PROJECT MANUAL

FOR

WEM COOLING TOWER & CHILLER

REPLACEMENT AT

WEST MIDDLE SCHOOL

PARKWAY BID NUMBER 26-145

PREPARED BY:
BOND ARCHITECTS, INC.
222 SOUTH CENTRAL AVENUE, SUITE 501
ST. LOUIS MO 63105
314.863.4994

DATED: 22 JULY, 2026

SECTION 000107
SEALS PAGE

SEALS

1.01 OWNER'S PROJECT NUMBER: PN432501B

1.02 PROJECT TITLE: WEM COOLING TOWER & CHILLER REPLACEMENT

1.03 PROJECT LOCATION: WEST MIDDLE | 2312 BAXTER ROAD, CHESTERFIELD, MO 63017 AND TRANSPORTATION BUILDING | 347 N. WOODS MILL RLOAD | CHESTERFIELD, MO 63017

1.04 THE SEALS THAT FOLLOW APPLY TO THE PROJECT MANUAL IN WHICH THIS SEALS PAGE IS BOUND FOR THE PROJECT IDENTIFIED ABOVE.









END OF SECTION 000107

SECTION 000110
TABLE OF CONTENTS

PROCUREMENT AND CONTRACTING REQUIREMENTS

1.01 DIVISION 00 -- PROCUREMENT AND CONTRACTING REQUIREMENTS

A. 000107 - Seals Page
B. 000110 - Table of Contents
C. 001100 - Invitation To Bid
D. 002113 - Instructions to Bidders
E. 003100 - Available Project Information
F. 004000 - Procurement Forms and Supplements
G. 004100 - Bid Form
H. 004301 - Bid Form Supplements Cover Sheet
I. 004322 - Unit Prices Form
J. 004336 - Proposed Subcontractors Form
K. 005000 - Contracting Forms and Supplements
L. 005200 - Agreement Form
M. 006000 - Project Forms
N. 007200 - General Conditions

SPECIFICATIONS

2.01 DIVISION 01 -- GENERAL REQUIREMENTS

A. 011000 - Summary
B. 012000 - Price and Payment Procedures
C. 012100 - Allowances
D. 012200 - Unit Prices
E. 012500 - Substitution Procedures
F. 013000 - Administrative Requirements
G. 013216 - Construction Progress Schedule
H. 013553 - Security Procedures
I. 014000 - Quality Requirements
J. 014100 - Regulatory Requirements
K. 014113 - Asbestos Abatement Codes, Regulations and Standards
L. 014216 - Definitions
M. 014529 - Air Monitoring Test Laboratory Services
N. 015000 - Temporary Facilities and Controls
O. 015100 - Temporary Utilities
P. 015139 - Temporary Negative Pressure Air Circuation System
Q. 015213 - Field Offices and Sheds
R. 015500 - Vehicular Access and Parking
S. 015643 - Temporary Enclosures
T. 015713 - Temporary Erosion and Sediment Control
U. 015719 - Temporary Environmental Controls

V. 015726 - Decontamination Units
W. 015733 - Worker Protection
X. 015736 - Respiratory Protection
Y. 015813 - Temporary Project Signage
Z. 016000 - Product Requirements
AA. 016116 - Volatile Organic Compound (VOC) Content Restrictions
BB. 017000 - Execution and Closeout Requirements
CC. 017333 - Project Contamination
DD. 017419 - Construction Waste Management and Disposal
EE. 017433 - Work Area Clearance
FF. 017800 - Closeout Submittals
GG. 017900 - Demonstration and Training

2.02 DIVISION 02 -- EXISTING CONDITIONS

A. 024100 - Demolition
B. 028213 - Removal of Asbestos Containing Materials
C. 028233 - Disposal of Asbestos Containing Waste Materials
D. 028236 - Removal of Class II Asbestos Containing Materials
E. 028410 - Hazardous Waste Management

2.03 DIVISION 03 -- CONCRETE

A. 030100 - Maintenance of Concrete
B. 031000 - Concrete Forming and Accessories
C. 032000 - Concrete Reinforcing
D. 033000 - Cast-in-Place Concrete

2.04 DIVISION 04 -- MASONRY

A. 040100 - Maintenance of Masonry
B. 040511 - Masonry Mortaring and Grouting
C. 042000 - Unit Masonry

2.05 DIVISION 05 -- METALS

A. 055000 - Metal Fabrications

2.06 DIVISION 06 -- WOOD, PLASTICS, AND COMPOSITES

A. 061000 - Rough Carpentry

2.07 DIVISION 07 -- THERMAL AND MOISTURE PROTECTION

A. 078400 - Firestopping
B. 079200 - Joint Sealants

2.08 DIVISION 08 -- OPENINGS

A. 083100 - Access Doors and Panels
B. 089100 - Louvers

2.09 DIVISION 09 -- FINISHES

A. 099123 - Interior Painting

2.10 DIVISION 10 -- SPECIALTIES

2.11 DIVISION 11 -- EQUIPMENT

2.12 DIVISION 12 -- FURNISHINGS

2.13 DIVISION 13 -- SPECIAL CONSTRUCTION

2.14 DIVISION 14 -- CONVEYING EQUIPMENT

2.15 DIVISION 21 -- FIRE SUPPRESSION

2.16 DIVISION 22 -- PLUMBING

2.17 DIVISION 23 -- HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

A. 230516 - Expansion Fittings and Loops for HVAC Piping
B. 230517 - Sleeves and Sleeve Seals for HVAC Piping
C. 230519 - Meters and Gauges for HVAC Piping
D. 230548 - Vibration and Seismic Controls for HVAC
E. 230553 - Identification for HVAC Piping and Equipment
F. 230593 - Testing, Adjusting, and Balancing for HVAC
G. 230716 - HVAC Equipment Insulation
H. 230719 - HVAC Piping Insulation
I. 230913 - Instrumentation and Control Devices for HVAC
J. 230923 - Direct-Digital Control System for HVAC
K. 230993 - Sequence of Operations for HVAC Controls
L. 232113 - Hydronic Piping
M. 232114 - Hydronic Specialties
N. 232123 - Hydronic Pumps
O. 232500 - HVAC Water Treatment
P. 233100 - HVAC Ducts and Casings
Q. 236426 - Rotary-Screw Water Chillers
R. 236514 - Induced-Draft Cooling Towers

2.18 DIVISION 25 -- INTEGRATED AUTOMATION

2.19 DIVISION 26 -- ELECTRICAL

A. 260519 - Low-Voltage Electrical Power Conductors and Cables
B. 260526 - Grounding and Bonding for Electrical Systems
C. 260529 - Hangers and Supports for Electrical Systems
D. 260533.13 - Conduit for Electrical Systems
E. 260533.16 - Boxes for Electrical Systems
F. 260548 - Vibration and Seismic Controls for Electrical Systems
G. 260553 - Identification for Electrical Systems
H. 260583 - Wiring Connections
I. 262726 - Wiring Devices
J. 262813 - Fuses
K. 262816.16 - Enclosed Switches

2.20 DIVISION 27 -- COMMUNICATIONS

2.21 DIVISION 28 -- ELECTRONIC SAFETY AND SECURITY

2.22 DIVISION 31 -- EARTHWORK

A. 311000 - Site Clearing
B. 312200 - Grading
C. 312316 - Excavation
D. 312316.13 - Trenching
E. 312316.26 - Rock Removal
F. 312323 - Fill
G. 312500 - Erosion and Sedimentation Control
H. 312500 - Erosion and Sedimentation Controls

2.23 DIVISION 32 -- EXTERIOR IMPROVEMENTS

A. 321313 - Concrete Paving
B. 323113 - Chain Link Fences and Gates
C. 329119 - Landscape Grading
D. 329223 - Sodding

2.24 DIVISION 33 -- UTILITIES

A. 334211 - Stormwater Gravity Piping
B. 334600 - Stormwater Management

2.25 DIVISION 34 -- TRANSPORTATION

2.26 DIVISION 40 -- PROCESS INTEGRATION

2.27 DIVISION 46 -- WATER AND WASTEWATER EQUIPMENT

END OF SECTION 000110

SECTION 001100
INVITATION TO BID

THE FACILITIES DEPARTMENT OF THE PARKWAY SCHOOL DISTRICT INVITES YOU TO BID ON THE FOLLOWING PROJECT:

1.01 PN432501B - WEM COOLING TOWER & CHILLER REPLACEMENT AT WEST MIDDLE | 2312 BAXTER ROAD, CHESTERFIELD, MO 63017

1.02 BIDS ARE TO BE ELECTRONICALLY SUBMITTED TO:

A. Vendors must submit their responses electronically via Bonfire:

B. https://parkwayschools.bonfirehub.com/

C. Any response not received via Bonfire before the response Submission Deadline will not be considered. Each vendor is solely responsible for ensuring that their response is acknowledged and confirmed. Responses will receive a Bonfire email confirmation upon receipt.

D. All bids shall be considered valid for acceptance until such time an award is made unless the vendor provides for a different time period within its bid response. However, the District reserves the right to reject a bid if the Vendor's response is unacceptable and the Vendor is unwilling to extend the validity of its proposal.

E. The District reserves the right to purchase any quantities of bid without altering the unit purchase price upon award.

1.03 BIDS WILL BE RECEIVED ON OR BEFORE:

A. Monday, September 14, 2026, at 2:00 p.m. CDT

1.04 ALL BIDS WILL BE PUBLICLY OPENED ON THE AFOREMENTIONED DATE AT THE SPECIFIED TIME AND PLACE.

A. Bids may not be withdrawn for at least forty-five (45) days after the closing date for receipt of Bids.

B. All Bids must be fully completed Bids by a Prime Contractor who shall have responsibility for all portions of the Work.

C. Individual Bids by separate Contractors for separate portions of the Work will not be accepted.

1.05 THE OWNER FOR THE PROJECT IS:

A. Parkway School District
455 North Woods Mill Road
Chesterfield, Missouri 63017

1.06 THE OWNER'S REPRESENTATIVE FOR THE PROJECT IS:

A. John Blanton
Manager of Planning and Construction
Parkway School District
363 North Woods Mill Road
Chesterfield, Missouri 63017
Telephone: (314) 415-8289
E-mail: jblanton@parkwayschools.net

1.07 THE ARCHITECT FOR THE PROJECT IS:

A. Bond Architects
222 South Central Avenue, Suite 501
St. Louis, Missouri 63105
Tel: (314) 863-4994, Fax: (314) 863-4995

1.08 NOTE: BIDDERS SHALL DIRECT ALL QUESTIONS AND CLARIFICATIONS TO THE OWNER'S REPRESENTATIVE.

1.09 COPIES OF THE BIDDING DOCUMENTS MAY BE OBTAINED FROM 8:00 A.M. TO 5:00 P.M., MONDAY THROUGH FRIDAY COMMENCING ON WEDNESDAY, JULY 22, 2026, AT 12:00 P.M. CDT, THROUGH DOCUMENT IMAGING SYSTEMS, INC., 1463 SOUTH VANDEVENTER AVENUE, ST. LOUIS, MISSOURI, 63110 (TELEPHONE NUMBER 314-531-0167).

A. The bid package can be viewed and ordered 24/7 through their website at https://parkwayschools.bonfirehub.com/portal/?tab=openOpportunities.
   1. Cick on "Open Public Opportunities" tab at top of page.
   2. Click on "View Opportunity" for "Ref # 26-145".

B. The bid package is available for purchase and there will be no deposit or refund.

1.10 BIDDING DOCUMENTS ARE ON FILE AT:

A. Associated General Contractors of Missouri, 6330 Knox Industrial Drive, St. Louis, Missouri, 63139, www.agcmo.org

B. Dodge Construction Network, www.construction.com

C. ConstructConnect, https://projects.constructconnect.com

1.11 A MANDATORY ATTENDANCE PRE-BID CONFERENCE IS SCHEDULED FOR MONDAY, AUGUST 10, 2026, AT 9:00 A.M. CST. MEET AT THE FRONT ENTRANCE TO WEST MIDDLE SCHOOL

A. Directions to the pre-bid conference may be obtained by contacting the Architect.

B. Failure of the Bidder to attend the mandatory pre-bid conference will disqualify any submitted Bid from the Bidder.

1.12 A BID BOND WILL BE REQUIRED IN THE AMOUNT OF FIVE PERCENT (5%) OF THE AMOUNT OF THE BIDDER'S BID.

A. The Bid Bond must accompany the Bid in order for the Bid to be accepted.

1.13 AN EXECUTED CONTRACTOR'S QUALIFICATION STATEMENT, AIA DOCUMENT A305 INCLUDING A QUARTERLY OR ANNUAL FINANCIAL STATEMENT NOT OVER 12 MONTHS OLD MUST BE DELIVERED PRIOR TO OR WITH THE BIDDER'S BID IN ORDER FOR THE BID TO BE ACCEPTED.

A. Financial statements will be returned to the Bidder upon request received prior to the Notice To Proceed Date.

B. All financial statements not requested to be returned shall be shredded and disposed of following the Notice To Proceed Date.

1.14 IT IS ANTICIPATED THAT THE SUCCESSFUL BIDDER WILL BE GIVEN NOTICE TO PROCEED ON OCTOBER 15, 2026 WITH SUBSTANTIAL COMPLETION TO OCCUR ON OR BEFORE APRIL 16, 2027.

A. The Bidder will be allowed to order equipment, materials, and supplies as necessary upon entering into the Agreement Between Owner and Contractor.

1.15 IT IS ANTICIPATED THAT THIS AGREEMENT WILL BE PRESENTED TO THE SUCCESSFUL BIDDER FOR SIGNATURE ON OCTOBER 15, 2026.

1.16 PAYMENTS WILL BE MADE BY THE OWNER WITHIN APPROXIMATELY TEN (10) BUSINESS DAYS, BUT NOT LATER THAN THIRTY (30) CALENDAR DAYS AFTER RECEIPT OF AN APPLICATION AND CERTIFICATE FOR PAYMENT WHICH RECEIVES APPROVAL.

1.17 NOT LESS THAN THE PREVAILING HOURLY RATES OF WAGES FOR WORK OF A SIMILAR CHARACTER IN THE LOCALITY IN WHICH THE WORK IS PERFORMED, ALL AS MORE FULLY SET OUT IN THE DETAILED SPECIFICATIONS FOR THIS PROJECT, SHALL BE PAID TO ALL WORKERS EMPLOYED ON SAID PROJECT.

1.18 CONTRACTOR AND SUBCONTRACTORS SHALL PROVIDE A OCCUPATIONAL SAFETY AND HEALTH (OSHA) TEN-HOUR CONSTRUCTION SAFETY AND HEALTH PROGRAM FOR THEIR ON-SITE EMPLOYEES WHICH INCLUDES A COURSE IN CONSTRUCTION SAFETY AND HEALTH APPROVED BY OSHA OR A SMILILAR PROGRAM APPROVED BY THE MISSOURI DEPATMENT OF LABOR WHICH IS AT LEAST AS STRINGENT AS AN APPROVED OSHA PROGRAM, UNLESS SUCH EMPLOYEES HAVE PREVIOUSLY COMPLETED THE REQUIRED PROGRAM.

END OF INVITATION TO BID

SECTION 002113
INSTRUCTIONS TO BIDDERS

FORM OF INSTRUCTIONS TO BIDDERS

1.01 SEE AIA DOCUMENT A701 (2018 EDITION), INSTRUCTIONS TO BIDDERS FOLLOWING THIS DOCUMENT .

END OF SECTION 002113

AIA® Document A701® – 2018

Instructions to Bidders

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

432501B – WEM Cooling Tower and Chiller Replacement West Middle School
2312 Baxter Road
Chesterfield, Missouri 63017
Bid No. 26-145

THE OWNER:
(Name, legal status, address, and other information)

Parkway School District
455 North Woods Mill Road
Chesterfield, Missouri 63017
Telephone Number: 314-415-8100

THE ARCHITECT:
(Name, legal status, address, and other information)

Bond Architects
222 South Central Avenue; Suite 501
St. Louis, Missouri 63105
Telephone Number: 314-863-4994

TABLE OF ARTICLES

1 DEFINITIONS

2 BIDDER'S REPRESENTATIONS

3 BIDDING DOCUMENTS

4 BIDDING PROCEDURES

5 CONSIDERATION OF BIDS

6 POST-BID INFORMATION

7 PERFORMANCE BOND AND PAYMENT BOND

8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

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.

FEDERAL, STATE, AND LOCAL LAWS MAY IMPOSE REQUIREMENTS ON PUBLIC PROCUREMENT CONTRACTS. CONSULT LOCAL AUTHORITIES OR AN ATTORNEY TO VERIFY REQUIREMENTS APPLICABLE TO THIS PROCUREMENT BEFORE COMPLETING THIS FORM.

It is intended that AIA Document G612™–2017, Owner's Instructions to the Architect, Parts A and B will be completed prior to using this document.

AIA Document A701 – 2018. Copyright © 1970, 1974, 1978, 1987, 1997 and 2018. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 10:56:53 ET on 07/14/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1295143732)

ARTICLE 1 DEFINITIONS

§ 1.1 Bidding Documents include the Bidding Requirements and the Proposed Contract Documents. The Bidding Requirements consist of the advertisement or invitation to bid, Instructions to Bidders, supplementary instructions to bidders, the bid form, and any other bidding forms. The Proposed Contract Documents consist of the unexecuted form of Agreement between the Owner and Contractor and that Agreement's Exhibits, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, all Addenda, and all other documents enumerated in Article 8 of these Instructions.

§ 1.2 Definitions set forth in the General Conditions of the Contract for Construction, or in other Proposed Contract Documents apply to the Bidding Documents.

§ 1.3 Addenda are written or graphic instruments issued by the Architect, which, by additions, deletions, clarifications, or corrections, modify or interpret the Bidding Documents.

§ 1.4 A Bid is a complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

§ 1.5 The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents, to which Work may be added or deleted by sums stated in Alternate Bids.

§ 1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from, or that does not change, the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.

§ 1.7 A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, as described in the Bidding Documents.

§ 1.8 A Bidder is a person or entity who submits a Bid and who meets the requirements set forth in the Bidding Documents.

§ 1.9 A Sub-bidder is a person or entity who submits a bid to a Bidder for materials, equipment, or labor for a portion of the Work.

ARTICLE 2 BIDDER'S REPRESENTATIONS

§ 2.1 By submitting a Bid, the Bidder represents that:

- **.1** the Bidder has read and understands the Bidding Documents;
- **.2** the Bidder understands how the Bidding Documents relate to other portions of the Project, if any, being bid concurrently or presently under construction;
- **.3** the Bid complies with the Bidding Documents;
- **.4** the Bidder has visited the site, become familiar with local conditions under which the Work is to be performed, and has correlated the Bidder's observations with the requirements of the Proposed Contract Documents;
- **.5** the Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception; and
- **.6** the Bidder has read and understands the provisions for liquidated damages, if any, set forth in the form of Agreement between the Owner and Contractor.

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 Distribution

§ 3.1.1 Bidders shall obtain complete Bidding Documents, as indicated below, from the issuing office designated in the advertisement or invitation to bid, for the deposit sum, if any, stated therein.
(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall obtain Bidding Documents.)

AIA Document A701 – 2018. Copyright © 1970, 1974, 1978, 1987, 1997 and 2018. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 10:56:53 ET on 07/14/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1295143732)

§ 3.1.2 Any required deposit shall be refunded to Bidders who submit a bona fide Bid and return the paper Bidding Documents in good condition within ten days after receipt of Bids. The cost to replace missing or damaged paper documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the paper Bidding Documents, and the Bidder's deposit will be refunded.

§ 3.1.3 Bidding Documents will not be issued directly to Sub-bidders unless specifically offered in the advertisement or invitation to bid, or in supplementary instructions to bidders.

§ 3.1.4 Bidders shall use complete Bidding Documents in preparing Bids. Neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete Bidding Documents.

