IDF end the 4-pair data cables for the 1st location in room 1137 would be labeled: 1137-A and 1137-B. At the BDF/IDF end the 4-pair voice cable for the 1st location in room 1137 would be labeled: 1137-1
- F. Horizontal voice and data cables at the rooms cables shall be labeled 1-3" from termination with the following: BDF/IDF TR room # - room # - Jack
1. Labels shall be visible by removing outlet cover plate.
 2. For rooms with multiple outlet locations, identification would begin with the first receptacle to the left of the main entrance to the room and continuing clockwise around the room. Examples: 1106-1137-A, 1106-1137-B, 1106-1137-1.
- G. Horizontal Patch Panel Labeling (Data)
1. At the IDF, data horizontal cables are terminated on their respective patch panels, with jacks on the panels labeled in ascending room number order.
 2. All horizontal cables from same room should be terminated in sequential order at the patch panels.
 3. Size of letters and numbers on labels for patch panels shall be no less than 3/32" high by 1/16" wide. Example: Single 4-pair cables will be labeled with a room location and a jack designation. e.g. 1137-A = a single data jack in room 1137.
- H. Faceplate Labeling:
1. At the rooms, the jacks will be labeled on the faceplates using the plastic insert to cover a printed identification tag with room number and proper jack designation as follows:
 - a. Jack designation: Data and VOIP = A through ZZ Traditional Voice and Critical Circuits = 1 through 999. Example: 1195-A = 1st data jack in room 1195 1195-B = 2nd data jack in room 1195 1195-AA = 27th data jack in room 1195 1195-AB = 28th data jack in room 1195. Example: 1195-1 = 1st voice jack in room 1195
 - b. Size of letters and numbers on labels for faceplates shall be no less than 3/8" high.
 - c. At the rooms, the fiber jacks will be labeled on the faceplates using the plastic insert to cover a printed identification tag with room number and proper jack designation as follows:

PART 3 - EXECUTION

3.1 PREPARATION

- A. Self-Adhesive Identification Products: Before applying communications identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.2 INSTALLATION

- A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.
- B. Install identifying devices before installing acoustical ceilings and similar concealment.
- C. Verify identity of each item before installing identification products.
- D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.
- E. Apply identification devices to surfaces that require finish after completing finish work.

END OF SECTION 27 0553

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Section 27 1513 - Communications Copper Horizontal Cabling

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Category 6a twisted pair cable.
 2. Twisted pair cable hardware, including plugs and jacks.
 3. Cabling identification products.
 4. Grounding provisions for twisted pair cable.
 5. Source quality control requirements for twisted pair cable.

1.2 DEFINITIONS

- A. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
- B. EMI: Electromagnetic interference.
- C. FTP: Shielded twisted pair.
- D. F/FTP: Overall foil screened cable with foil screened twisted pair.
- E. F/UTP: Overall foil screened cable with unscreened twisted pair.
- F. IDC: Insulation displacement connector.
- G. LAN: Local area network.
- H. Jack: Also commonly called an "outlet," it is the fixed, female connector.
- I. Plug: Also commonly called a "connector," it is the removable, male telecommunications connector.
- J. RCDD: Registered Communications Distribution Designer.
- K. Screen: A metallic layer, either a foil or braid, placed around a pair or group of conductors.
- L. Shield: A metallic layer, either a foil or braid, placed around a pair or group of conductors.
- M. S/FTP: Overall braid screened cable with foil screened twisted pair.
- N. S/UTP: Overall braid screened cable with unscreened twisted pairs.
- O. UTP: Unscreened (unshielded) twisted pair.