§ 3.1.5 The Bidding Documents will be available for the sole purpose of obtaining Bids on the Work. No license or grant of use is conferred by distribution of the Bidding Documents.

§ 3.2 Modification or Interpretation of Bidding Documents

§ 3.2.1 The Bidder shall carefully study the Bidding Documents, shall examine the site and local conditions, and shall notify the Architect of errors, inconsistencies, or ambiguities discovered and request clarification or interpretation pursuant to Section 3.2.2.

§ 3.2.2 Requests for clarification or interpretation of the Bidding Documents shall be submitted by the Bidder in writing and shall be received by the Architect at least seven days prior to the date for receipt of Bids.
(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall submit requests for clarification and interpretation.)

§ 3.2.3 Modifications and interpretations of the Bidding Documents shall be made by Addendum. Modifications and interpretations of the Bidding Documents made in any other manner shall not be binding, and Bidders shall not rely upon them.

§ 3.3 Substitutions

§ 3.3.1 The materials, products, and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution.

§ 3.3.2 Substitution Process

§ 3.3.2.1 Written requests for substitutions shall be received by the Architect at least ten days prior to the date for receipt of Bids. Requests shall be submitted in the same manner as that established for submitting clarifications and interpretations in Section 3.2.2.

§ 3.3.2.2 Bidders shall submit substitution requests on a Substitution Request Form if one is provided in the Bidding Documents.

§ 3.3.2.3 If a Substitution Request Form is not provided, requests shall include (1) the name of the material or equipment specified in the Bidding Documents; (2) the reason for the requested substitution; (3) a complete description of the proposed substitution including the name of the material or equipment proposed as the substitute, performance and test data, and relevant drawings; and (4) any other information necessary for an evaluation. The request shall include a statement setting forth changes in other materials, equipment, or other portions of the Work, including changes in the work of other contracts or the impact on any Project Certifications (such as LEED), that will result from incorporation of the proposed substitution.

§ 3.3.3 The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

§ 3.3.4 If the Architect approves a proposed substitution prior to receipt of Bids, such approval shall be set forth in an Addendum. Approvals made in any other manner shall not be binding, and Bidders shall not rely upon them.

AIA Document A701 – 2018. Copyright © 1970, 1974, 1978, 1987, 1997 and 2018. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 10:56:53 ET on 07/14/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1295143732)

§ 3.3.5 No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents.

§ 3.4 Addenda

§ 3.4.1 Addenda will be transmitted to Bidders known by the issuing office to have received complete Bidding Documents.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Addenda will be transmitted.)

§ 3.4.2 Addenda will be available where Bidding Documents are on file.

§ 3.4.3 Addenda will be issued no later than four days prior to the date for receipt of Bids, except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.

§ 3.4.4 Prior to submitting a Bid, each Bidder shall ascertain that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid.

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 Preparation of Bids

§ 4.1.1 Bids shall be submitted on the forms included with or identified in the Bidding Documents.

§ 4.1.2 All blanks on the bid form shall be legibly executed. Paper bid forms shall be executed in a non-erasable medium.

§ 4.1.3 Sums shall be expressed in both words and numbers, unless noted otherwise on the bid form. In case of discrepancy, the amount entered in words shall govern.

§ 4.1.4 Edits to entries made on paper bid forms must be initialed by the signer of the Bid.

§ 4.1.5 All requested Alternates shall be bid. If no change in the Base Bid is required, enter "No Change" or as required by the bid form.

§ 4.1.6 Where two or more Bids for designated portions of the Work have been requested, the Bidder may, without forfeiture of the bid security, state the Bidder's refusal to accept award of less than the combination of Bids stipulated by the Bidder. The Bidder shall neither make additional stipulations on the bid form nor qualify the Bid in any other manner.

§ 4.1.7 Each copy of the Bid shall state the legal name and legal status of the Bidder. As part of the documentation submitted with the Bid, the Bidder shall provide evidence of its legal authority to perform the Work in the jurisdiction where the Project is located. Each copy of the Bid shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further name the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached, certifying the agent's authority to bind the Bidder.

§ 4.1.8 A Bidder shall incur all costs associated with the preparation of its Bid.

§ 4.2 Bid Security

§ 4.2.1 Each Bid shall be accompanied by the following bid security:

(Insert the form and amount of bid security.)

§ 4.2.2 The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and shall, if required, furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty. In the event the Owner fails to comply with Section 6.2, the amount of the bid security shall not be forfeited to the Owner.

AIA Document A701 – 2018. Copyright © 1970, 1974, 1978, 1987, 1997 and 2018. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 10:56:53 ET on 07/14/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1295143732)

§ 4.2.3 If a surety bond is required as bid security, it shall be written on AIA Document A310™, Bid Bond, unless otherwise provided in the Bidding Documents. The attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of an acceptable power of attorney. The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 4.2.4 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until (a) the Contract has been executed and bonds, if required, have been furnished; (b) the specified time has elapsed so that Bids may be withdrawn; or (c) all Bids have been rejected. However, if no Contract has been awarded or a Bidder has not been notified of the acceptance of its Bid, a Bidder may, beginning days after the opening of Bids, withdraw its Bid and request the return of its bid security.

§ 4.3 Submission of Bids

§ 4.3.1 A Bidder shall submit its Bid as indicated below:
(Indicate how, such as by website, host site/platform, paper copy, or other method Bidders shall submit their Bid.)

§ 4.3.2 Bids shall be submitted by the date and time and at the place indicated in the invitation to bid. Bids submitted after the date and time for receipt of Bids, or at an incorrect place, will not be accepted.

§ 4.3.3 The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

§ 4.3.4 A Bid submitted by any method other than as provided in this Section 4.3 will not be accepted.

(Paragraph deleted)

§ 4.4 Modification or Withdrawal of Bid

§ 4.4.1 Prior to the date and time designated for receipt of Bids, a Bidder may submit a new Bid to replace a Bid previously submitted, or withdraw its Bid entirely, by notice to the party designated to receive the Bids. Such notice shall be received and duly recorded by the receiving party on or before the date and time set for receipt of Bids. The receiving party shall verify that replaced or withdrawn Bids are removed from the other submitted Bids and not considered. Notice of submission of a replacement Bid or withdrawal of a Bid shall be worded so as not to reveal the amount of the original Bid.

§ 4.4.2 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids in the same format as that established in Section 4.3, provided they fully conform with these Instructions to Bidders. Bid security shall be in an amount sufficient for the Bid as resubmitted.

§ 4.4.3 After the date and time designated for receipt of Bids, a Bidder who discovers that it made a clerical error in its Bid shall notify the Architect of such error within two days, or pursuant to a timeframe specified by the law of the jurisdiction where the Project is located, requesting withdrawal of its Bid. Upon providing evidence of such error to the reasonable satisfaction of the Architect, the Bid shall be withdrawn and not resubmitted. If a Bid is withdrawn pursuant to this Section 4.4.3, the bid security will be attended to as follows:
(State the terms and conditions, such as Bid rank, for returning or retaining the bid security.)

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 Opening of Bids

If stipulated in an advertisement or invitation to bid, or when otherwise required by law, Bids properly identified and received within the specified time limits will be publicly opened and read aloud. A summary of the Bids may be made available to Bidders.

§ 5.2 Rejection of Bids

Unless otherwise prohibited by law, the Owner shall have the right to reject any or all Bids.

§ 5.3 Acceptance of Bid (Award)

§ 5.3.1 It is the intent of the Owner to award a Contract to the lowest responsive and responsible Bidder, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents. Unless otherwise prohibited by law,

AIA Document A701 – 2018. Copyright © 1970, 1974, 1978, 1987, 1997 and 2018. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 10:56:53 ET on 07/14/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1295143732)

the Owner shall have the right to waive informalities and irregularities in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's best interests.

§ 5.3.2 Unless otherwise prohibited by law, the Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the lowest responsive and responsible Bidder on the basis of the sum of the Base Bid and Alternates accepted.

ARTICLE 6 POST-BID INFORMATION

§ 6.1 Contractor's Qualification Statement

Bidders to whom award of a Contract is under consideration shall submit to the Architect, upon request and within the timeframe specified by the Architect, a properly executed AIA Document A305™, Contractor's Qualification Statement, unless such a Statement has been previously required and submitted for this Bid.

§ 6.2 Owner's Financial Capability

A Bidder to whom award of a Contract is under consideration may request in writing, fourteen days prior to the expiration of the time for withdrawal of Bids, that the Owner furnish to the Bidder reasonable evidence that financial arrangements have been made to fulfill the Owner's obligations under the Contract. The Owner shall then furnish such reasonable evidence to the Bidder no later than seven days prior to the expiration of the time for withdrawal of Bids. Unless such reasonable evidence is furnished within the allotted time, the Bidder will not be required to execute the Agreement between the Owner and Contractor.

§ 6.3 Submittals

§ 6.3.1 After notification of selection for the award of the Contract, the Bidder shall, as soon as practicable or as stipulated in the Bidding Documents, submit in writing to the Owner through the Architect:

- **.1** a designation of the Work to be performed with the Bidder's own forces;
- **.2** names of the principal products and systems proposed for the Work and the manufacturers and suppliers of each; and
- **.3** names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.

§ 6.3.2 The Bidder will be required to establish to the satisfaction of the Architect and Owner the reliability and responsibility of the persons or entities proposed to furnish and perform the Work described in the Bidding Documents.

§ 6.3.3 Prior to the execution of the Contract, the Architect will notify the Bidder if either the Owner or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Architect has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder's option, withdraw the Bid or submit an acceptable substitute person or entity. The Bidder may also submit any required adjustment in the Base Bid or Alternate Bid to account for the difference in cost occasioned by such substitution. The Owner may accept the adjusted bid price or disqualify the Bidder. In the event of either withdrawal or disqualification, bid security will not be forfeited.

§ 6.3.4 Persons and entities proposed by the Bidder and to whom the Owner and Architect have made no reasonable objection must be used on the Work for which they were proposed and shall not be changed except with the written consent of the Owner and Architect.

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 Bond Requirements

§ 7.1.1 If stipulated in the Bidding Documents, the Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder.

§ 7.1.2 If the furnishing of such bonds is stipulated in the Bidding Documents, the cost shall be included in the Bid. If the furnishing of such bonds is required after receipt of bids and before execution of the Contract, the cost of such bonds shall be added to the Bid in determining the Contract Sum.

§ 7.1.3 The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

AIA Document A701 – 2018. Copyright © 1970, 1974, 1978, 1987, 1997 and 2018. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 10:56:53 ET on 07/14/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1295143732)

§ 7.1.4 Unless otherwise indicated below, the Penal Sum of the Payment and Performance Bonds shall be the amount of the Contract Sum.
(If Payment or Performance Bonds are to be in an amount other than 100% of the Contract Sum, indicate the dollar amount or percentage of the Contract Sum.)

§ 7.2 Time of Delivery and Form of Bonds
§ 7.2.1 The Bidder shall deliver the required bonds to the Owner not later than three days following the date of execution of the Contract. If the Work is to commence sooner in response to a letter of intent, the Bidder shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished and delivered in accordance with this Section 7.2.1.

§ 7.2.2 Unless otherwise provided, the bonds shall be written on AIA Document A312, Performance Bond and Payment Bond.

§ 7.2.3 The bonds shall be dated on or after the date of the Contract.

§ 7.2.4 The Bidder shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix to the bond a certified and current copy of the power of attorney.

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS
§ 8.1 Copies of the proposed Contract Documents have been made available to the Bidder and consist of the following documents:

.1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)

.2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)

.3 AIA Document A201™–2017, General Conditions of the Contract for Construction, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)

.4 Building Information Modeling Exhibit, if completed:

.5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda:

AIA Document A701 – 2018. Copyright © 1970, 1974, 1978, 1987, 1997 and 2018. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 10:56:53 ET on 07/14/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1295143732)

Number	Date	Pages

.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.)

[ ] The Sustainability Plan:

Title	Date	Pages

[ ] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.9 Other documents listed below:
(List here any additional documents that are intended to form part of the Proposed Contract Documents.)

AIA Document A701 – 2018. Copyright © 1970, 1974, 1978, 1987, 1997 and 2018. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 10:56:53 ET on 07/14/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1295143732)

SECTION 003100
AVAILABLE PROJECT INFORMATION

PART 1 GENERAL

1.01 EXISTING CONDITIONS

A. Certain information relating to existing surface and subsurface conditions and structures is available to bidders but will not be part of Contract Documents, as follows:

B. Asbestos Management Plans: Available for interiors of facilities only.
   1. Original copy is available for inspection at Owner's offices during normal business hours.
   2. Asbestos containing material location drawings excerpted from the asbestos management plans are attached following this document.
   3. All asbestos abatement required to accomplish the Work shall be performed by the Owner's asbestos abatement contractor.

C. Lead Management Plans: Available for interiors and exteriors of facilities.
   1. Original copy is available for inspection at Owner's offices during normal business hours.
   2. Lead containing material location drawings excerpted from the leadmanagement plans are attached following this document.
   3. All lead abatement required to accomplish the Work shall be performed by the Owner's lead abatement contractor.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

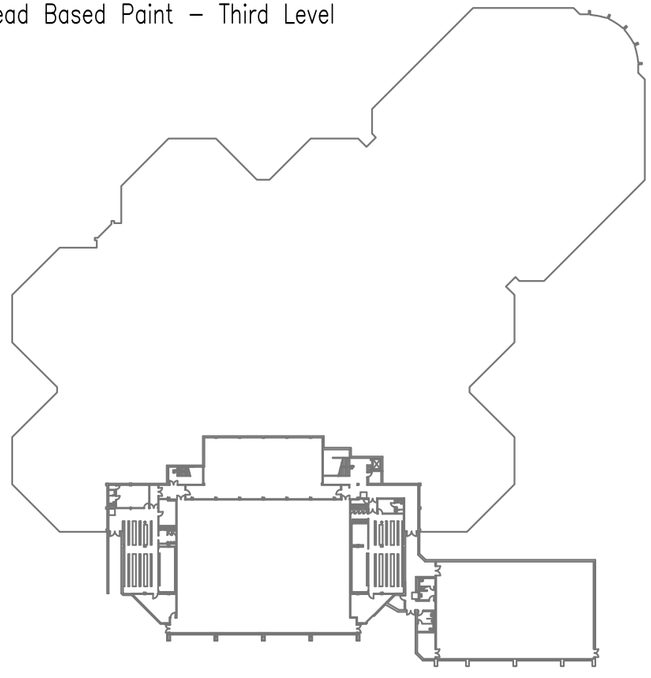
END OF SECTION 003100

DRAWING INDEX

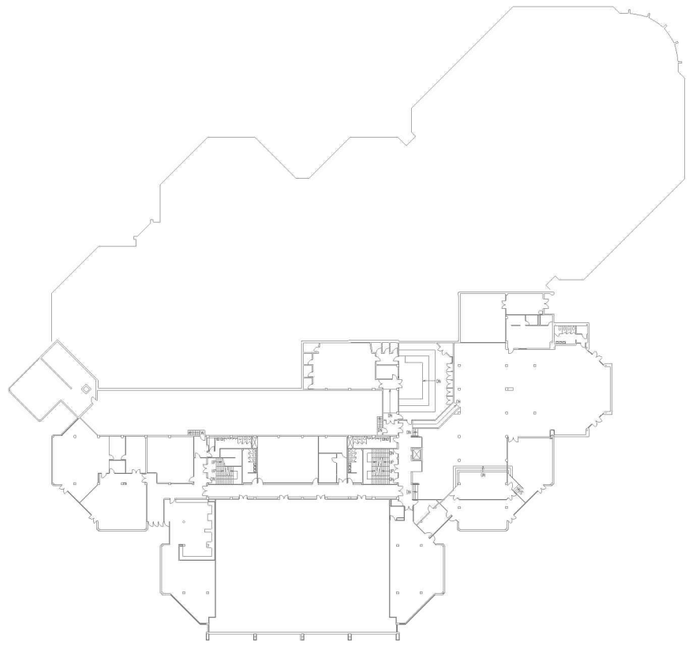
HMD–1.0 Cover Sheet
A2–01 Asbestos – Thermal System Insulation – First Level
A2–02 Asbestos – Thermal System Insulation – Second Level
A2–03 Asbestos – Thermal System Insulation – Third Level
A3–01 Asbestos – Miscellaneous Material – Flooring – First Level
A3–02 Asbestos – Miscellaneous Material – Flooring – Second Level
A3–03 Asbestos – Miscellaneous Material – Flooring – Third Level
A4–01 Asbestos – Miscellaneous Material – Other – First Level
A4–02 Asbestos – Miscellaneous Material – Other – Second Level
A4–03 Asbestos – Miscellaneous Material – Other – Third Level
A5–01 Asbestos – Miscellaneous Material – Joint Compound – First Level
A5–02 Asbestos – Miscellaneous Material – Joint Compound – Second Level
A5–03 Asbestos – Miscellaneous Material – Joint Compound – Third Level
A8–01 Asbestos – Miscellaneous Material – Caulk – First Level
A8–02 Asbestos – Miscellaneous Material – Caulk – Second Level
A8–03 Asbestos – Miscellaneous Material – Caulk – Third Level
L1–01 Lead Based Paint – First Level
L1–02 Lead Based Paint – Second Level
L1–03 Lead Based Paint – Third Level

DRAWING INDEX

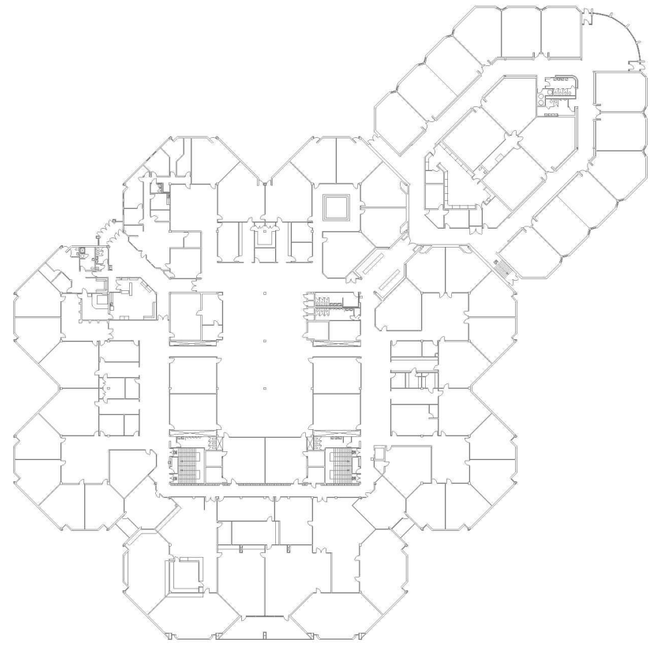
B1-01 Asbestos - Bulk Sample Locations - First Level
B1.1-01 Asbestos - Bulk Sample Locations - First Level
B2-02 Asbestos - Bulk Sample Locations - Second Level
B2.1-02 Asbestos - Bulk Sample Locations - Second Level
B3-03 Asbestos - Bulk Sample Locations - Third Level
B3.1-03 Asbestos - Bulk Sample Locations - Third Level
B3.2-03 Asbestos - Bulk Sample Locations - Third Level
B4-Roof Asbestos - Bulk Sample Locations - Roof Level
F1-01 Asbestos - Functional Spaces - First Level
F1-02 Asbestos - Functional Spaces - Second Level
F1-03 Asbestos - Functional Spaces - Third Level