1.3 COPPER HORIZONTAL CABLING DESCRIPTION

- A. The maximum allowable horizontal cable length is 295 feet. This maximum allowable length does not include an allowance for the length of 16 feet to the workstation equipment or in the horizontal cross-connect.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Reviewed and stamped by RCDD.
 - 1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.
 - 2. Cabling administration Drawings and printouts.
 - 3. Wiring diagrams and installation details of telecommunications equipment, to show location and layout of telecommunications equipment, including the following:
 - a. Telecommunications rooms plans and elevations.
 - b. Telecommunications pathways.
 - c. Telecommunications system access points.
 - d. Telecommunications grounding system.
 - e. Telecommunications conductor drop locations.
 - f. Typical telecommunications details.
 - g. Mechanical, electrical, and plumbing systems.
- C. Twisted pair cable testing plan.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For RCDD, Installer, installation supervisor, and field inspector.
- B. Product Certificates: For each type of product.
- C. Source quality-control reports.
- D. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For splices and connectors to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
 - 1. Layout Responsibility: Preparation of Shop Drawings, cabling administration Drawings, and field testing program development by an RCDD.
 - 2. Installation Supervision: Installation shall be under the direct supervision of Technician, who shall be present at all times when Work of this Section is performed at Project site.

3. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site.
 1. Test each pair of twisted pair cable for open and short circuits.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA-568-C.1, when tested according to test procedures of this standard.
- B. Telecommunications Pathways and Spaces: Comply with TIA-569-D.
- C. Grounding: Comply with TIA-607-B.

2.2 CATEGORY 6a TWISTED PAIR CABLE

- A. Description: Four-pair, balanced-twisted pair cable, with internal spline, certified to meet transmission characteristics of Category 6a cable at frequencies up to 500MHz.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Belden CDT Networking Division/NORDX.
 - a. 10GXF53 Cat 6A F/UTP – 10GXF53-0071000 (Purple/Violet Color)
 2. Berk-Tek Leviton; a Nexans/Leviton alliance.
 - a. LANmark-10G2 – 10189548
 3. CommScope, Inc.
 - a. 884034054 (Purple/Violet Color)
 4. General Cable; General Cable Corporation.
 - a. GenSPEED 10,000 - 7131593
 5. Mohawk; a division of Belden Networking, Inc.
 - a. XGO – M58893
 6. Superior Essex Inc.
 - a. 6F-246-7B
- C. Standard: Comply with TIA-568-C.2 for Category 6a cables.
- D. Conductors: 100-ohm, 23 AWG solid copper.

E. Shielding/Screening: Shielded twisted pairs (FTP).

F. Cable Rating: Plenum.

G. Jacket: Violet/Purple thermoplastic.

2.3 TWISTED PAIR CABLE HARDWARE

A. Description: Hardware designed to connect, splice, and terminate twisted pair copper communications cable.

B. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Panduit Corp.
2. Refer to drawings for part numbers.

C. Patch Panel:

1. Panduit #CPPA24FMWBLY

D. Patch Cords – Wireless Access Points: Factory-made, four-pair cables in 36-inch lengths; terminated with an eight-position modular plug at each end.

1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure performance. Patch cords shall have latch guards to protect against snagging.
2. Patch cords shall have color-coded boots for circuit identification. Purple/Violet.

E. Jacks and Jack Assemblies:

1. Refer to drawings for part numbers.
2. Designed to snap-in to a patch panel or faceplate.
3. Standard: Comply with TIA-568-C.2.
4. Marked to indicate transmission performance.

F. Faceplate:

1. Refer to drawings.

G. Legend:

1. Snap-in, clear-label covers and machine-printed paper inserts.

2.4 IDENTIFICATION PRODUCTS

A. Comply with TIA-606-B and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

2.5 GROUNDING

A. Comply with requirements in Section 27 05 26 "Grounding and Bonding for Communications Systems" for grounding conductors and connectors.

B. Comply with TIA-607-B.

2.6 SOURCE QUALITY CONTROL

- A. Factory test cables on reels according to TIA-568-C.1.
- B. Factory test twisted pair cables according to TIA-568-C.2.
- C. Cable will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 WIRING METHODS

- A. Wiring Method: Install cables in raceways and cable trays, except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces, attics, and gypsum board partitions where unenclosed wiring method may be used. Conceal raceway and cables, except in unfinished spaces.
 - 1. Install plenum cable in environmental air spaces, including plenum ceilings.
 - 2. Comply with requirements for raceways and boxes specified in Section 27 05 28 "Pathways for Communications Systems."
- B. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- C. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools. Install conductors parallel with or at right angles to sides and back of enclosure.

3.2 INSTALLATION OF PATHWAYS

- A. Comply with requirements for demarcation point, cabinets, and racks specified in Section 27 11 00 "Communications Equipment Room Fittings."
- B. Comply with Section 27 05 28 "Pathways for Communications Systems."
- C. Comply with Section 27 05 29 "Hangers and Supports for Communications Systems."
- D. Drawings indicate general arrangement of pathways and fittings.

3.3 INSTALLATION OF TWISTED-PAIR HORIZONTAL CABLES

- A. Comply with NECA 1 and NECA/BICSI 568.
- B. General Requirements for Cabling:
 - 1. Comply with TIA-568-C.0, TIA-568-C.1, and TIA-568-C.2.
 - 2. Comply with BICSI's "Information Transport Systems Installation Methods Manual (ITSIMM), Ch. 5, "Copper Structured Cabling Systems," "Cable Termination Practices" Section.

3. Install 110-style IDC termination hardware unless otherwise indicated.
 4. Do not untwist twisted pair cables more than 1/2 inch from the point of termination to maintain cable geometry.
 5. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
 6. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
 7. Install lacing bars to restrain cables, prevent straining connections, and prevent bending cables to smaller radii than minimums recommended by manufacturer.
 8. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI Information Transport Systems Installation Methods Manual , Ch. 5, "Copper Structured Cabling Systems," "Cable Termination Practices" Section. Use lacing bars and distribution spools.
 9. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation, and replace it with new cable.
 10. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
 11. In the communications equipment room, install a 10-foot-long service loop on each end of cable.
 12. Pulling Cable: Comply with BICSI Information Transport Systems Installation Methods Manual, Ch. 5, "Copper Structured Cabling Systems," "Pulling and Installing Cable" Section. Monitor cable pull tensions.
- C. Open-Cable Installation:
1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
 2. Suspend twisted pair cabling, not in a wireway or pathway, a minimum of 8 inches above ceilings by cable supports not more than 60 inches apart.
 3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.
- D. Group connecting hardware for cables into separate logical fields.
- E. Separation from EMI Sources:
1. Comply with recommendations from BICSI's "Telecommunications Distribution Methods Manual" and TIA-569-D for separating unshielded copper communication cable from potential EMI sources, including electrical power lines and equipment.
 2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches.

3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches.
4. Separation between communications cables in grounded metallic raceways, power lines, and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches.
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches.
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches.

3.4 FIRESTOPPING

- A. Comply with requirements in Section 07 84 13 "Penetration Firestopping."
- B. Comply with TIA-569-D, Annex A, "Firestopping."
- C. Comply with "Firestopping Systems" Article in BICSI's "Telecommunications Distribution Methods Manual."

3.5 GROUNDING

- A. Install grounding according to the "Grounding, Bonding, and Electrical Protection" chapter in BICSI's "Telecommunications Distribution Methods Manual."
- B. Comply with TIA-607-B and NECA/BICSI-607.
- C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall, allowing at least a 2-inch clearance behind the grounding bus bar. Connect grounding bus bar to suitable electrical building ground, using a minimum No. 4 AWG grounding electrode conductor.
- D. Bond metallic equipment to the grounding bus bar, using not smaller than a No. 6 AWG equipment grounding conductor.

3.6 IDENTIFICATION

- A. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors.
- B. Cable and Wire Identification:

1. Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
2. Each wire connected to building-mounted devices is not required to be numbered at the device if wire color is consistent with associated wire connected and numbered within panel or cabinet.
3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet.
4. Label each terminal strip, and screw terminal in each cabinet, rack, or panel.
 - a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group, extended from a panel or cabinet to a building-mounted device, with the name and number of a particular device.
 - b. Label each unit and field within distribution racks and frames.
5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and -connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.