First Level



Second Level



Third Level

psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

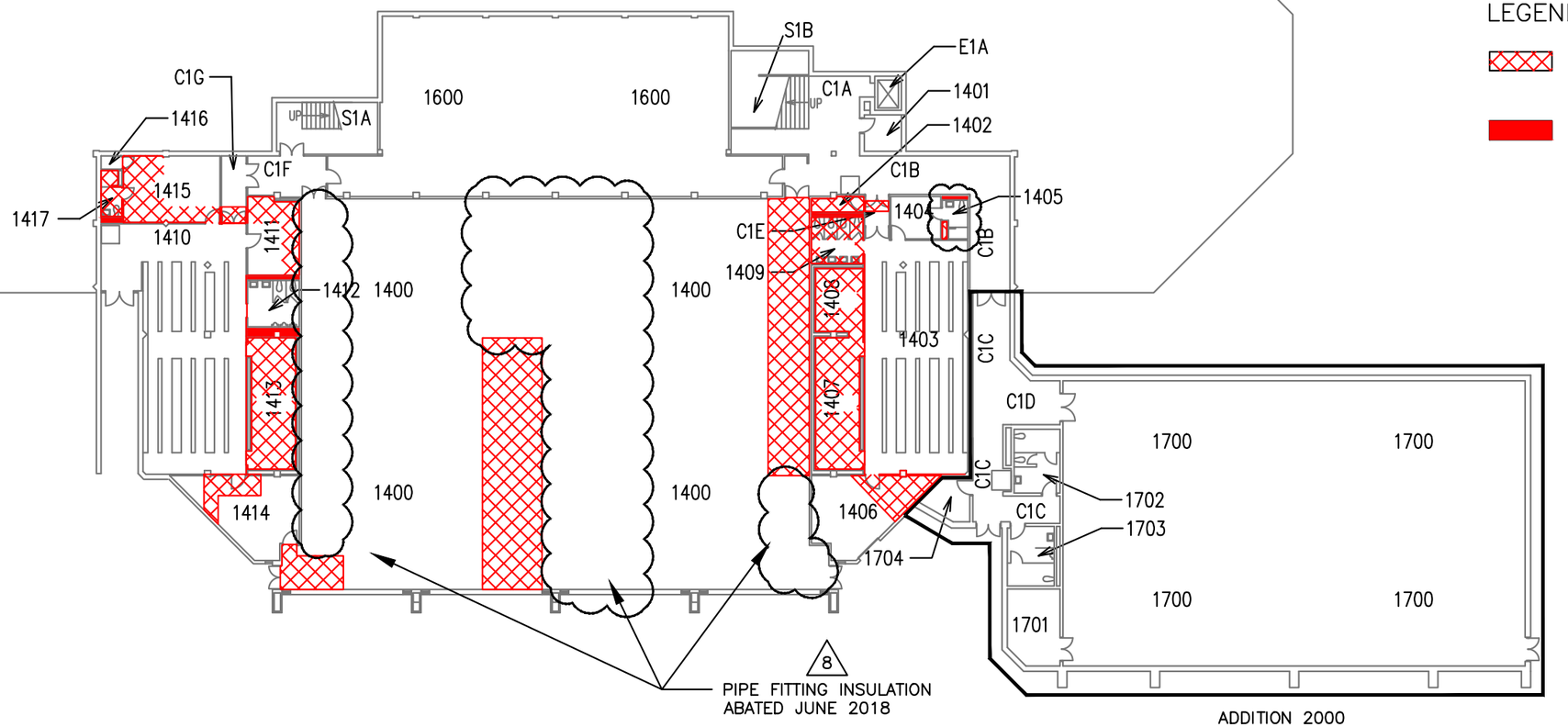
TITLE:
HAZARDOUS MATERIALS DRAWINGS
WEST MIDDLE SCHOOL – SCIENCE RENOVATIONS
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN: TDA	DES: MCD
CHKD: MCD	APPD: MCD
ASSEMBLED: 2–5–18	REV:

PARKWAY PROJECT NO.: 431701B
PARKWAY SCHOOL DISTRICT

HMD–1.0



ADDITION 2000

LEGEND

APPROXIMATE LOCATION OF TSI FITTINGS HOMOGENEOUS MATERIALS #11, #12, #13, #14, #15 & #16

APPROXIMATE LOCATION OF TSI FITTING PRESUMED TO BE IN PIPE CHASE HOMOGENEOUS MATERIALS #11, #12 & #13

NOTES:
1. The drawing for this material, originally produced by NPN Environmental for P.S.D.
2. Locations of ACM material are approximate.
3. Revisions 1–4 prepared by PSC Industrial Outsourcing, LP.

N

0 30

FEET

psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

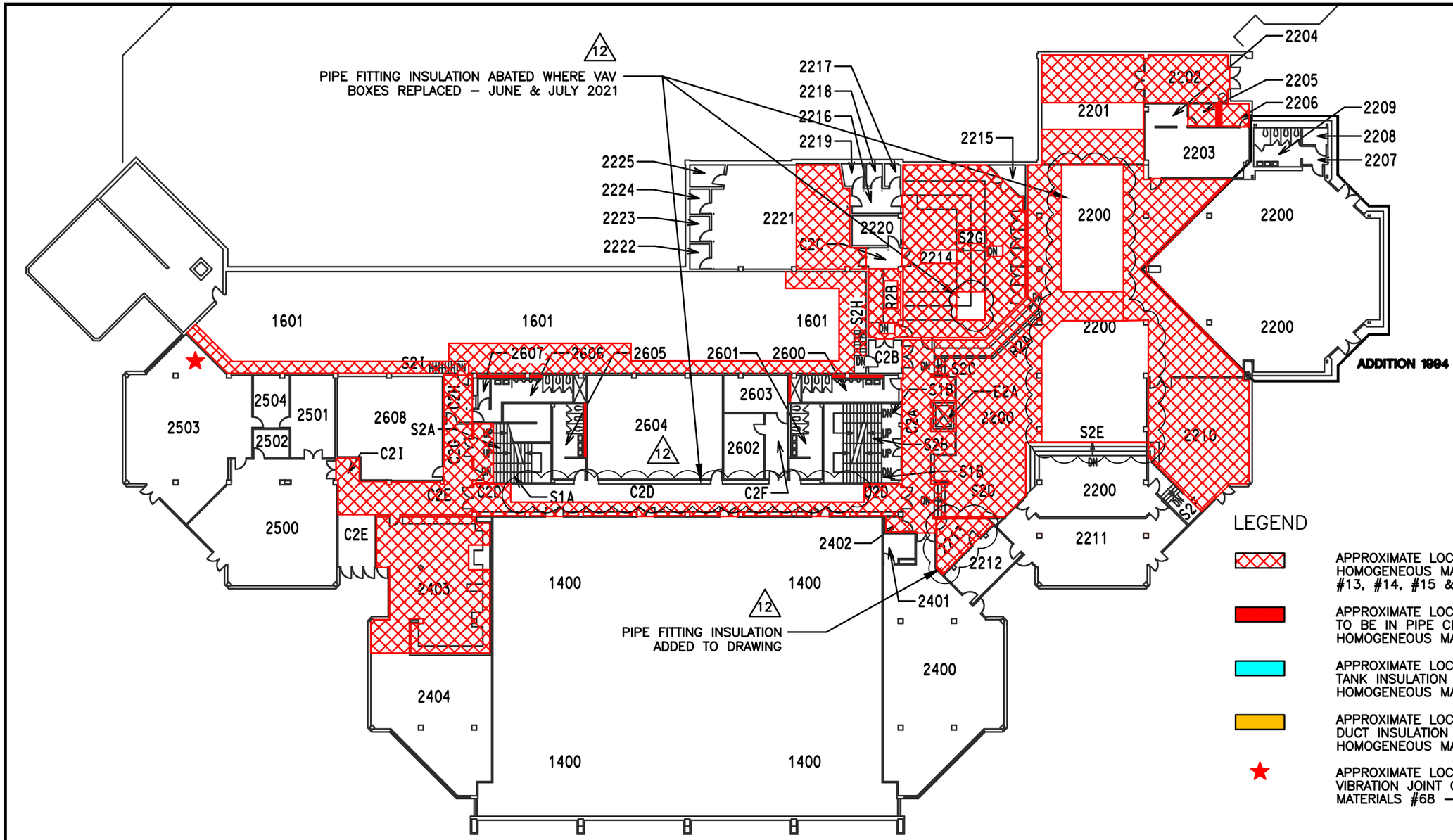
TITLE:
ASBESTOS – THERMAL SYSTEM INSULATION
WEST MIDDLE SCHOOL – FIRST LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN: TDA	DES: MCD
CHKD: MCD	APPD: MCD
DATE: 08–21–18	REV: 8

PROJECT NO: 00291604
PARKWAY SCHOOL DIST.
ST.LOUIS COUNTY, MO.

A2–01



ORIGINAL BUILDING BUILT IN 1969

LEGEND

- APPROXIMATE LOCATION OF TSI FITTINGS HOMOGENEOUS MATERIALS #11, #12, #13, #14, #15 & #16
- APPROXIMATE LOCATION OF TSI FITTING PRESUMED TO BE IN PIPE CHASE HOMOGENEOUS MATERIALS #11, #12 & #13
- APPROXIMATE LOCATION OF HOT WATER TANK INSULATION HOMOGENEOUS MATERIALS #17
- APPROXIMATE LOCATION OF BOILER EXHAUST DUCT INSULATION HOMOGENEOUS MATERIALS #18
- ★ APPROXIMATE LOCATION OF ASBESTOS–CONTAINING VIBRATION JOINT CLOTH – HOMOGENEOUS MATERIALS #68 – POSITIVE FOR ASBESTOS.

NOTES: 1. Locations of ACM material are approximate.

N

0 30

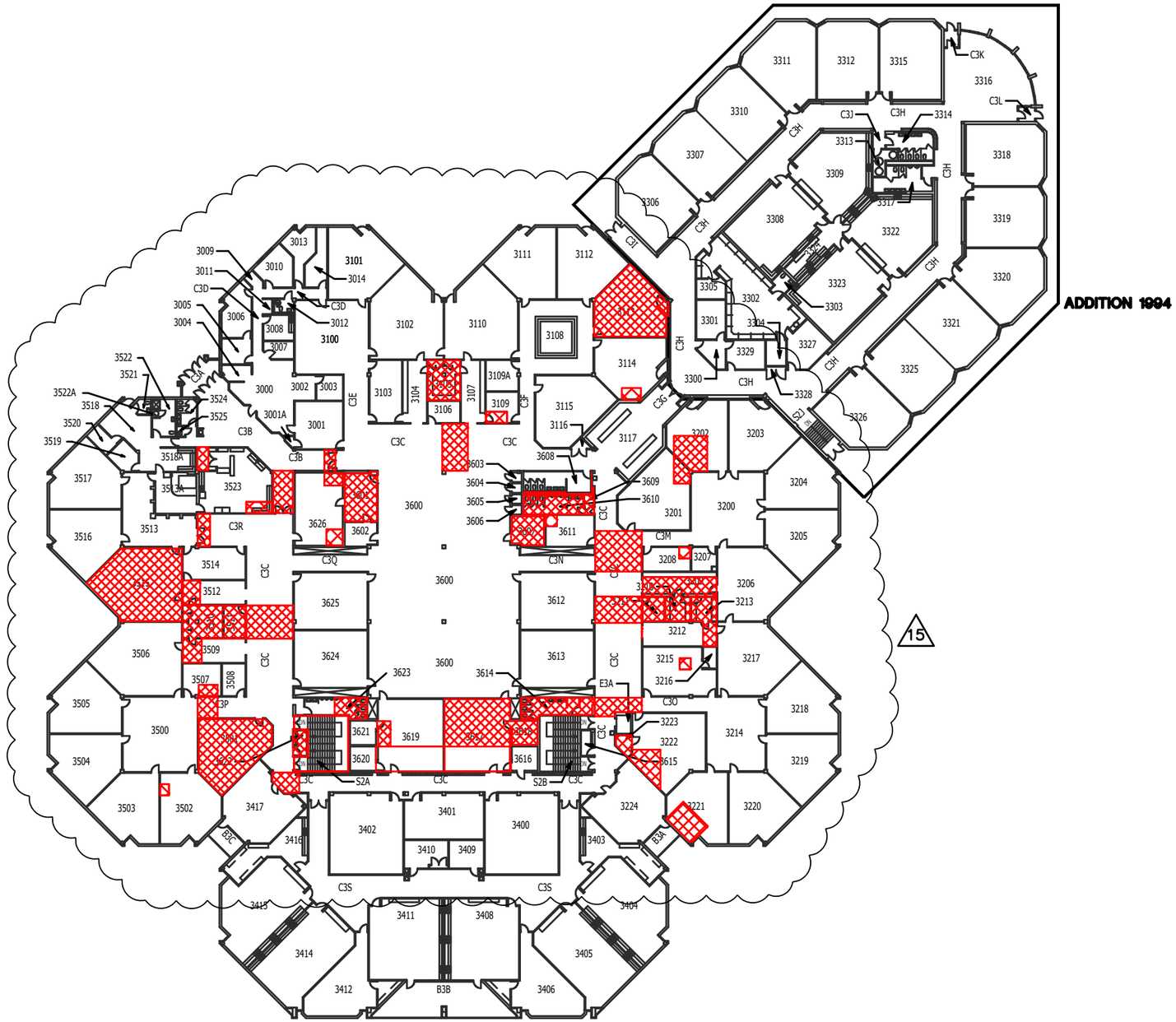
FEET

psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

TITLE:
ASBESTOS – THERMAL SYSTEM INSULATION
WEST MIDDLE SCHOOL – SECOND LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN:	DES:	PROJECT NO: 00291604
DRB	MCD	PARKWAY SCHOOL DIST. ST.LOUIS COUNTY, MO.
CHKD: MCD	APPD: MCD	
DATE: 09–01–21	REV: 12	A2–02



LEGEND

APPROXIMATE LOCATION OF TSI FITTINGS HOMOGENEOUS MATERIALS #11, #12, #13, #14, #15 & #16

APPROXIMATE LOCATION OF TSI FITTING PRESUMED TO BE IN PIPE CHASE HOMOGENEOUS MATERIALS #11, #12 & #13

NOTES:
1. The drawing for this material, originally produced by NPN Environmental for P.S.D.
2. Revisions 1–9 prepared by PSC Industrial Outsourcing, LP.

N

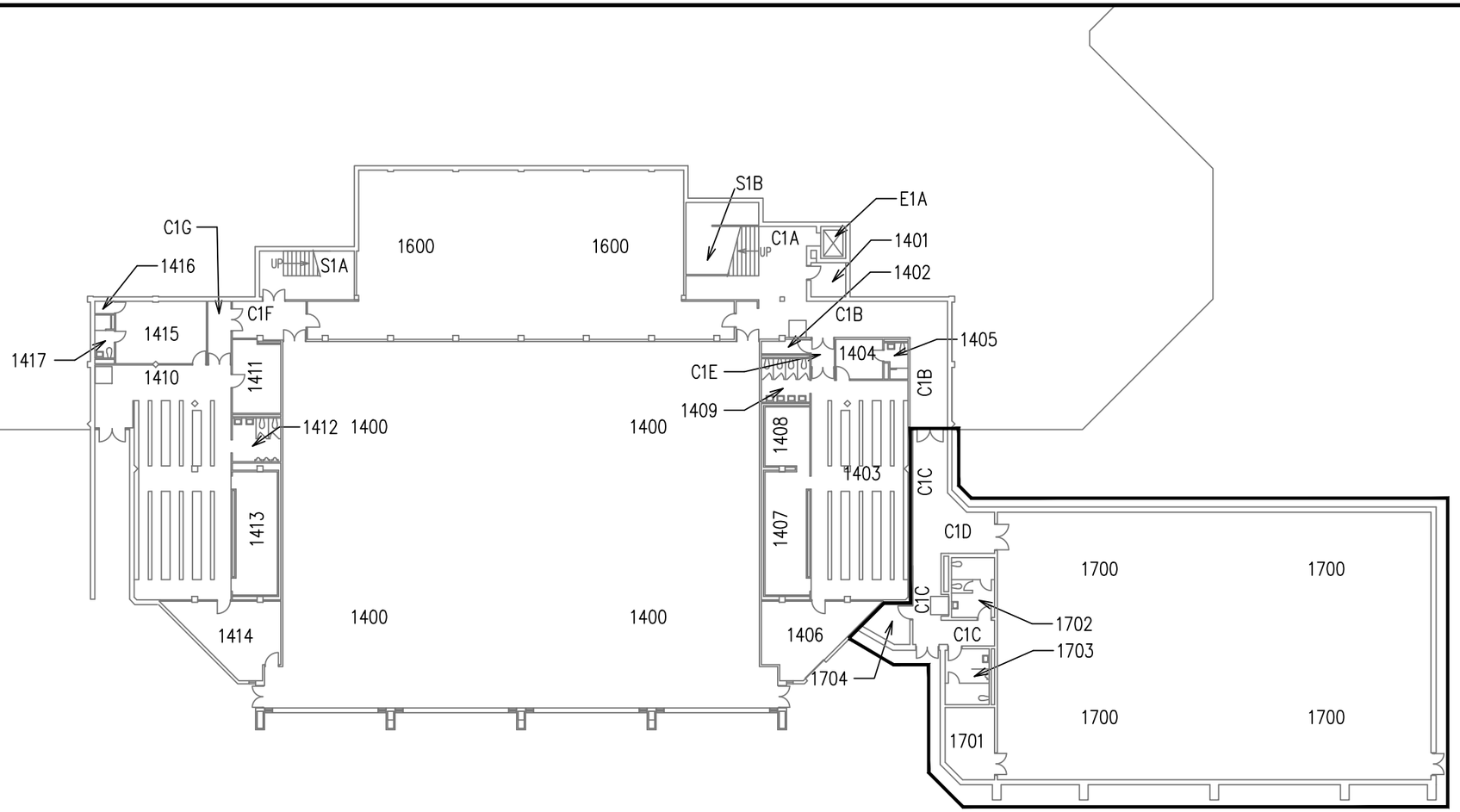
0 50
FEET

psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

TITLE:
ASBESTOS – THERMAL SYSTEM INSULATION
WEST MIDDLE SCHOOL – THIRD LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN:	DES:	PROJECT NO: 00291604
TDA	MCD	PARKWAY SCHOOL DIST. ST.LOUIS COUNTY, MO.
CHKD: MCD	APPD: MCD	
DATE: 09–01–21	REV: 15	A2–03



ADDITION 2000

NOTES:
1. The drawing for this material originally produced by NPN Environmental for P.S.D.
2. Locations of ACM material are approximate.

2 3. Revision 1 prepared by PSC Industrial Outsourcing, LP.