- C. Labels shall be preprinted or computer-printed type, with a printing area and font color that contrast with cable jacket color but still comply with TIA-606-B requirements for the following:

1. Cables use flexible vinyl or polyester that flexes as cables are bent.

3.7 FIELD QUALITY CONTROL

- A. Perform tests and inspections.

- B. Tests and Inspections:

1. Visually inspect jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA-568-C.1.
2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
3. Test twisted pair cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
 - a. Test instruments shall meet or exceed applicable requirements in TIA-568-C.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

- C. Data for each measurement shall be documented. Data for submittals shall be printed in a summary report that is formatted similarly to Table 10.1 in BICSI's "Telecommunications Distribution Methods Manual," or shall be transferred from the instrument to the computer, saved as text files, printed, and submitted.

- D. Remove and replace cabling where test results indicate that they do not comply with specified requirements.
- E. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.
- G. A 20% verification by the Purdue IT Infrastructure Services Department of all horizontal voice and data cable tests will be performed. A 100% verification by the Purdue IT Infrastructure Services Department of all wireless access point installations will be performed. The contractor performing the telecommunications testing shall schedule a meeting with a Purdue IT Infrastructure Services Representative before the start of testing. Contractor may request Purdue personnel to accompany them in the testing of cables to ensure proper information entry into the Tester. If Purdue personnel accompany the Contractor on testing, verification testing shall not be required.
- H. The horizontal cabling consisting of single 4-pair cable runs for data and VOIP shall be tested for Category 6a compliance utilizing a Fluke DTX or Fluke DSX series tester. Test unit shall be set up using: 1) cat. 6a permanent link test, 2) actual cable # installed (e.g. CommScope #874010104). 3) Cable Test Results shall be submitted in Fluke Linkware (.flw) format on a CD at the end of the project. Purdue IT Infrastructure Services Department will expedite activation of service before substantial completion if test results are submitted electronically via email. Testing required is 100%. The Purdue IT Infrastructure Services Department will perform random verification testing as part of acceptance of all copper voice cable testing.

END OF SECTION 27 1513

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DIVISION 28

Section 28 4621.11 - Addressable Fire-Alarm Systems

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide all material, labor, engineering and operations necessary for the installation of a complete, operable fire detection and alarm system as shown on the drawings and as specified herein.
- B. The fire alarm system shall be initially configured by the manufacturer.
- C. Section Includes:
 - 1. Notification appliances.

1.2 DEFINITIONS

- A. ANAC: Addressable Notification Appliance Controller.
- B. EMT: Electrical Metallic Tubing.
- C. FACP: Fire Alarm Control Panel.
- D. FASP: Fire Alarm Sub-control panel
- E. FAPS: Fire alarm Power Supply
- F. FABC: Fire Alarm Battery Cabinet
- G. HLI: High Level Interface.
- H. NICET: National Institute for Certification in Engineering Technologies.
- I. RAAP: Remote Alarm Annunciator Panel

1.3 ACTION SUBMITTALS

- A. Fire alarm system shall be submitted to the owner for review and approval prior to system installation and shall include the following:
 - 1. Voltage calculations and shop drawings with riser diagram and system layout showing the actual location of all components including initiating devices, notification appliances with candela ratings, control devices, monitoring devices, FACP, FASP, FAPS, RAAP, FABC, ANAC. Include the number of conductors, zones and conduit sizes.
 - 2. Manufacturer's product data sheets for all equipment and materials. Indicate which products will be used in the project.
- B. Product Data: For each type of product, including furnished options and accessories.

1. Include construction details, material descriptions, dimensions, profiles, and finishes.
 2. Include rated capacities, operating characteristics, and electrical characteristics.
- C. Shop Drawings: For fire-alarm system.
1. Comply with recommendations and requirements in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 2. Include plans, elevations, sections, details, and attachments to other work.
 3. Detail assembly and support requirements.
 4. Include voltage drop calculations for notification-appliance circuits.
 5. Include statement from manufacturer that all equipment and components have been tested as a system and meet all requirements in this Specification and in NFPA 72.
- D. General Submittal Requirements:
1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Architect.
 2. Shop Drawings shall be prepared by persons with the following qualifications:
 - a. Trained and certified by manufacturer in fire-alarm system design.
 - b. NICET-certified, fire-alarm technician; Level IV minimum.
 - c. Licensed or certified by authorities having jurisdiction.
- E. Delegated-Design Submittal: For notification appliances and smoke and heat detectors, in addition to submittals listed above, indicate compliance with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
1. Drawings showing the location of each notification appliance and smoke and heat detector, ratings of each, and installation details as needed to comply with listing conditions of the device.
 2. Design Calculations: Calculate requirements for selecting the spacing and sensitivity of detection, complying with NFPA 72. Calculate spacing and intensities for strobe signals and sound-pressure levels for audible appliances.
 3. Indicate audible appliances required to produce square wave signal per NFPA 72.
- 1.4 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For Installer.
- B. Field quality-control reports.
- 1.5 Sample Warranty: For special warranty.
- 1.6 CLOSEOUT SUBMITTALS
- A. A closeout submittal for the fire alarm system shall be submitted to the Owner after the system installation is complete and shall include all of the following:
1. Record documentation with all changes made since the approved action submittal.

2. Schedule of circuits and components by function, location and wire code.
3. A sequence of operation including a troubleshooting guide of the system.
4. Provide a “Fire Alarm System Record of Completion” in accordance with NFPA 72
5. Provide a digital copy of the complete programming for the FACP.
6. All parts, maintenance manuals, keys, and a list of spare devices.
7. Furnish spare devices to the Owner as specified
 - a. Furnish spare devices of each type installed on the project. The amount of spare devices shall be 6% of the total devices but not less than one device. This includes all notification appliances and initiating devices.
 - b. Furnish one of each type of module installed on this project.

1.7 QUALITY ASSURANCE

A. Contractor Qualifications

1. The operation and configuration of the fire alarm system shall be certified by a Fire Protection Engineering Technician. The technician shall be a full-time employee of the system sub-contractor and be National Institute for Certification in Engineering Technologies (NICET) Level II certified, in the technical subfield of Fire Alarm Systems.
2. Work shall be performed by a contractor regularly engaged in the design and installation of fire alarm systems.

B. Regulatory Requirements

1. System design, installation and materials shall comply with the applicable regulating agencies and organizations, which include, but are not limited to the following:
 - a. Indiana Department of Homeland Security (IDHS) Division of Fire and Building Safety.
 - b. Underwriters Laboratories (UL).
 - c. Factory Mutual (FM).

C. Purdue University System design, installation and materials shall comply with applicable codes, standards, and regulations, which include, but are not limited to the following: • Indiana Building Code (IBC)

1. Indiana Fire Code (IFC)
2. Indiana Electrical Code (IEC)
3. Indiana Mechanical Code (IMC)
4. National Fire Protection Association (NFPA) Codes and Standards
5. Americans with Disabilities Act (ADA)

D. It is the contractor’s responsibility to notify the engineer, architect and owner in writing prior to installation if there is a conflict or discrepancy between the applicable codes, standards or regulations and the drawings or specifications.

E. The contractor shall assume full financial responsibility for compliance with all applicable codes, standards and regulations. This includes compliance for modification or extension of existing systems. All deficiencies shall be corrected at no additional cost to the Owner.