N

0 30

FEET

psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

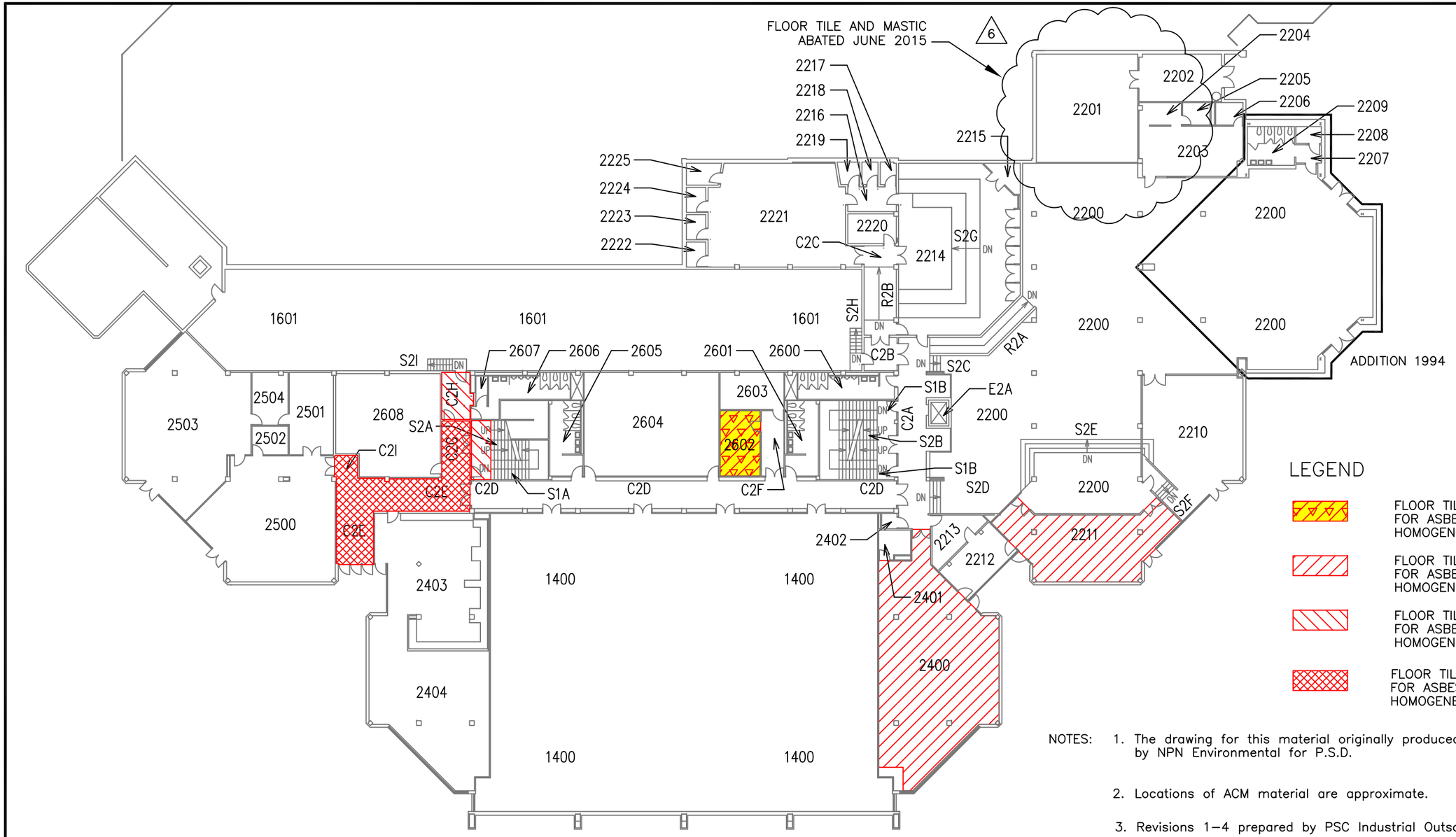
TITLE:
ASBESTOS – MISCELLANEOUS MATERIAL – FLOORING
WEST MIDDLE SCHOOL – FIRST LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN:	DES:
TDA	MCD
CHKD:	APPD:
MCD	MCD
DATE:	REV:
05-08-14	2

PROJECT NO: 00291604
PARKWAY SCHOOL DIST.
ST.LOUIS COUNTY, MO.

A3-01



ORIGINAL BUILDING BUILT IN 1969

LEGEND

- FLOOR TILE & MASTIC BOTH POSITIVE FOR ASBESTOS – EXPOSED HOMOGENEOUS MATERIAL WM–02
- FLOOR TILE NEGATIVE, MASTIC POSITIVE FOR ASBESTOS – EXPOSED HOMOGENEOUS MATERIAL WM–05
- FLOOR TILE NEGATIVE, MASTIC POSITIVE FOR ASBESTOS – EXPOSED HOMOGENEOUS MATERIAL WM–07
- FLOOR TILE NEGATIVE, MASTIC POSITIVE FOR ASBESTOS – UNDER CARPET HOMOGENEOUS MATERIAL WM–07

NOTES:

1. The drawing for this material originally produced by NPN Environmental for P.S.D.
2. Locations of ACM material are approximate.
3. Revisions 1–4 prepared by PSC Industrial Outsourcing, LP.

N

0 30

FEET

psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

TITLE:

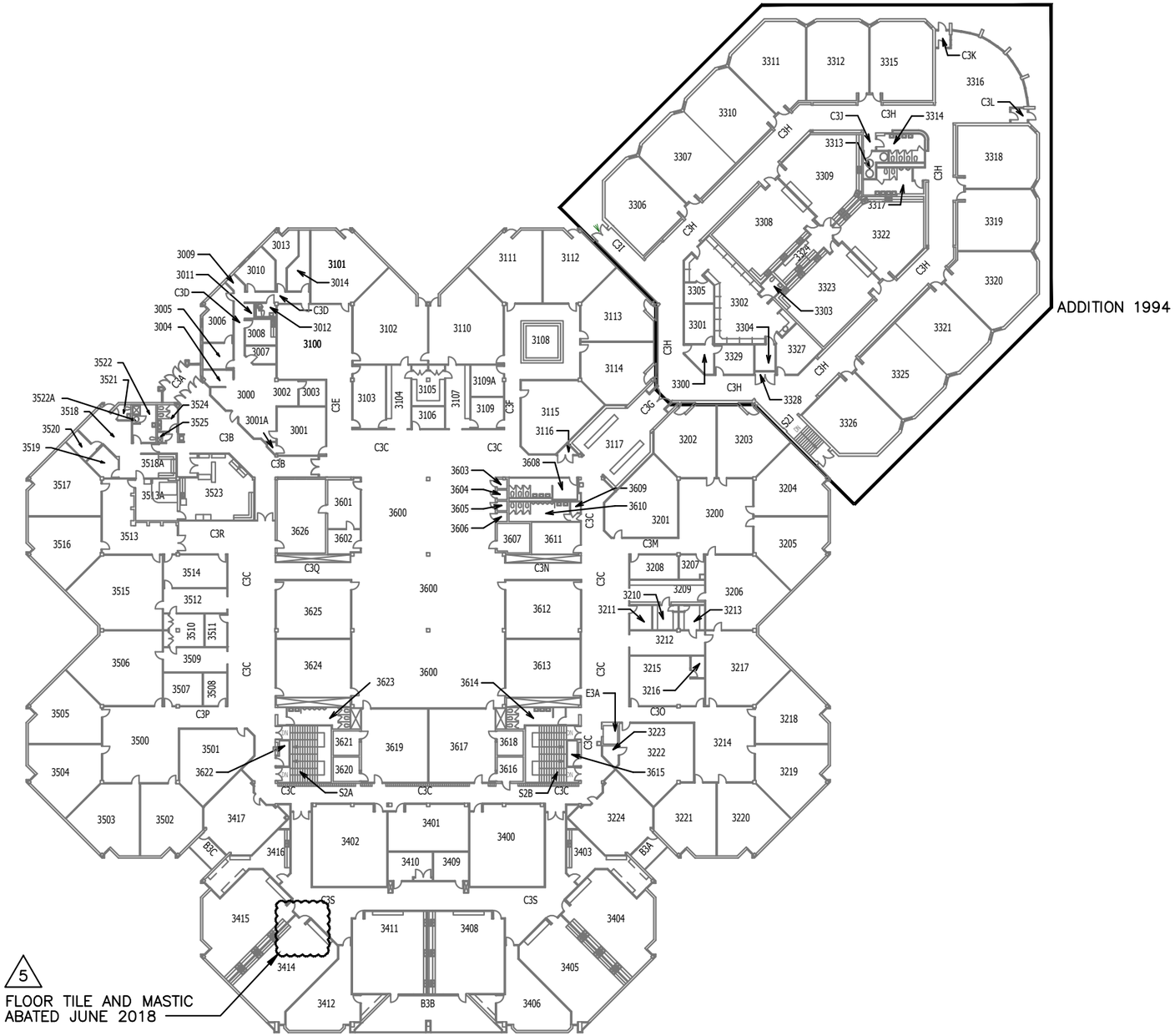
ASBESTOS – MISCELLANEOUS MATERIAL – FLOORING
WEST MIDDLE SCHOOL – SECOND LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN: DRB	DES: MCD
CHKD: MCD	APPD: MCD
DATE: 08–10–15	REV: 6

PROJECT NO: 00291604
PARKWAY SCHOOL DIST.
ST.LOUIS COUNTY, MO.

A3–02



LEGEND

FLOOR TILE & MASTIC BOTH POSITIVE FOR ASBESTOS – EXPOSED HOMOGENEOUS MATERIAL WM–02

NOTES:

1. The drawing for this material originally produced by NPN Environmental for P.S.D.
2. Locations of ACM material are approximate.
3. Revisions 1–3 prepared by PSC Industrial Outsourcing, LP.

N

0 50

FEET

psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

TITLE:

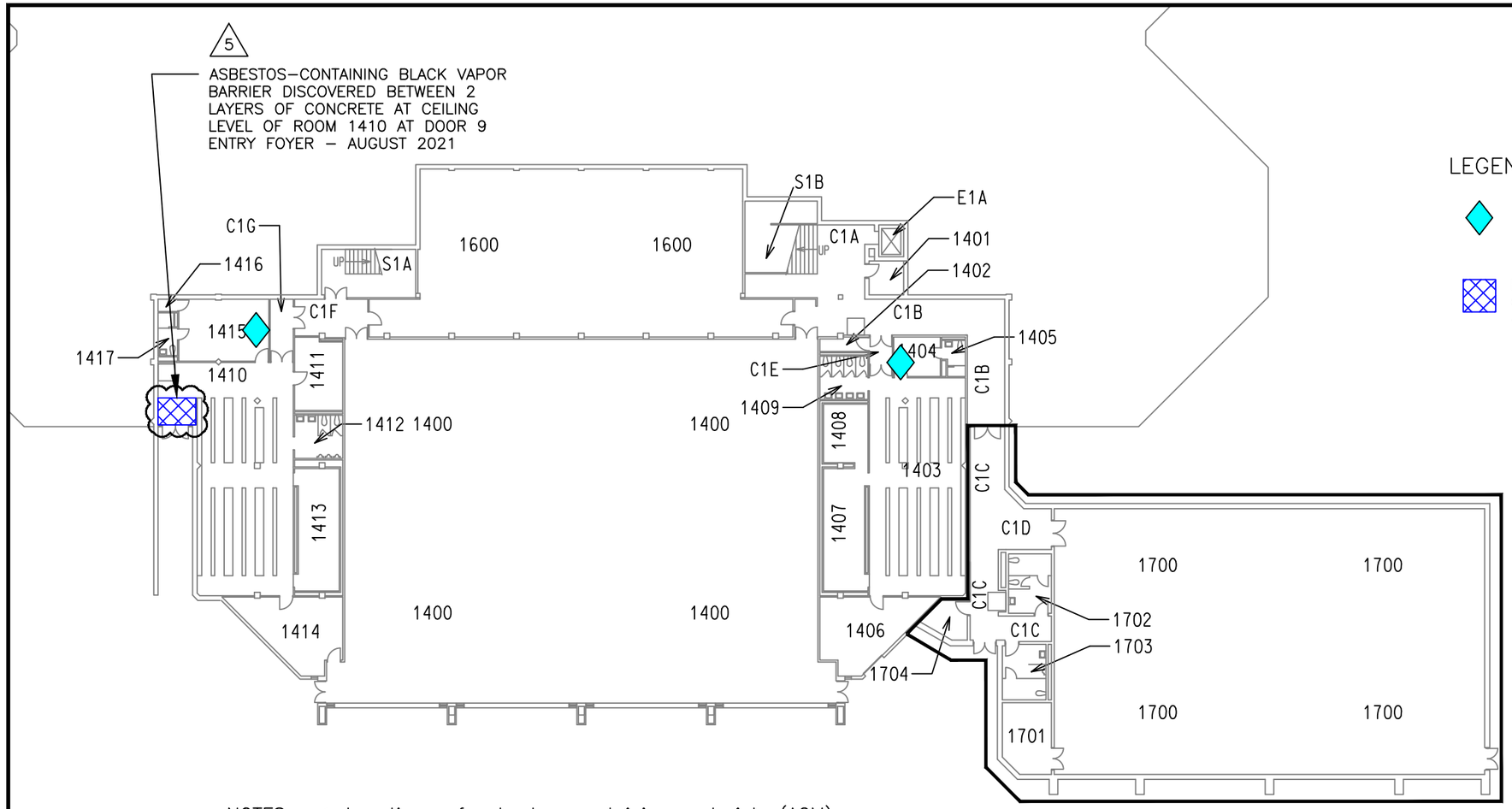
ASBESTOS – MISCELLANEOUS MATERIAL – FLOORING
WEST MIDDLE SCHOOL – THIRD LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN:	DES:
TDA	MCD
CHKD:	APPD:
MCD	MCD
DATE:	REV:
08–21–18	5

PROJECT NO: 00291604
PARKWAY SCHOOL DIST.
ST.LOUIS COUNTY, MO.

A3–03



ADDITION 2000

LEGEND

MASTIC/SEALANT ON CLOCK/INTERCOM ASSEMBLY HOMOGENEOUS MATERIAL WM–38 POSITIVE FOR ASBESTOS

BLACK VAPOR BARRIER BETWEEN 2 LAYERS OF CONCRETE – HOMOGENEOUS MATERIAL WM–152 – POSITIVE FOR ASBESTOS.

NOTES:

1. Locations of asbestos–containing materials (ACM) are approximate.
2. All solid core, metal or wooden doors, are assumed to be Asbestos–Containing unless noted otherwise. Homogeneous Material #21.
3. All chalkboards, metal or slate, are assumed to have an Asbestos–Containing mastic behind them. Homogeneous Material #33.
4. All bulletin boards are assumed to have an Asbestos–Containing mastic behind them. Homogeneous Material #41.
5. All mirrors are assumed to have an Asbestos–Containing mastic behind them.
6. Consult with Parkway Environmental Department prior to drilling into or demolishing concrete block walls.

N

0 30

FEET

psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

TITLE:

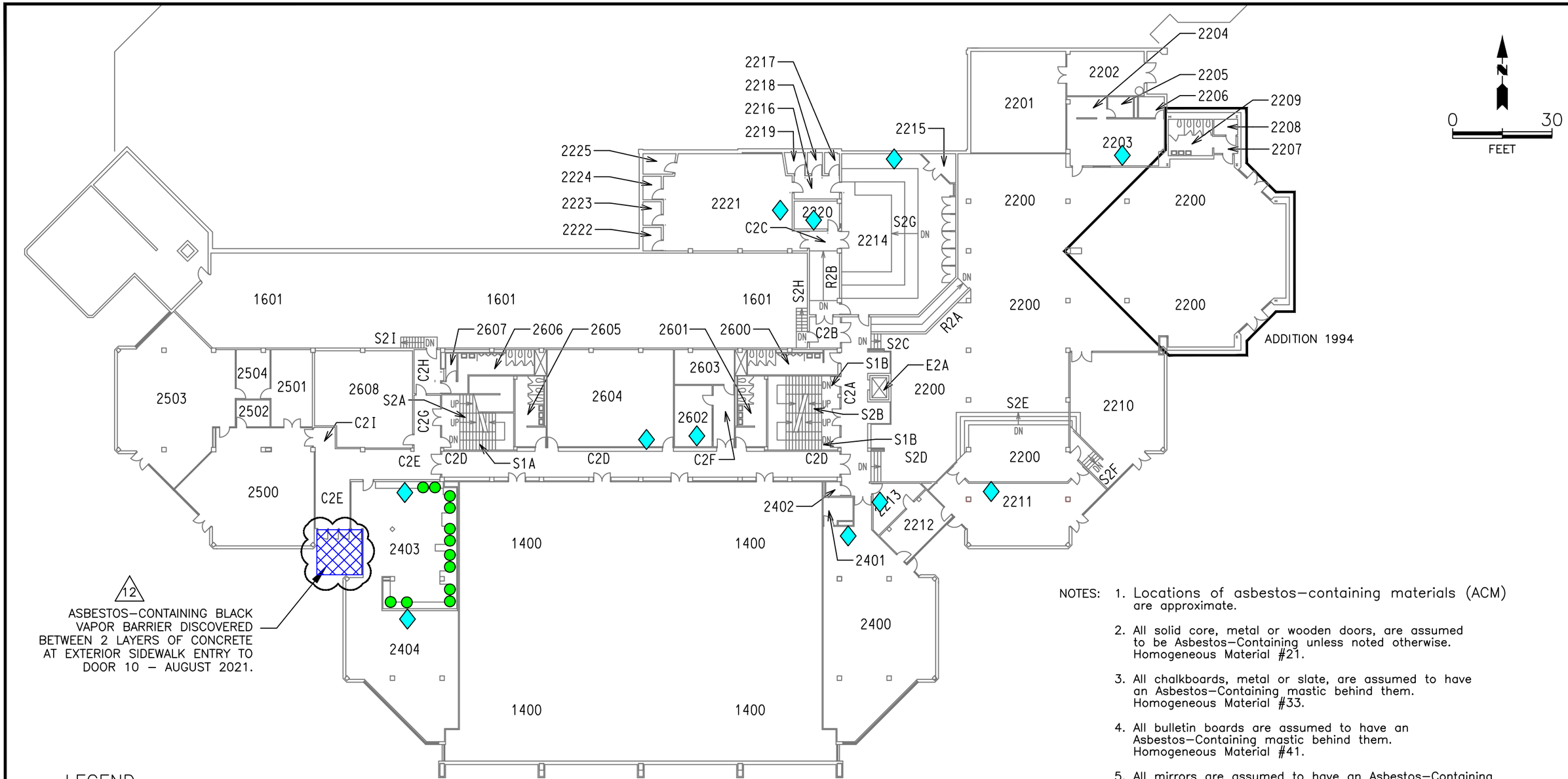
ASBESTOS – MISCELLANEOUS MATERIAL – OTHER
WEST MIDDLE SCHOOL – FIRST LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN:	DES:
TDA	MCD
CHKD:	APPD:
MCD	MCD
DATE:	REV:
09–01–21	5

PROJECT NO: 00291604
PARKWAY SCHOOL DIST.
ST.LOUIS COUNTY, MO.

A4–01



NOTES:

1. Locations of asbestos–containing materials (ACM) are approximate.
2. All solid core, metal or wooden doors, are assumed to be Asbestos–Containing unless noted otherwise. Homogeneous Material #21.
3. All chalkboards, metal or slate, are assumed to have an Asbestos–Containing mastic behind them. Homogeneous Material #33.
4. All bulletin boards are assumed to have an Asbestos–Containing mastic behind them. Homogeneous Material #41.
5. All mirrors are assumed to have an Asbestos–Containing mastic behind them.
6. Consult with Parkway Environmental Department prior to drilling into or demolishing concrete block walls.