1.8 PROJECT CONDITIONS

- A. Perform a full test of the existing system prior to starting work. Document any equipment or components not functioning as designed.
- B. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:
 - 1. Notify Owner no fewer than seven days in advance of proposed interruption of fire-alarm service.
 - 2. Do not proceed with interruption of fire-alarm service without Owner's written permission.
- C. Use of Devices during Construction: Protect devices during construction unless devices are placed in service to protect the facility during construction.
- D. Existing Fire Alarm System is a Simplex 4100U.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Source Limitations for Fire-Alarm System and Components: Components shall be compatible with, and operate as an extension of, existing system. Provide system manufacturer's certification that all components provided have been tested as, and will operate as, a system.
- B. All components provided shall be listed for use with the selected system.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 WIRING

- A. All fire alarm system wiring shall be sized and installed per fire alarm vendor and manufacturer's recommendations. The contractor shall verify specific requirements with fire alarm vendor and make necessary changes both in sizes and quantities.
- B. Notification Appliances circuit shall be loaded to not more than 75% of the circuit power rating.
- C. 12 AWG for AC, Power supply connections
- D. 14 AWG for DC, Power supply connections.
- E. 2C/14 AWG UTP for DC, Audio/Visual Devices Power (Simplex Addressable)
- F. 14 AWG for Discrete Control Circuits

- G. IDNet/Mapnet/FlashScan/Data, and Network Communications (addressable systems) cable shall be 2/c, 18 AWG, solid copper and shielded. Manhattan Cable M39124, West Penn 975 or approved equal. If Simplex 4100ES is used then IDNet+ circuits do not require shielded cable. Unshielded twisted-pair wire shall be 2/c, 18 AWG, solid copper. West Penn 980 or approved equal.

2.3 Conductors

- A. Black (hot) and White (neutral) for all 120v power wiring.
- B. Fire alarm Cabling shall have red (positive) and black (negative) conductors with red outer jacket.

2.4 INITIATION DEVICES

- A. Manual Pull station shall be equal to Simplex #4099-9004.
- B. All locks on manual pull stations shall be replaced with Fort #415 key lock.
- C. Smoke Detectors
 - 1. Smoke Detector shall have pulsating power on LED indicator that locks on to steady in an alarm situation.
 - 2. Photoelectric smoke sensor shall be Simplex #4098-9714.
 - 3. Sensor base shall be Simplex #4098-9792.
- D. Duct Detectors assembly
 - 1. Duct Smoke sensor shall be Simplex #4098-9714.
 - 2. Duct Sensor housing shall be Simplex #098-9756.
 - 3. Remote Test Station shall be Simplex #2098-9806.

2.5 NOTIFICATION APPLIANCES

- A. Wall mounted notification appliances shall be red.
- B. Multi-Candela Visual Appliance shall be one of the following:
 - 1. Simplex #4901-9109
 - 2. Wheelock #STR
 - 3. Gentex #GES3-WR
- C. Combination Audible/Multi-Candela Visual Appliance shall be one of the following:
 - 1. Simplex #4906-9127
 - 2. Wheelock #HSR
 - 3. Gentex #GEC3-WR

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.

1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.
- B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 GENERAL EQUIPMENT INSTALLATION

- A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."
 1. Devices placed in service before all other trades have completed cleanup shall be replaced.
 2. Devices installed but not yet placed in service shall be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.
- B. Connecting to Existing Equipment: Verify that existing fire-alarm system is operational before making changes or connections.
 1. Connect new equipment to existing control panel in existing part of the building.
 2. Connect new equipment to existing monitoring equipment at the supervising station.
 3. Expand, modify, and supplement existing monitoring equipment as necessary to extend existing monitoring functions to the new points. New components shall be capable of merging with existing configuration without degrading the performance of either system.
- C. Install a cover on each smoke detector that is not placed in service during construction. Cover shall remain in place except during system testing. Remove cover prior to system turnover.
- D. Audible Alarm-Indicating Devices: Install not 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. Install all devices at the same height unless otherwise indicated.
- E. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches below the ceiling. Install all devices at the same height unless otherwise indicated.

3.3 MANUAL PULL STATION INSTALLATION

- A. Manual pull Stations shall be mounted at +48" above finished floor to top of box.
- B. Manual pull stations shall be surface mounted using Simplex 2975-9178, Notifier SB-10 or semi-flush mounted using Simplex 2099-9813 trim plate, Notifier BG-TR trim ring.