LEGEND

- WM–08 PINK SINK LINERS POSITIVE FOR ASBESTOS
- MASTIC/SEALANT ON CLOCK/INTERCOM ASSEMBLY HOMOGENEOUS MATERIALS WM–38 POSITIVE FOR ASBESTOS
- BLACK VAPOR BARRIER BETWEEN 2 LAYERS OF CONCRETE – HOMOGENEOUS MATERIAL – WM–152 – POSITIVE FOR ASBESTOS.

psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

TITLE:

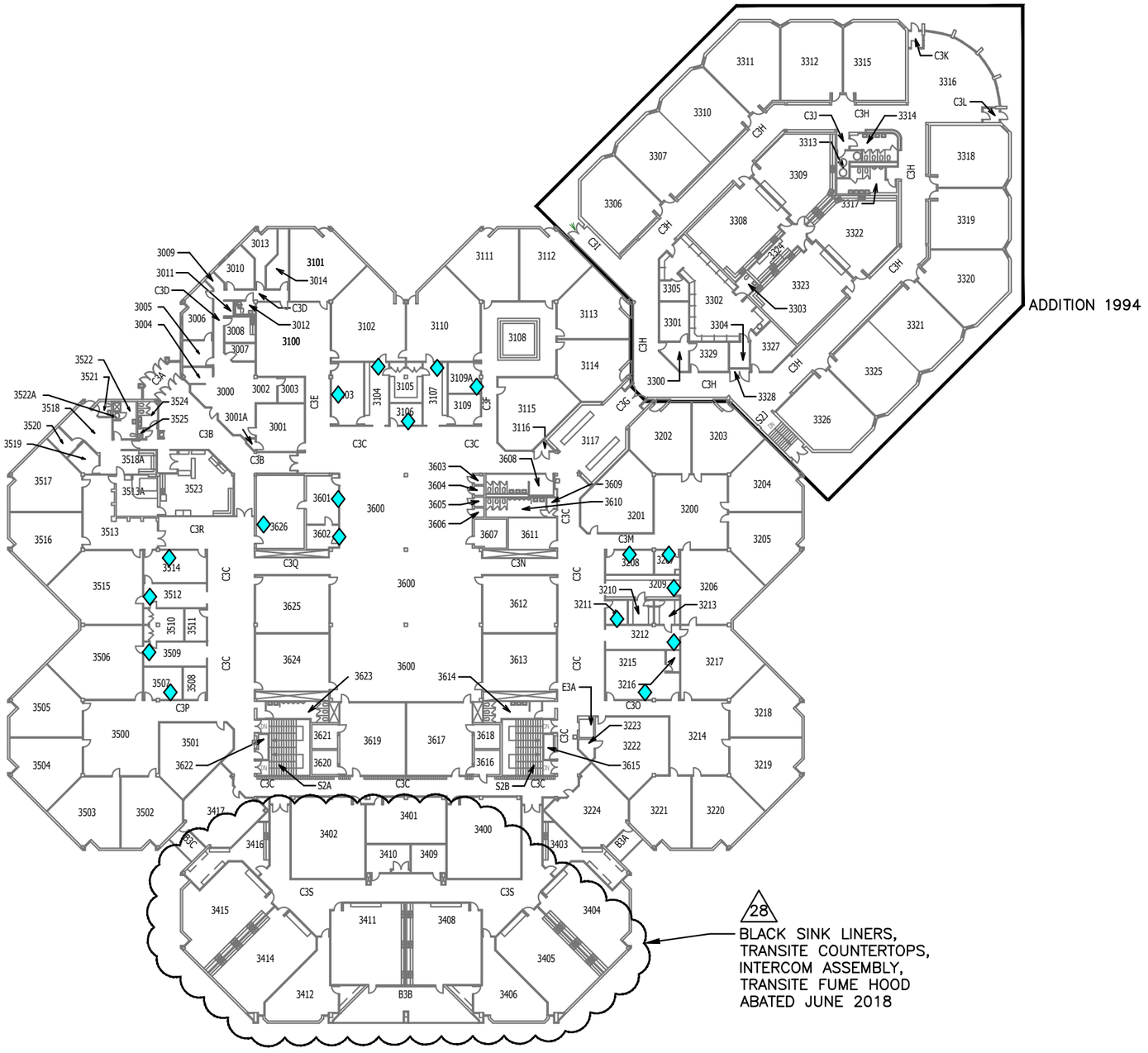
ASBESTOS – MISCELLANEOUS MATERIAL – OTHER
WEST MIDDLE SCHOOL – SECOND LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN:	DES:
DRB	MCD
CHKD:	APPD:
MCD	MCD
DATE:	REV:
09–01–21	12

PROJECT NO: 00291604
PARKWAY SCHOOL DIST.
ST.LOUIS COUNTY, MO.

A4–02



LEGEND

- WM–01 BLACK SINK LINERS ON STAINLESS STELL SINKS POSITIVE FOR ASBESTOS
- WM–20 TRANSITE TABLES/COUNTERTOPS ASSUMED TO CONTAIN ASBESTOS
- MASTIC/SEALANT ON CLOCK/INTERCOM ASSEMBLY HOMOGENEOUS MATERIAL WM–38 POSITIVE FOR ASBESTOS
- WM–42 TRANSITE FUME HOOD ASSUMED TO CONTAIN ASBESTOS

NOTES:

1. Locations of asbestos–containing materials (ACM) are approximate.
2. All solid core, metal or wooden doors, are assumed to be Asbestos–Containing unless noted otherwise. Homogeneous Material #21.
3. All chalkboards, metal or slate, are assumed to have an Asbestos–Containing mastic behind them. Homogeneous Material #33.
4. All bulletin boards are assumed to have an Asbestos–Containing mastic behind them. Homogeneous Material #41.
5. All mirrors are assumed to have an Asbestos–Containing mastic behind them.
6. Consult with Parkway Environmental Department prior to drilling into or demolishing concrete block walls.

N

0 50
FEET

psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

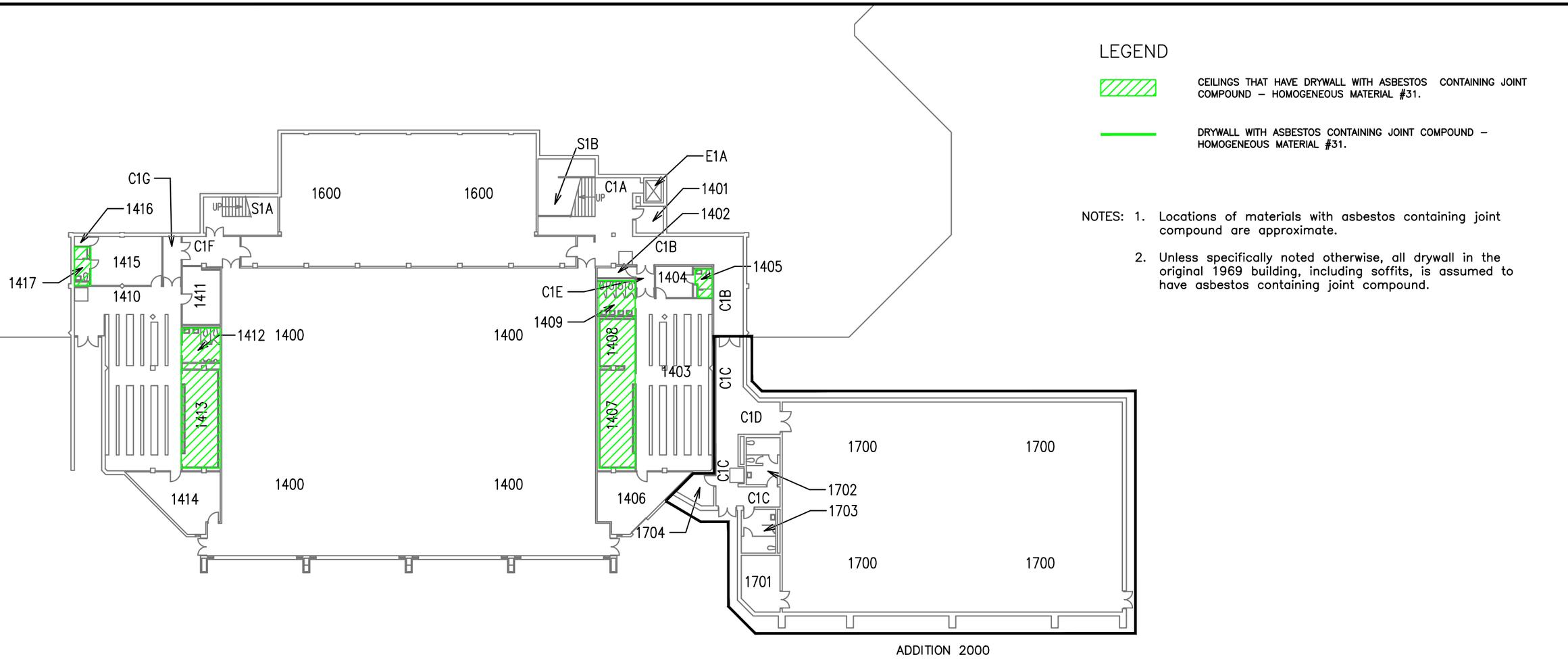
TITLE:
ASBESTOS – MISCELLANEOUS MATERIAL – OTHER
WEST MIDDLE SCHOOL – THIRD LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN:	DES:
TDA	MCD
CHKD:	APPD:
MCD	MCD
DATE:	REV:
08–21–18	28

PROJECT NO: 00291604
PARKWAY SCHOOL DIST.
ST.LOUIS COUNTY, MO.

A4–03



LEGEND

CEILINGS THAT HAVE DRYWALL WITH ASBESTOS CONTAINING JOINT COMPOUND – HOMOGENEOUS MATERIAL #31.

DRYWALL WITH ASBESTOS CONTAINING JOINT COMPOUND – HOMOGENEOUS MATERIAL #31.

NOTES:
1. Locations of materials with asbestos containing joint compound are approximate.
2. Unless specifically noted otherwise, all drywall in the original 1969 building, including soffits, is assumed to have asbestos containing joint compound.

N

0 30
FEET

psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

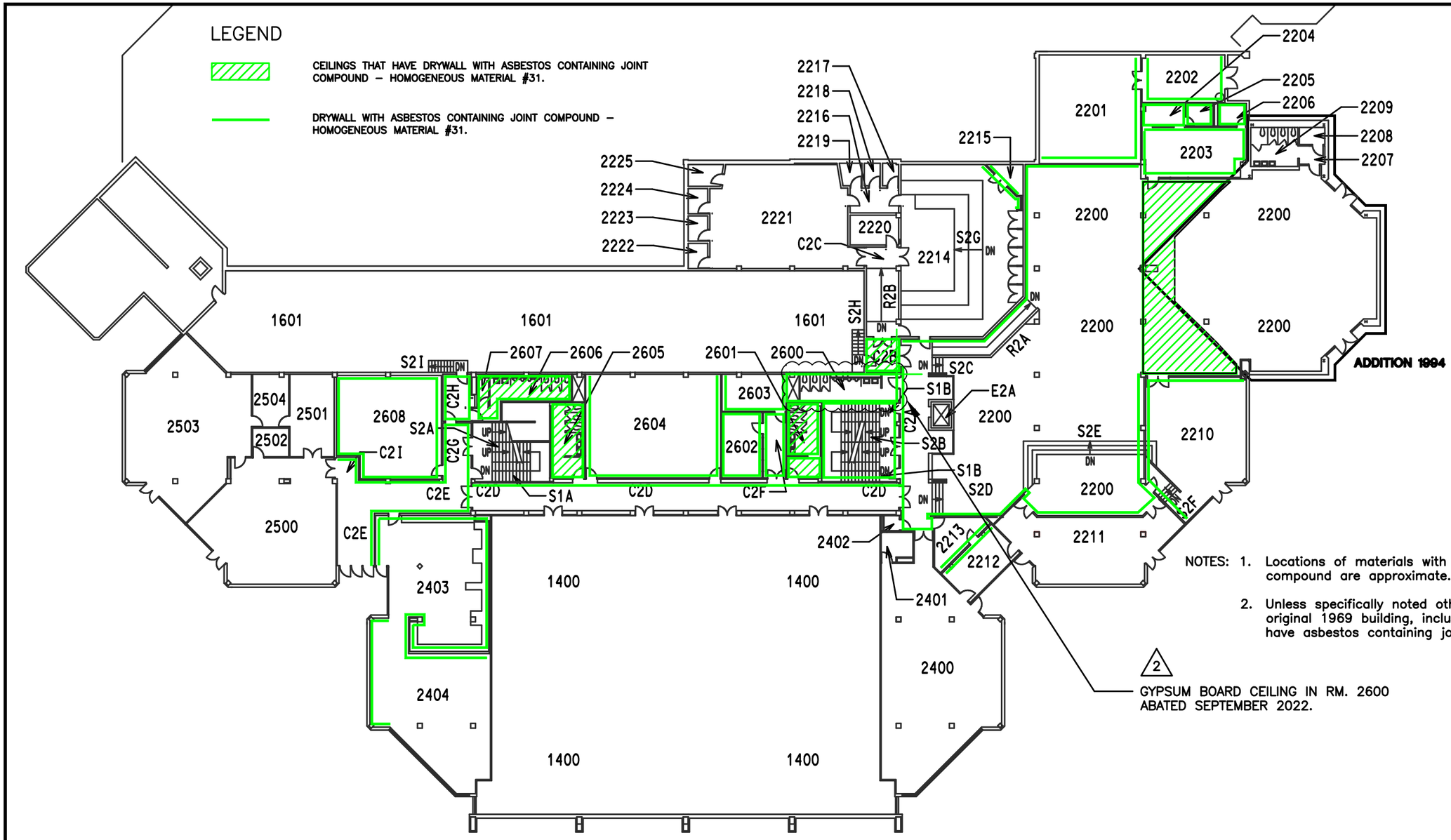
TITLE:
ASBESTOS – MISCELLANEOUS MATERIAL – JOINT COMPOUND
WEST MIDDLE SCHOOL – FIRST LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN: TDA	DES: MCD
CHKD: MCD	APPD: MCD
DATE: 11-27-17	REV: 1

PROJECT NO: 00291604
PARKWAY SCHOOL DIST.
ST.LOUIS COUNTY, MO.

A5-01



intertek psi Information To Build On
Engineering • Consulting • Testing
11826 Borman Dr. Maryland Heights, MO 63146
Tel (314) 432-8073 Fax (314) 432-5119

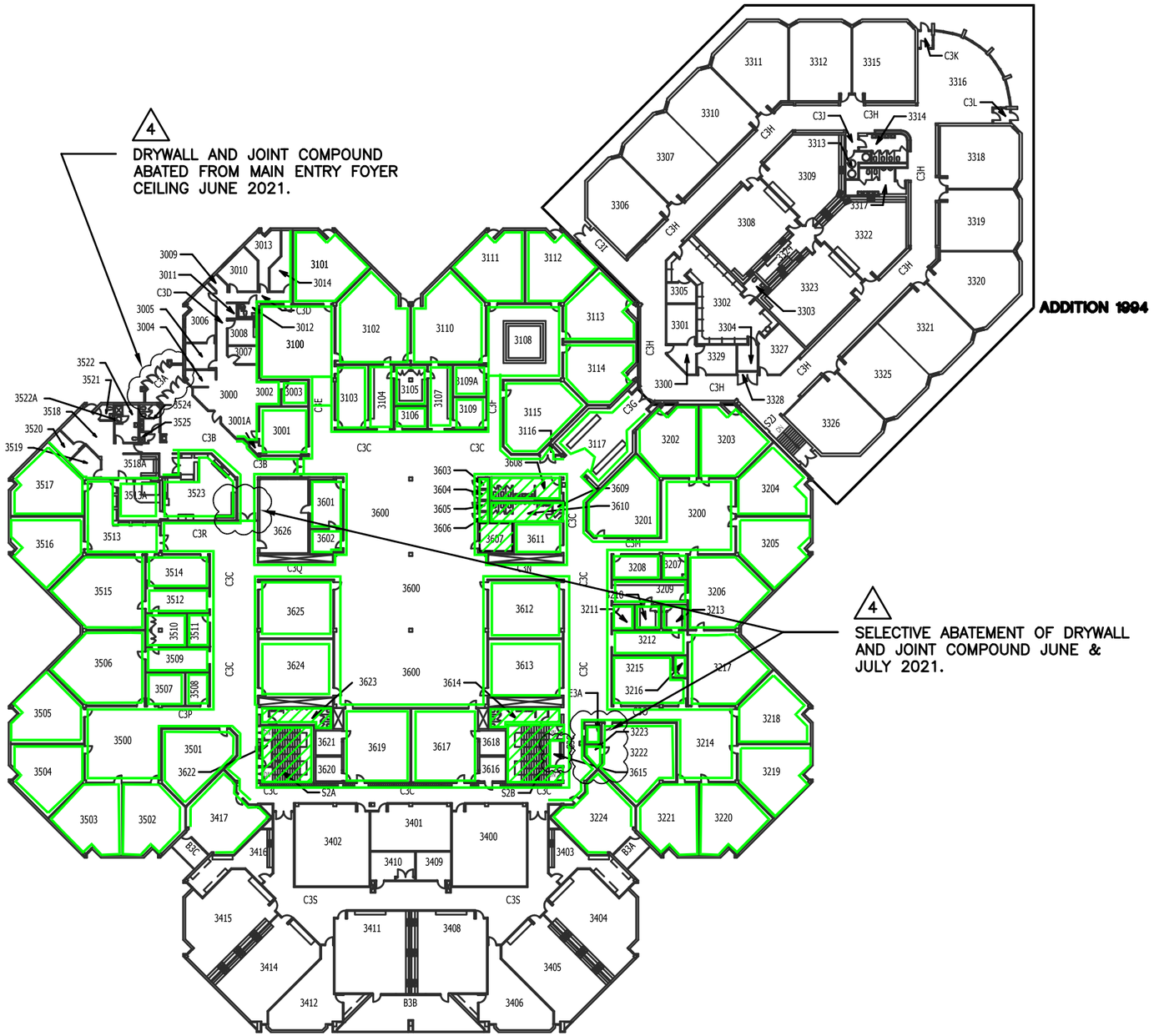
TITLE:
ASBESTOS – MISCELLANEOUS MATERIAL – JOINT COMPOUND
WEST MIDDLE SCHOOL – SECOND LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN: DRB	DES: MCD
CHKD: MCD	APPD: MCD
DATE: 11–03–22	REV: 2

PROJECT NO: 00291604
PARKWAY SCHOOL DIST.
ST.LOUIS COUNTY, MO.

A5–02



LEGEND

CEILINGS THAT HAVE DRYWALL WITH ASBESTOS CONTAINING JOINT COMPOUND – HOMOGENEOUS MATERIAL #31.

DRYWALL WITH ASBESTOS CONTAINING JOINT COMPOUND – HOMOGENEOUS MATERIAL #31.

NOTES:
1. Locations of materials with asbestos containing joint compound are approximate.
2. Unless specifically noted otherwise, all drywall in the original 1969 building, including soffits, is assumed to have asbestos containing joint compound.

N

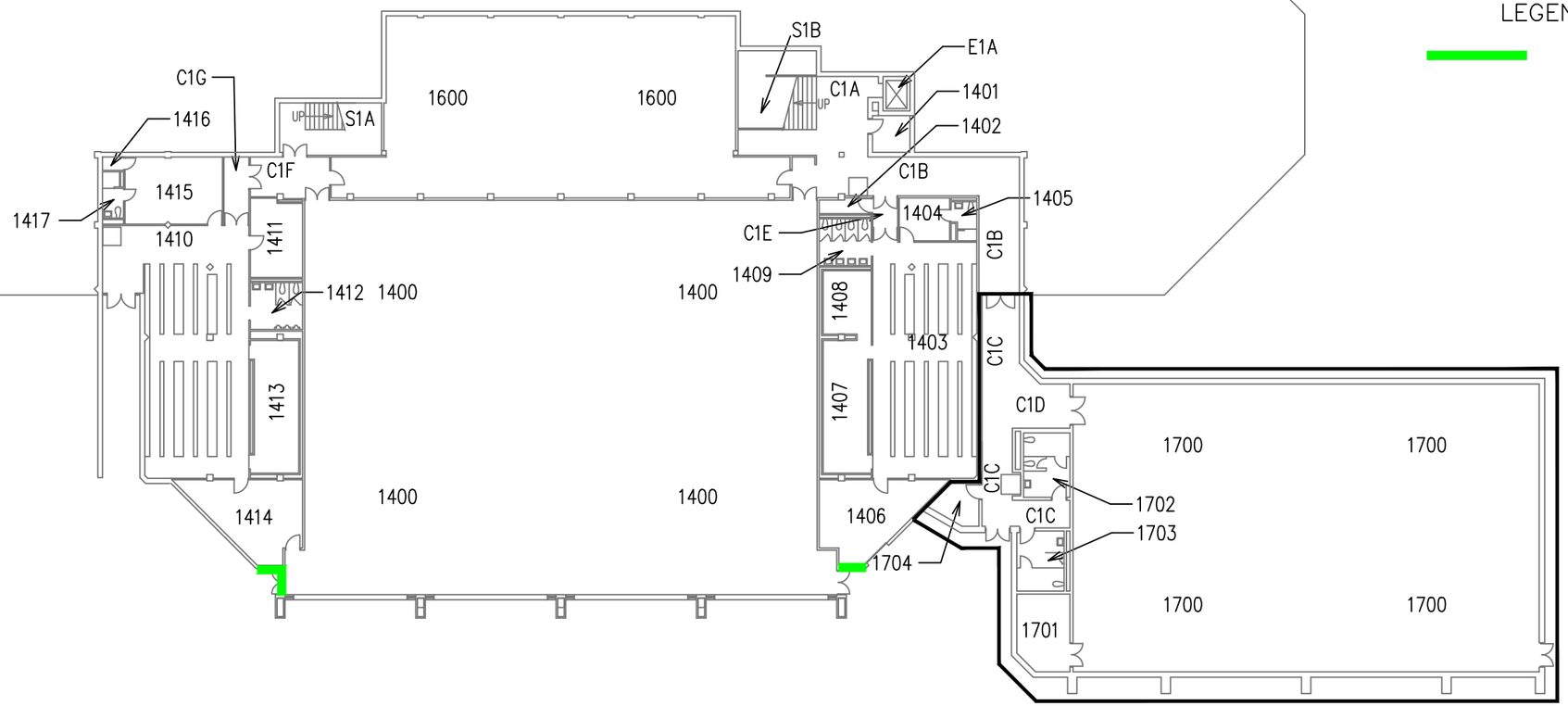
0 50
FEET

psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

TITLE:
ASBESTOS – MISCELLANEOUS MATERIAL – JOINT COMPOUND
WEST MIDDLE SCHOOL – THIRD LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN:	DES:	PROJECT NO: 00291604
TDA	MCD	PARKWAY SCHOOL DIST. ST.LOUIS COUNTY, MO.
CHKD: MCD	APPD: MCD	
DATE: 09-01-21	REV: 4	A5-03



ADDITION 2000

LEGEND

LOUVER CAULK – HOMOGENEOUS MATERIAL
WM–81 POSITIVE FOR ASBESTOS.