Simplex 2099-9814 back ring may be used to surface mount Simplex manual stations to a Wiremold box.

3.4 SMOKE DETECTORS

- A. Smoke detectors should not be in direct airflow or closer than 36" from an air supply diffuser or return air opening.

3.5 DUCT DETECTORS

- A. Provide duct smoke detectors in accordance with the IMC.
- B. Each duct smoke detector, upon activation of alarm, shall shut down all operational capabilities of the respective air distribution system in accordance with the listing and labeling of appliances used in the system.
- C. The sampling tube shall match duct size.
- D. Provide a remote-control station mounted at most 6' above finished floor with Indicator lights and key test switch in the immediate area near detector.
- E. Duct detectors, remote test stations and indicator lights shall have legend tags denoting which fan unit they serve and the type (conventional or addressable) of the detector

3.6 NOTIFICATION DEVICES

- A. Provide appropriate back-boxes, adapter plate, and skirts for mounting, supplied by the manufacturer.

3.7 PATHWAYS

- 3.8 fire alarm system wiring (non-addressable and addressable) shall be installed in metallic raceway. Minimum conduit size $\frac{3}{4}$ ", minimum Wiremold size #700. Provide raceway capacity for minimum 20% future conductors.

3.9 IDENTIFICATION

- A. All junction boxes, covers, and conduit fittings installed above ceilings or in walls shall be red. J-Boxes and covers installed exposed shall be red. Not required for exposed surface raceway, boxes and fittings, i.e. Wiremold. Paint shall be Glidden #7100 "Fire Red
- B. All terminals shall be numbered and match the record documentation designations.
- C. All switches shall be label as to function and/or position ("Normal". "Test")
- D. Label Each conductor at each termination.
- E. Labels shall be 2,3 or 4 characters per termination.

- F. Labels Shall be similar to the following or Owner approved designation:
1. Network data/communications loop label : NWK:1
 2. Initiating device circuits(conventional) label: Z-1
 3. Initiating device circuits(addressable) label: M plus (loop #) :1 (panel #) - 1 (device #) -1.
 4. Notification appliance circuits label : A plus (panel #) : 1 (circuit #) -1
 5. Addressable module label: M plus (loop #) :1 (panel #) – 1 (device #) -1
 6. Control relay(conventional) label: CR-1. • Heat detector(conventional) label: HD-1, Heat detector(addressable) label: M plus (loop #) :1 (panel #) – 1 (device #) -1
 7. Smoke detector(addressable) label: M plus (loop #) :1 (panel #) – 1 (device #) -1

3.10 GROUNDING

- A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.
- B. Ground shielded cables at the control panel location only. Insulate shield at device location.

3.11 SYSTEM DESCRIPTION

- A. The fire alarm system shall be modular with the latest compatible version of software from the manufacturer. The system shall be capable of on-site programming to accommodate system expansion and facilitate changes in operation.
- B. All active points, spare points and hardware related points shall include numerical identification as well as a text description.

3.12 ACCEPTANCE TEST PREPARATION

- A. Verify that the fire alarm system is installed in accordance with the drawings, specifications and codes.
- B. Test the function of the fire alarm system with the manufacturer's representative

3.13 ACCEPTANCE TEST

- A. Schedule an acceptance test with the Owner at least seven days in advance.
- B. The fire alarm system acceptance test will fail if the contractor has not completed the acceptance test preparation.
- C. Demonstrate the operation of the complete fire alarm system including but not limited to annunciators, initiating devices, notification appliances, emergency control function interfaces, fire suppression system components and connection to fire alarm receiving equipment.
- D. Acceptance test failures will be rescheduled.

3.14 SYSTEM ACCEPTANCE

- A. The fire alarm system acceptance shall be coordinated with fire suppression system acceptance.
- B. The Owner's Fire Equipment Services personnel shall be given instruction for operating and testing the fire alarm system immediately upon system acceptance.
- C. Provide the closeout submittal to the Owner upon completion of the fire alarm.

END OF SECTION 28 4621.11

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