NOTES: 1. Locations of ACM material are approximate.

N

0 30

FEET

psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

TITLE:

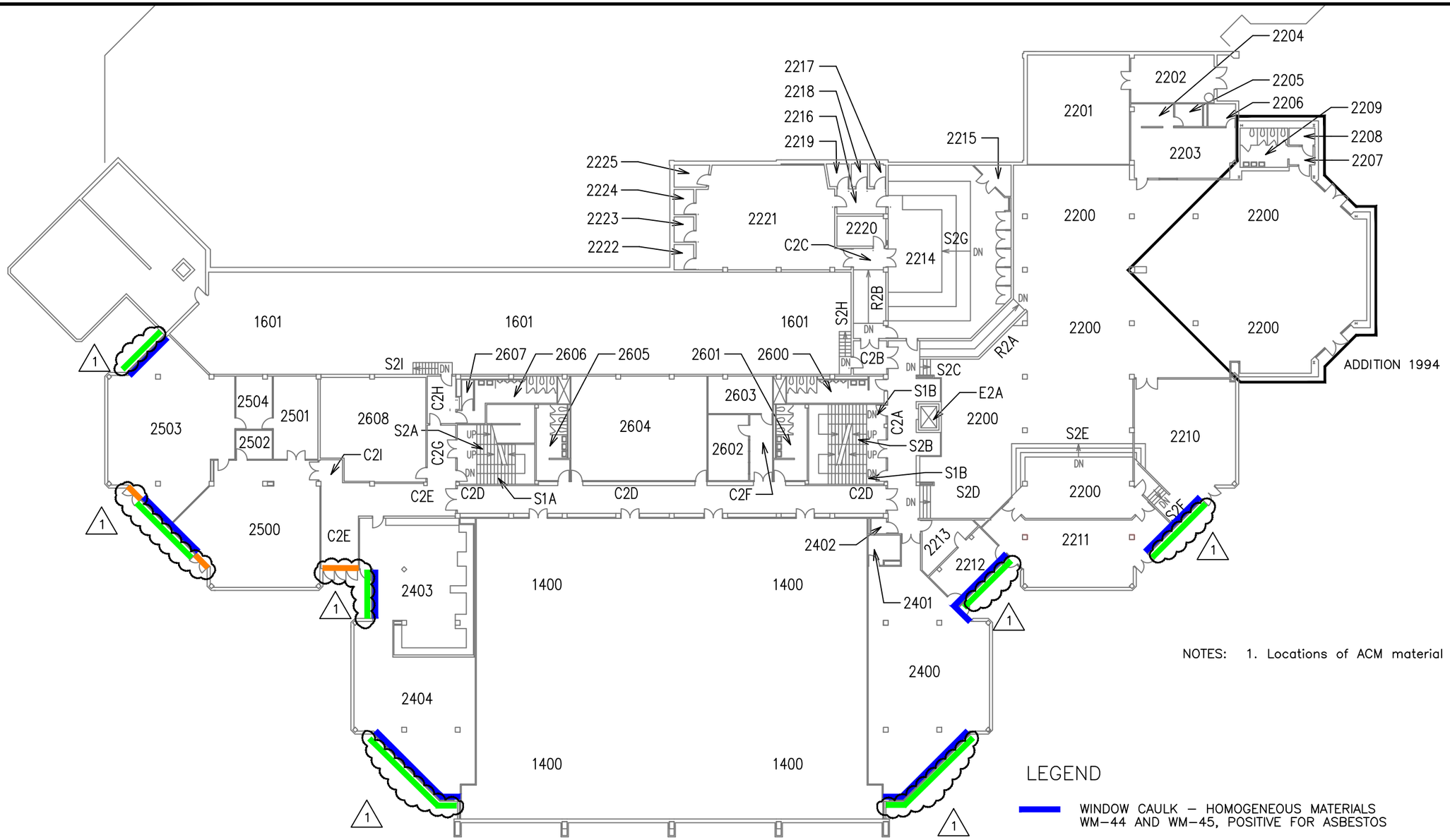
ASBESTOS – MISCELLANEOUS MATERIAL – CAULK
WEST MIDDLE SCHOOL – FIRST LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN: TDA	DES: MCD
CHKD: MCD	APPD: MCD
DATE: 02–06–17	REV: 0

PROJECT NO: 00291604
PARKWAY SCHOOL DIST.
ST.LOUIS COUNTY, MO.

A8–01



ORIGINAL BUILDING BUILT IN 1969

NOTES: 1. Locations of ACM material are approximate.

LEGEND

- WINDOW CAULK – HOMOGENEOUS MATERIALS WM–44 AND WM–45, POSITIVE FOR ASBESTOS
- DOOR FRAME CAULK – HOMOGENEOUS MATERIALS WM–79, POSITIVE FOR ASBESTOS.
- WINDOW GLAZING – HOMOGENEOUS MATERIALS WM–43 AND WM–47, POSITIVE FOR ASBESTOS.

N

0 30

FEET

psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

TITLE:

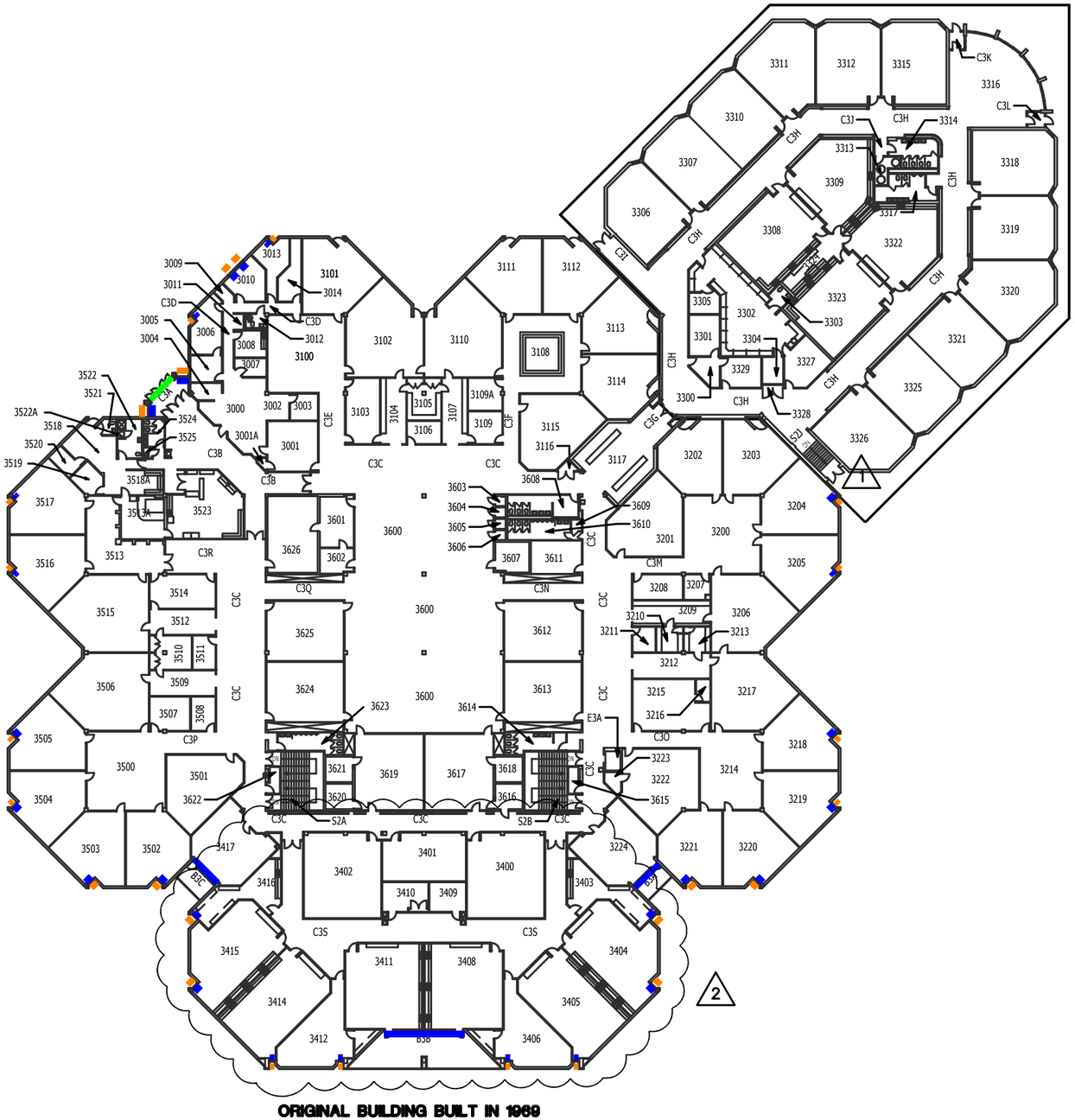
ASBESTOS – MISCELLANEOUS MATERIAL – CAULK
WEST MIDDLE SCHOOL – SECOND LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN:	DES:
DRB	MCD
CHKD:	APPD:
MCD	MCD
DATE:	REV:
02–06–17	1

PROJECT NO: 00291604
PARKWAY SCHOOL DIST.
ST.LOUIS COUNTY, MO.

A8–02



LEGEND

- WINDOW CAULK – HOMOGENEOUS MATERIALS WM–44 AND WM–45, POSITIVE FOR ASBESTOS
- WINDOW GLAZING – HOMOGENEOUS MATERIALS WM–43 AND WM–47, POSITIVE FOR ASBESTOS
- DOOR FRAME CAULK – HOMOGENEOUS MATERIALS WM–79, POSITIVE FOR ASBESTOS

NOTES: 1. Locations of ACM material are approximate.

N

0 50

FEET

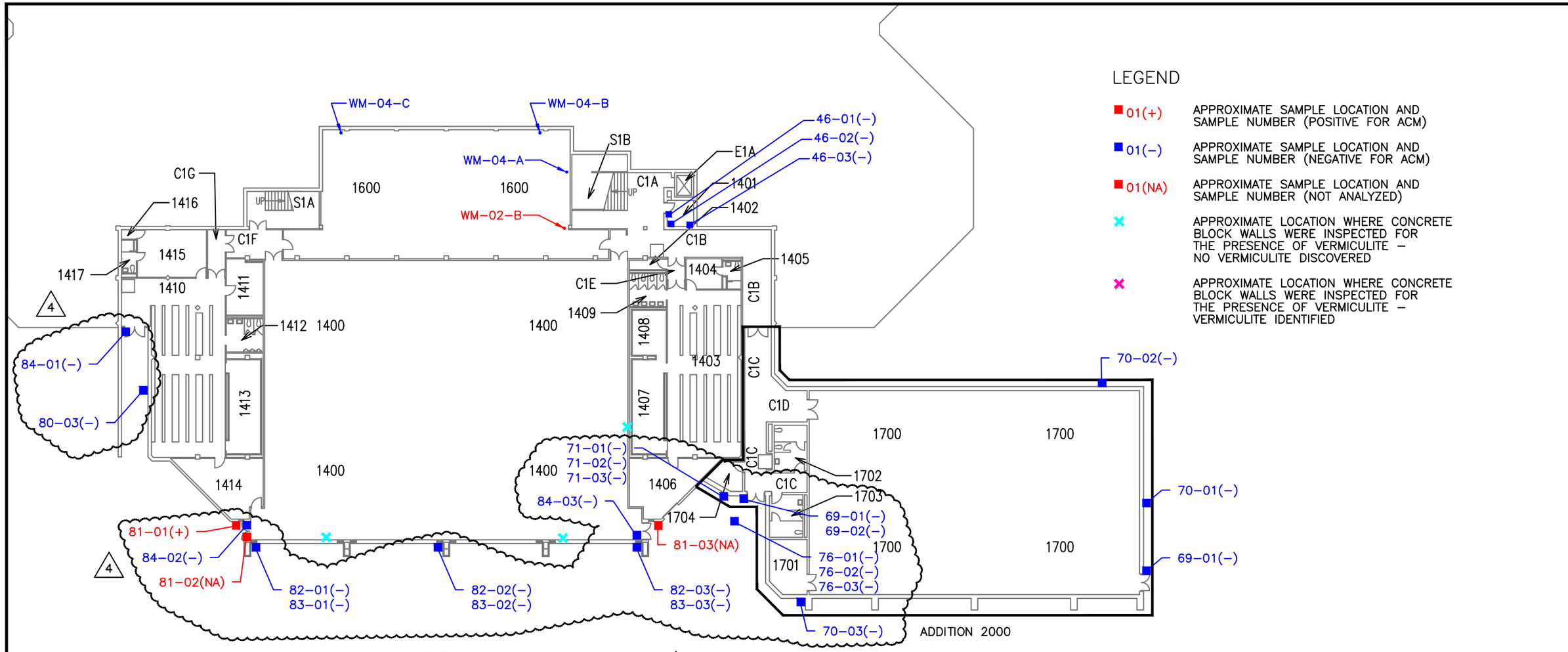
psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

TITLE:

ASBESTOS – MISCELLANEOUS MATERIAL – CAULK
WEST MIDDLE SCHOOL – THIRD LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN:	DES:	PROJECT NO: 00291604
TDA	MCD	PARKWAY SCHOOL DIST. ST.LOUIS COUNTY, MO.
CHKD: MCD	APPD: MCD	
DATE: 04–09–20	REV: 2	A8–03



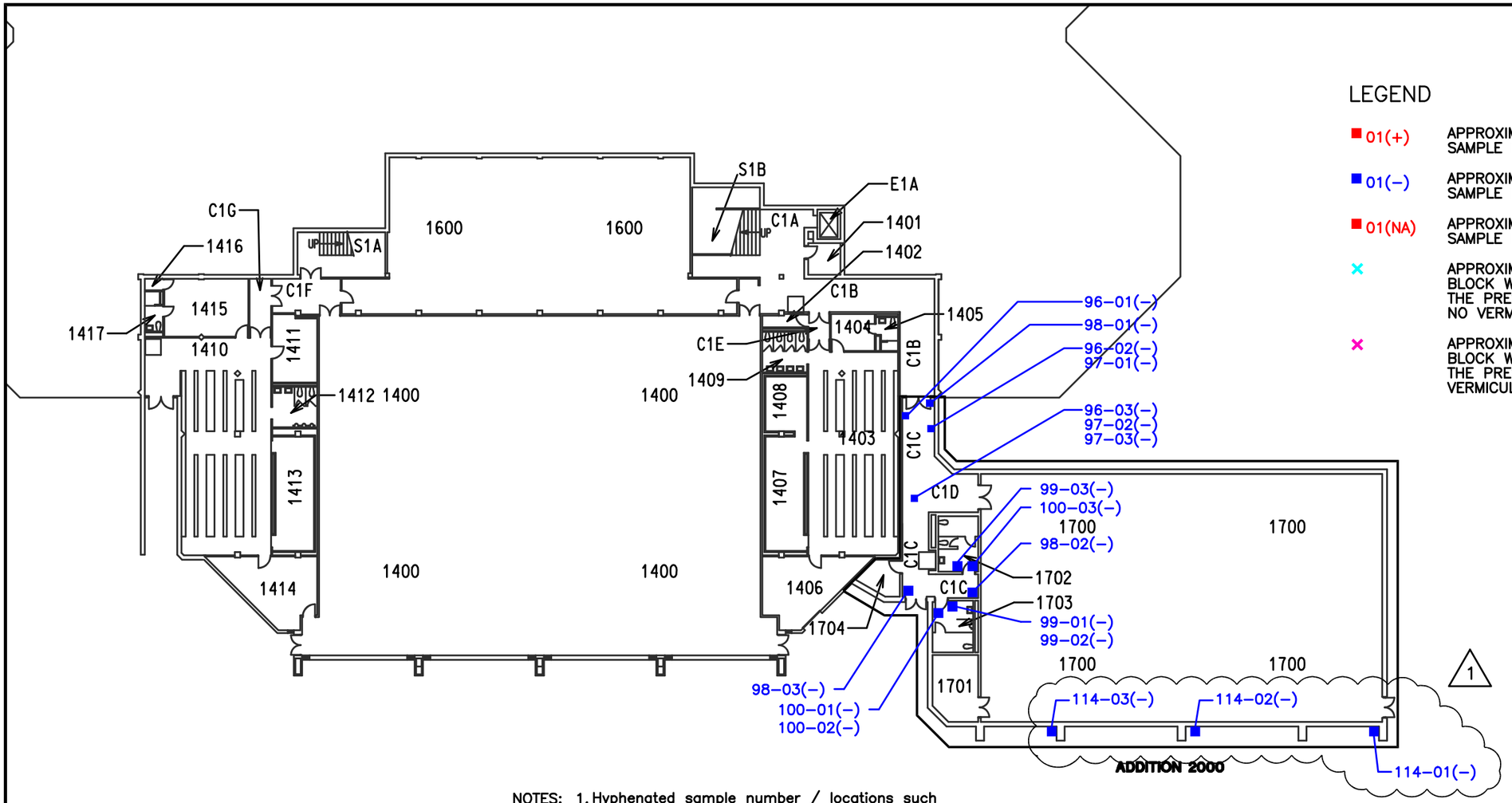
NOTES:
1. Hyphenated sample number / locations such as 38–01 have a prefix "WM" in the analysis report.
2. As part of Parkway's 2012 3–Year re–inspections, PSC randomly inspected exterior concrete block walls of the building erected prior to 1990 for the presence of vermiculite. Exterior concrete block walls behind gypsum board or other finished surfaces were not inspected for the presence of vermiculite. PSC did not inspect interior concrete block walls.
3. Revisions 1 and 2 prepared by PSC Industrial Outsourcing, LP.

psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

TITLE:
ASBESTOS – BULK SAMPLE LOCATIONS
WEST MIDDLE SCHOOL – FIRST LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN:	DES:	PROJECT NO: 00291604
TDA	MCD	PARKWAY SCHOOL DIST. ST.LOUIS COUNTY, MO.
CHKD: MCD	APPD: MCD	
DATE: 02–06–17	REV: 4	B1–01



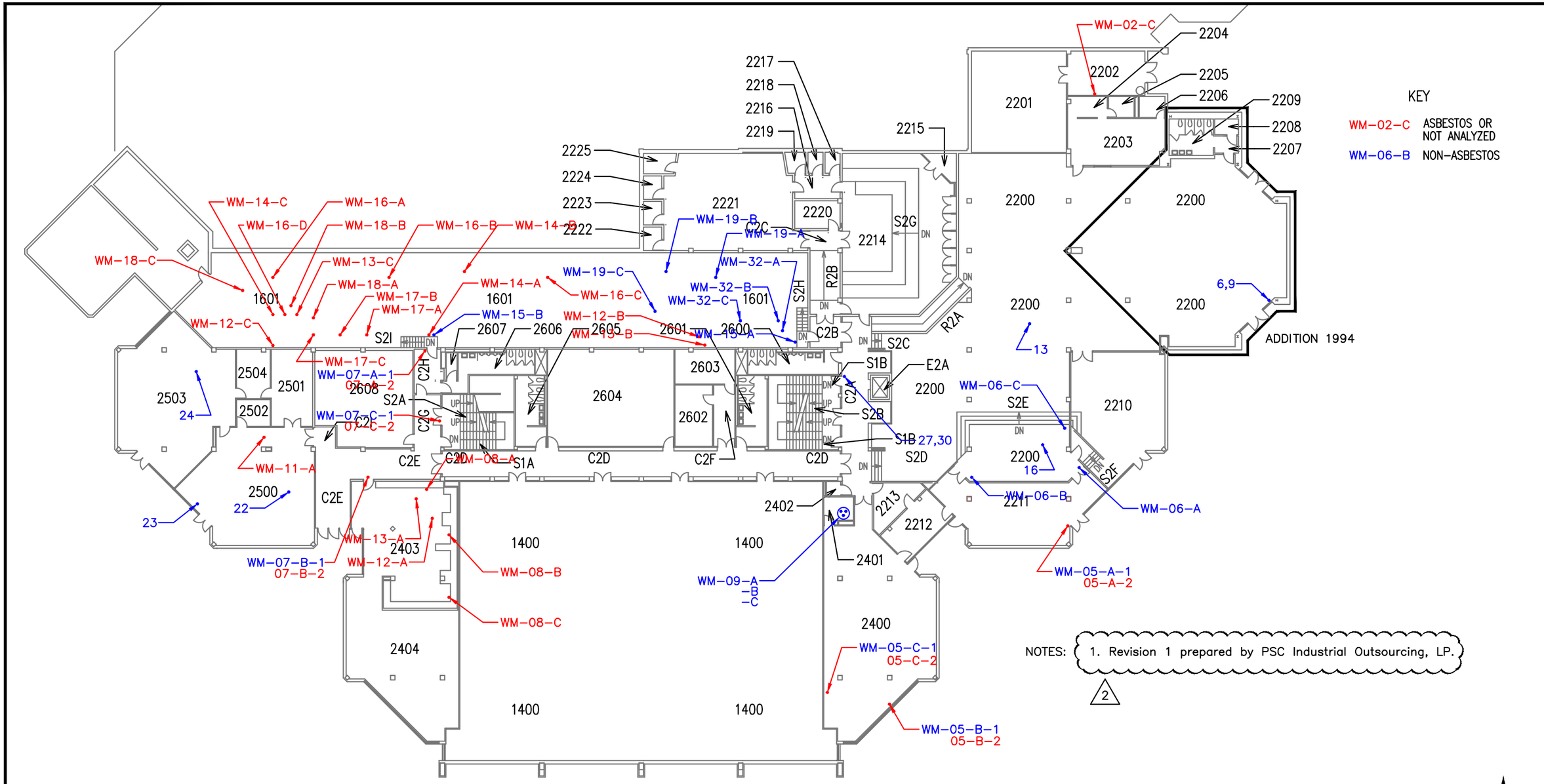
NOTES:
1. Hyphenated sample number / locations such as 38–01 have a prefix "WM" in the analysis report.
2. As part of Parkway's 2012 3–Year re–inspections, PSC randomly inspected exterior concrete block walls of the building erected prior to 1990 for the presence of vermiculite. Exterior concrete block walls behind gypsum board or other finished surfaces were not inspected for the presence of vermiculite. PSC did not inspect interior concrete block walls.
3. Revisions 1 and 2 prepared by PSC Industrial Outsourcing, LP.

psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

TITLE:
ASBESTOS – BULK SAMPLE LOCATIONS
WEST MIDDLE SCHOOL – FIRST LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN:	DES:	PROJECT NO: 00291604
TDA	MCD	PARKWAY SCHOOL DIST. ST.LOUIS COUNTY, MO.
CHKD: MCD	APPD: MCD	
DATE: 04–09–20	REV: 1	B1.1–01



Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

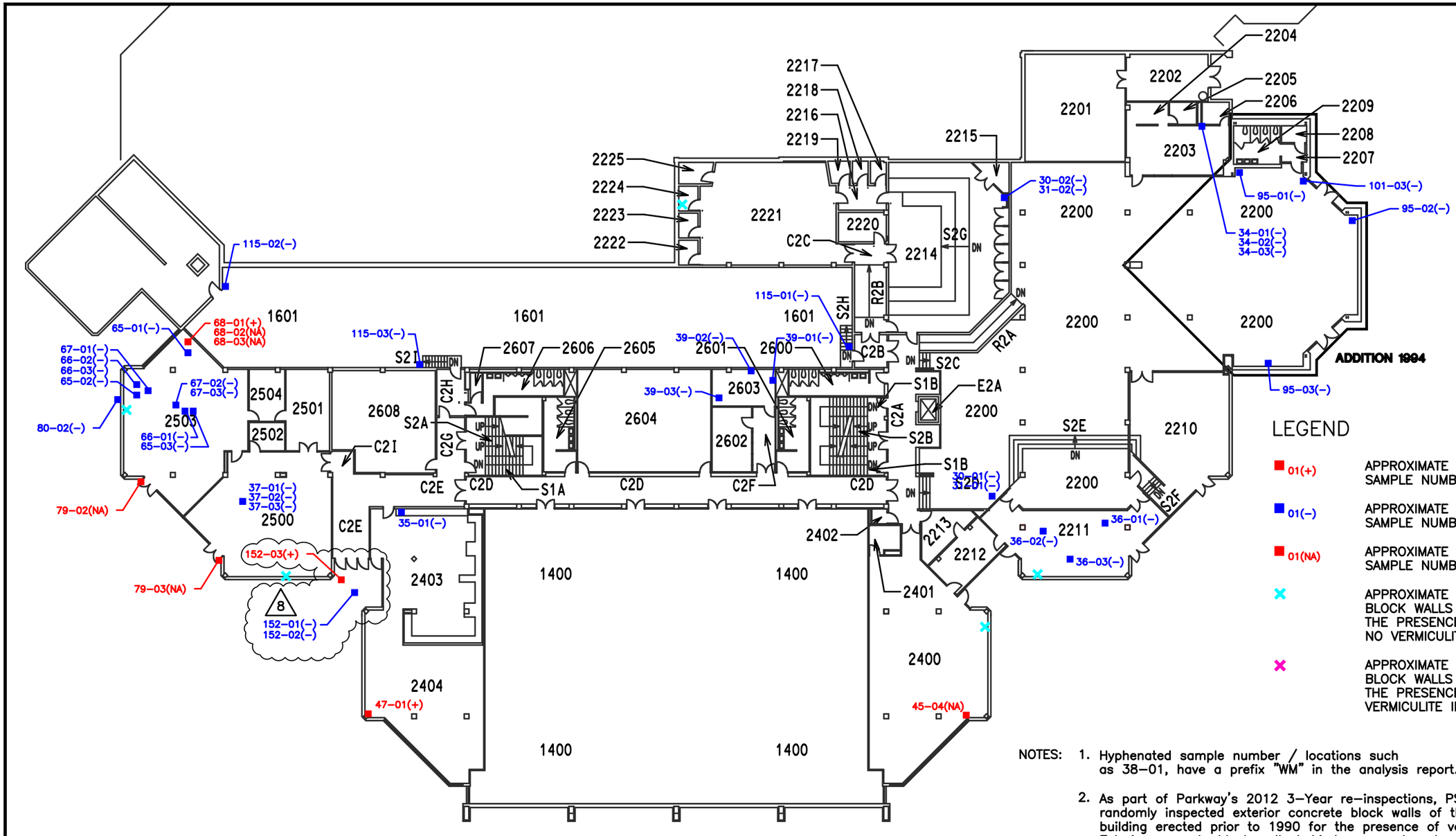
TITLE:
ASBESTOS – BULK SAMPLE LOCATIONS
WEST MIDDLE SCHOOL – SECOND LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN: DRB	DES: MCD
CHKD: MCD	APPD: MCD
DATE: 05-08-14	REV: 2

PROJECT NO: 00291604
PARKWAY SCHOOL DIST. ST.LOUIS COUNTY, MO.

B2-02



ORIGINAL BUILDING BUILT IN 1969

LEGEND

■ 01(+)	APPROXIMATE SAMPLE LOCATION AND SAMPLE NUMBER (POSITIVE FOR ACM)
■ 01(-)	APPROXIMATE SAMPLE LOCATION AND SAMPLE NUMBER (NEGATIVE FOR ACM)
■ 01(NA)	APPROXIMATE SAMPLE LOCATION AND SAMPLE NUMBER (NOT ANALYZED)
×	APPROXIMATE LOCATION WHERE CONCRETE BLOCK WALLS WERE INSPECTED FOR THE PRESENCE OF VERMICULITE – NO VERMICULITE DISCOVERED
×	APPROXIMATE LOCATION WHERE CONCRETE BLOCK WALLS WERE INSPECTED FOR THE PRESENCE OF VERMICULITE – VERMICULITE IDENTIFIED

NOTES:

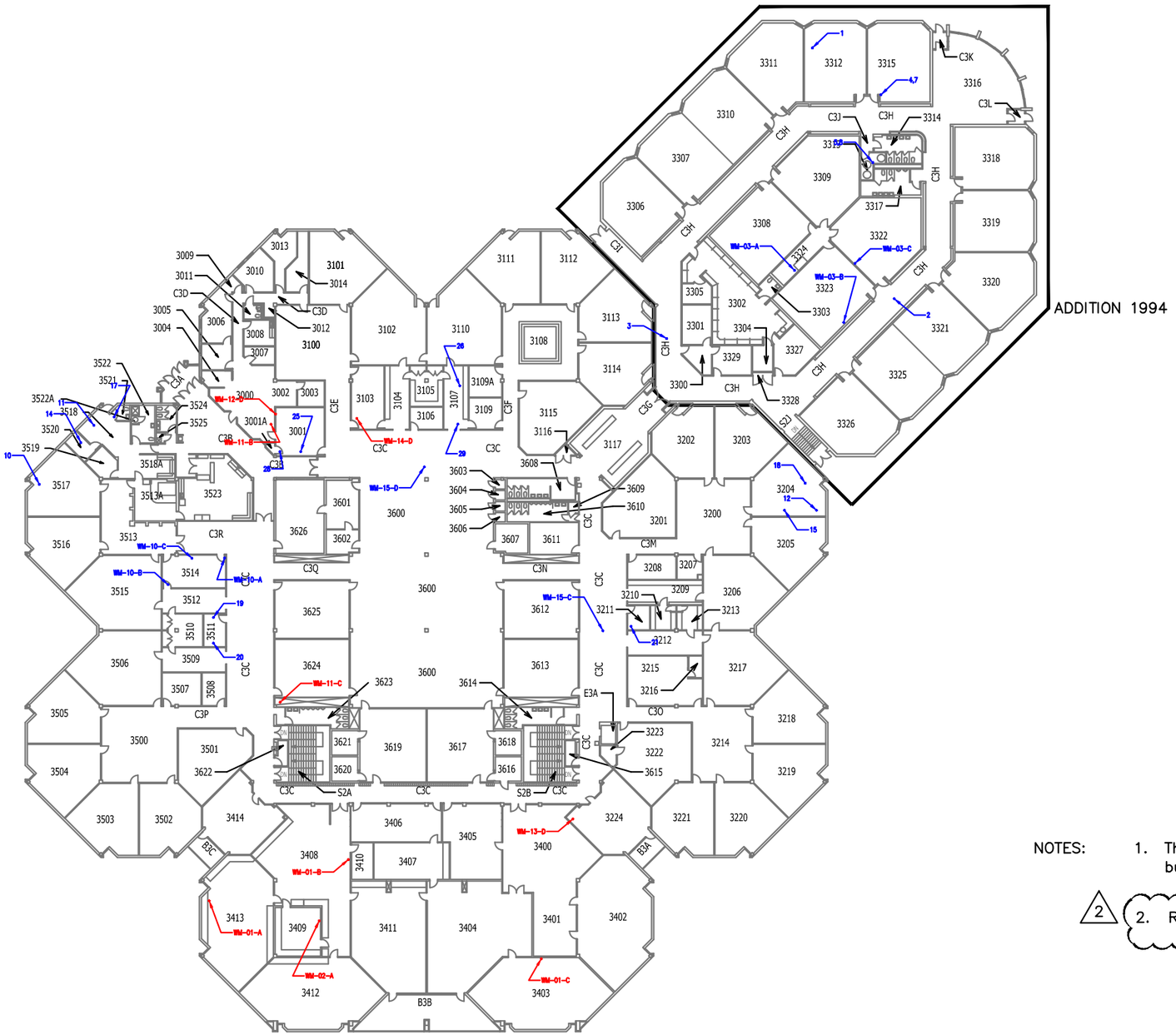
1. Hyphenated sample number / locations such as 38–01, have a prefix "WM" in the analysis report.
2. As part of Parkway's 2012 3–Year re–inspections, PSC randomly inspected exterior concrete block walls of the building erected prior to 1990 for the presence of vermiculite. Exterior concrete block walls behind gypsum board or other finished surfaces were not inspected for the presence of vermiculite. PSC did not inspect interior concrete block walls.
3. Revisions 1 and 2 prepared by PSC Industrial Outsourcing, LP.

psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

TITLE:
ASBESTOS – BULK SAMPLE LOCATIONS
WEST MIDDLE SCHOOL – SECOND LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN: DRB	DES: MCD	PROJECT NO: 00291604	
CHKD: MCD	APPD: MCD	PARKWAY SCHOOL DIST. ST.LOUIS COUNTY, MO.	
DATE: 09–01–21	REV: 8	B2.1–02	



ORIGINAL BUILDING BUILT IN 1969

KEY

WM-01-C ASBESTOS OR NOT ANALYZED

WM-10-A NON-ASBESTOS

NOTES:

1. This drawing shows the locations of bulk samples taken by NPN Environmental.

2. Revision 1 prepared by PSC Industrial Outsourcing, LP.

N

0 50

FEET

psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

TITLE:

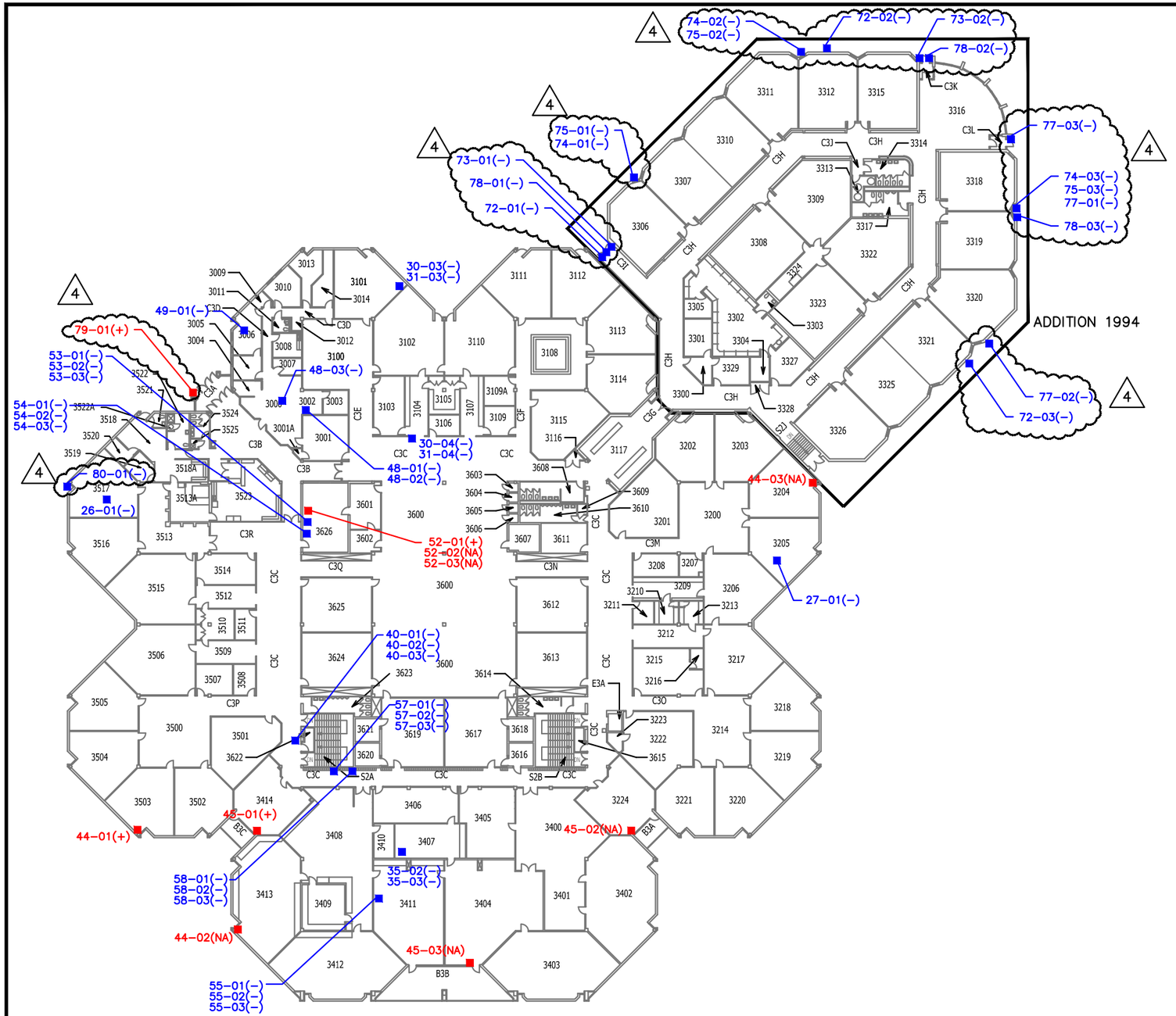
ASBESTOS – BULK SAMPLE LOCATIONS
WEST MIDDLE SCHOOL – THIRD LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN: TDA	DES: MCD
CHKD: MCD	APPD: MCD
DATE: 05-08-14	REV: 2

PROJECT NO: 00291604
PARKWAY SCHOOL DIST.
ST.LOUIS COUNTY, MO.

B3-03



LEGEND

■ 01(+)	APPROXIMATE SAMPLE LOCATION AND SAMPLE NUMBER (POSITIVE FOR ACM)
■ 01(–)	APPROXIMATE SAMPLE LOCATION AND SAMPLE NUMBER (NEGATIVE FOR ACM)
■ 01(NA)	APPROXIMATE SAMPLE LOCATION AND SAMPLE NUMBER (NOT ANALYZED)

NOTES:

1. Hyphenated sample number / locations such as 38–01, have a prefix "WM" in the analysis report.
2. Revisions 1 and 2 prepared by PSC Industrial Outsourcing, LP.

N

0 50

FEET

psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

TITLE:

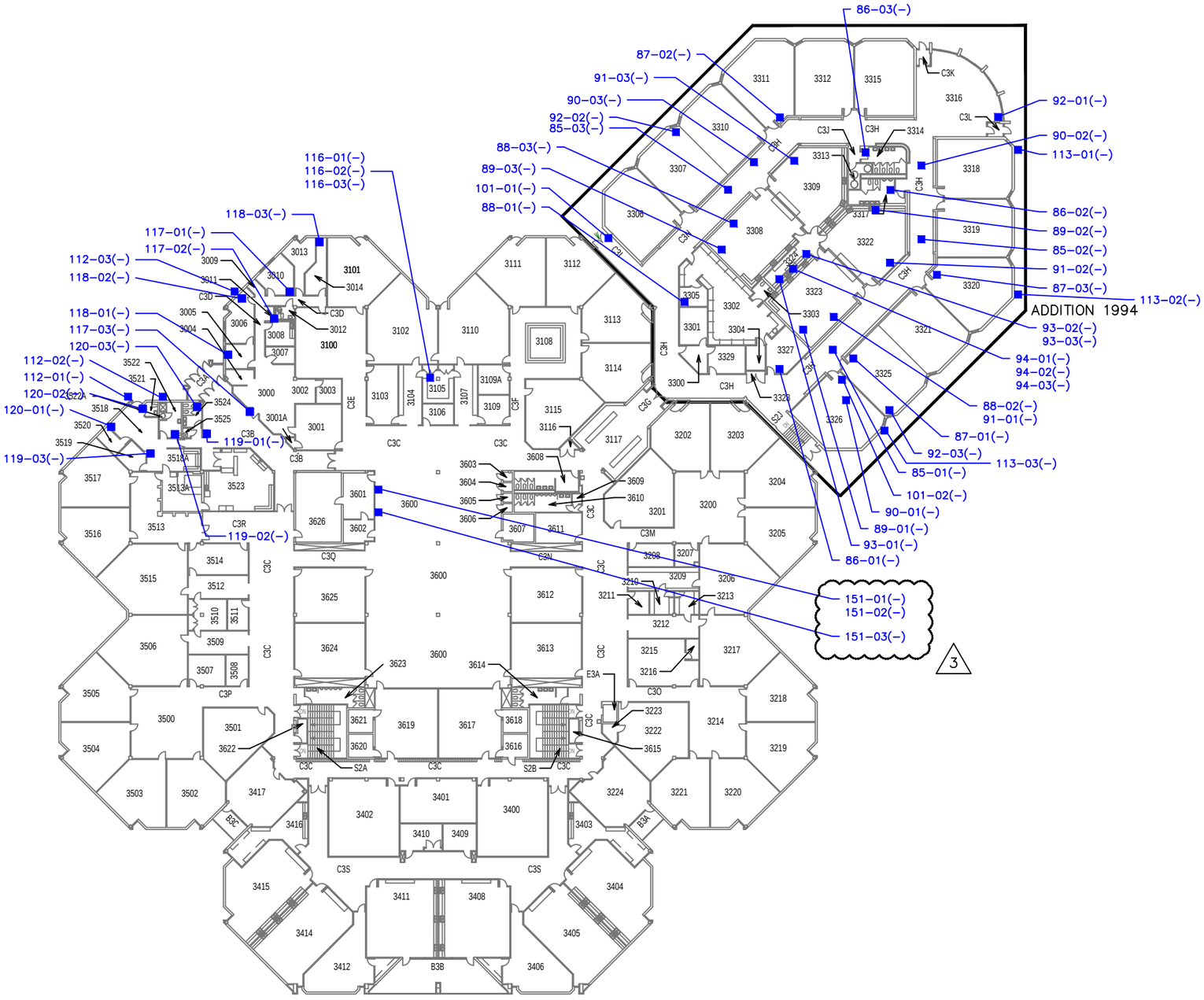
ASBESTOS –BULK SAMPLE LOCATIONS
WEST MIDDLE SCHOOL – THIRD LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN: TDA	DES: MCD
CHKD: MCD	APPD: MCD
DATE: 04–04–17	REV: 4

PROJECT NO: 00291604
PARKWAY SCHOOL DIST. ST.LOUIS COUNTY, MO.

B3.1–03



LEGEND

01(+)	APPROXIMATE SAMPLE LOCATION AND SAMPLE NUMBER (POSITIVE FOR ACM)
01(–)	APPROXIMATE SAMPLE LOCATION AND SAMPLE NUMBER (NEGATIVE FOR ACM)
01(NA)	APPROXIMATE SAMPLE LOCATION AND SAMPLE NUMBER (NOT ANALYZED)

NOTES:

1. Hyphenated sample number / locations such as 38–01, have a prefix "WM" in the analysis report.
2. Revisions 1 and 2 prepared by PSC Industrial Outsourcing, LP.

N

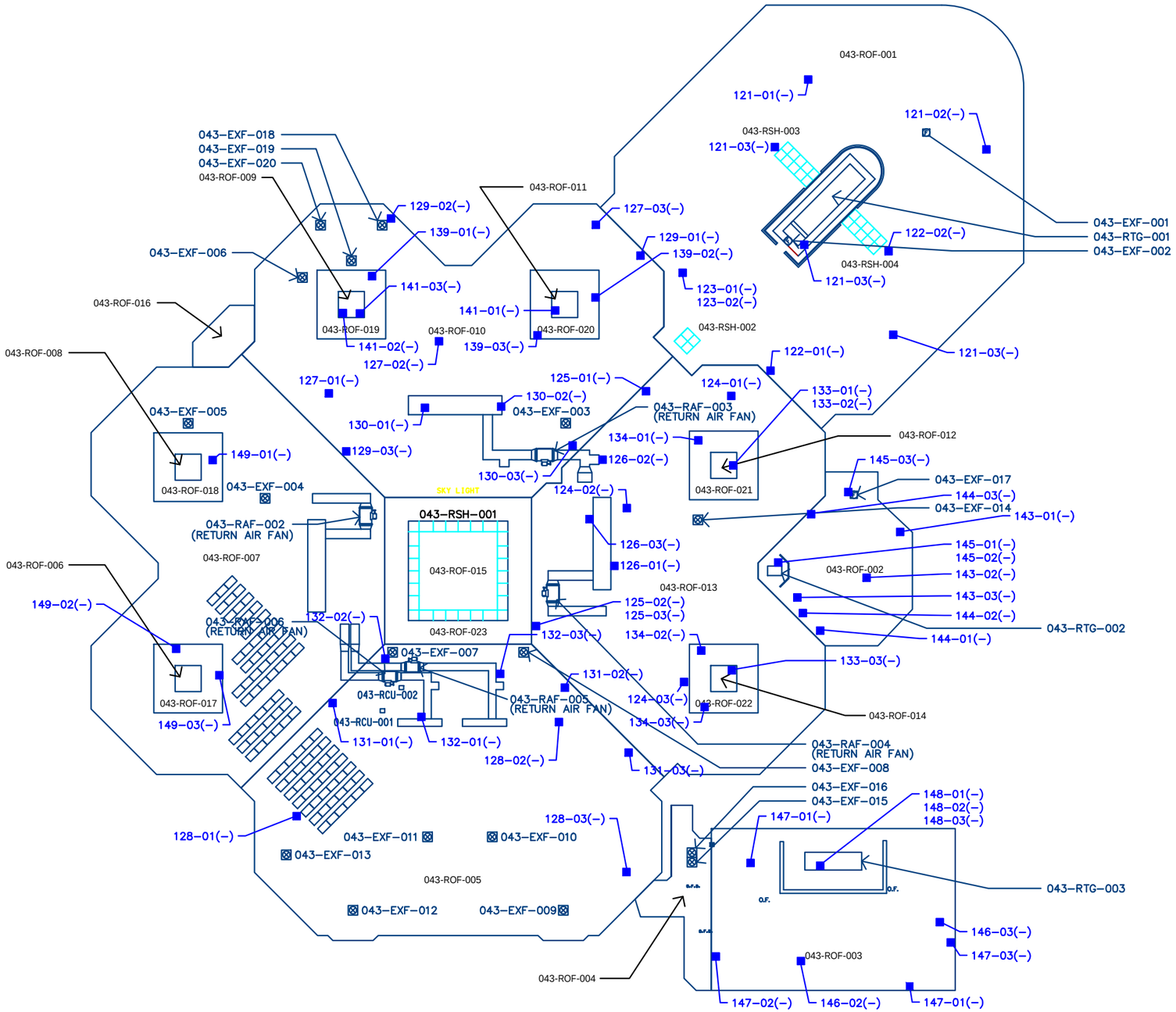
0 50
FEET

psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

TITLE:
ASBESTOS –BULK SAMPLE LOCATIONS
WEST MIDDLE SCHOOL – THIRD LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN: TDA	DES: MCD	PROJECT NO: 00291604	
CHKD: MCD	APPD: MCD	PARKWAY SCHOOL DIST. ST.LOUIS COUNTY, MO.	
DATE: 09–01–21	REV: 3	B3.2–03	



LEGEND

01(+)	APPROXIMATE SAMPLE LOCATION AND SAMPLE NUMBER (POSITIVE FOR ACM)
01(–)	APPROXIMATE SAMPLE LOCATION AND SAMPLE NUMBER (NEGATIVE FOR ACM)
01(NA)	APPROXIMATE SAMPLE LOCATION AND SAMPLE NUMBER (NOT ANALYZED)

NOTES:
1. PSI has not conducted an asbestos survey of all building materials on the roof. This material was added to the management plan after PSD had roofing materials analyzed for asbestos.
2. All samples are preceded with a prefix of "CT–".
3. Locations of ACM material are approximate.

psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

TITLE:

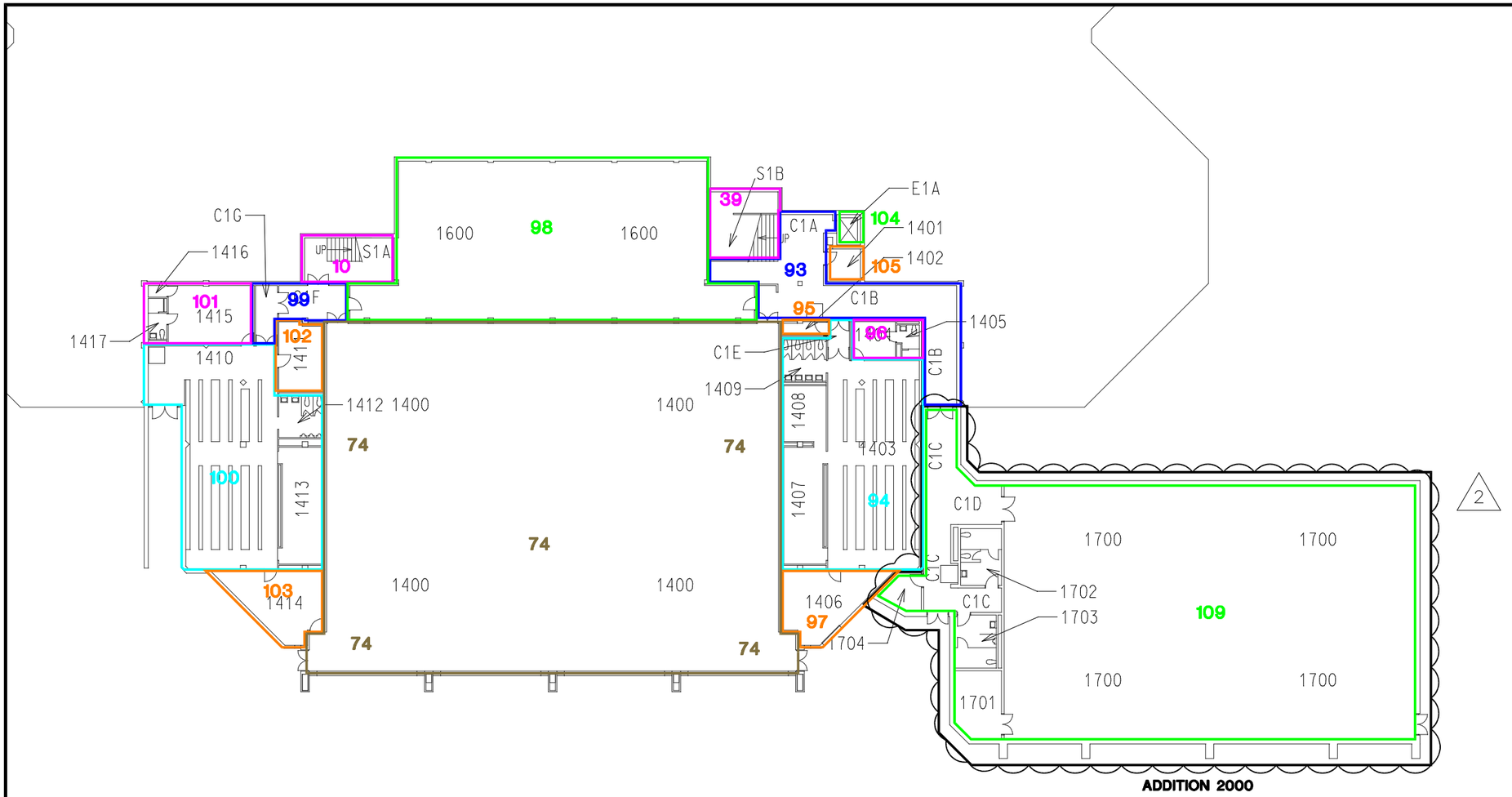
ASBESTOS – BULK SAMPLE LOCATIONS
WEST MIDDLE SCHOOL – ROOF
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN: TDA	DES: MCD
CHKD: MCD	APPD: MCD
DATE: 08–17–20	REV: 0

PROJECT NO: 00291604
PARKWAY SCHOOL DIST.
ST.LOUIS COUNTY, MO.

B4–ROOF



LEGEND

10	STAIRWELL	97	STORAGE ROOM	104	ELEVATOR
39	STAIRWELL	98	WEIGHT ROOM	105	ELEVATOR HYDRAULIC ROOM
74	GYMNASIUM	99	HALLWAYS/CORRIDORS	109	2000 ADDITION
93	HALLWAYS/CORRIDORS	100	BOYS LOCKER ROOM		
94	GIRLS LOCKER ROOM	101	COACH'S OFFICE		
95	STORAGE ROOM	102	STORAGE ROOM		
96	COACH'S OFFICE	103	STORAGE ROOM		

NOTE:

1. Original drawing prepared by PSC Industrial Outsourcing, LP.

N

0 30

FEET

psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

TITLE:

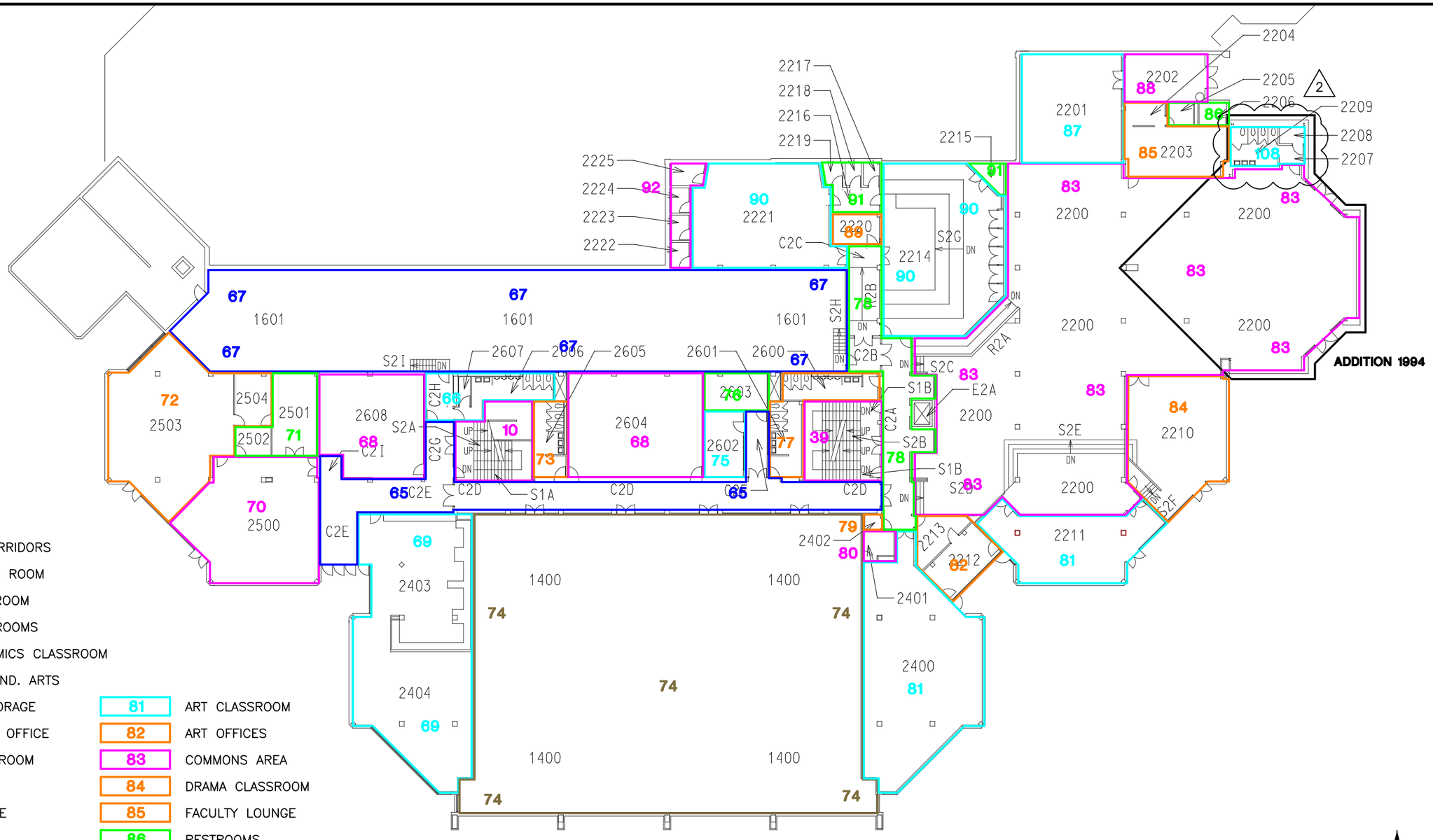
ASBESTOS – FUNCTIONAL SPACES
WEST MIDDLE SCHOOL – FIRST LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN: TDA	DES: MCD
CHKD: MCD	APPD: MCD
DATE: 04-09-20	REV: 2

PROJECT NO: 00291604
PARKWAY SCHOOL DIST.
ST.LOUIS COUNTY, MO.

F1-01



ORIGINAL BUILDING BUILT IN 1969

LEGEND

10	STAIRWELL	81	ART CLASSROOM		
39	STAIRWELL	82	ART OFFICES		
65	HALLWAYS/CORRIDORS	83	COMMONS AREA		
66	MENS LOCKER ROOM	84	DRAMA CLASSROOM		
67	MECHANICAL ROOM	85	FACULTY LOUNGE		
68	MUSIC CLASSROOMS	86	RESTROOMS		
69	HOME ECONOMICS CLASSROOM	87	FOOD SERVICE AREA		
70	WOOD SHOP/IND. ARTS	88	CAFETERIA OFFICE	91	INSTRUMENT STORAGE
71	IND. ARTS STORAGE	89	MUSIC OFFICE	92	PRACTICE ROOM
72	WOODSHOP & OFFICE	90	MUSIC CLASSROOMS	108	1994 ADDITION
73	FORMER RESTROOM				
74	GYMNASIUM				
75	SCHOOL STORE				
76	OFFICE				
77	RESTROOM				
78	HALLWAYS/CORRIDORS				
79	CUSTODIAL CLOSET				
80	KILN ROOM				

NOTE: 1. Original drawing prepared by PSC Industrial Outsourcing, LP.

N

0 30

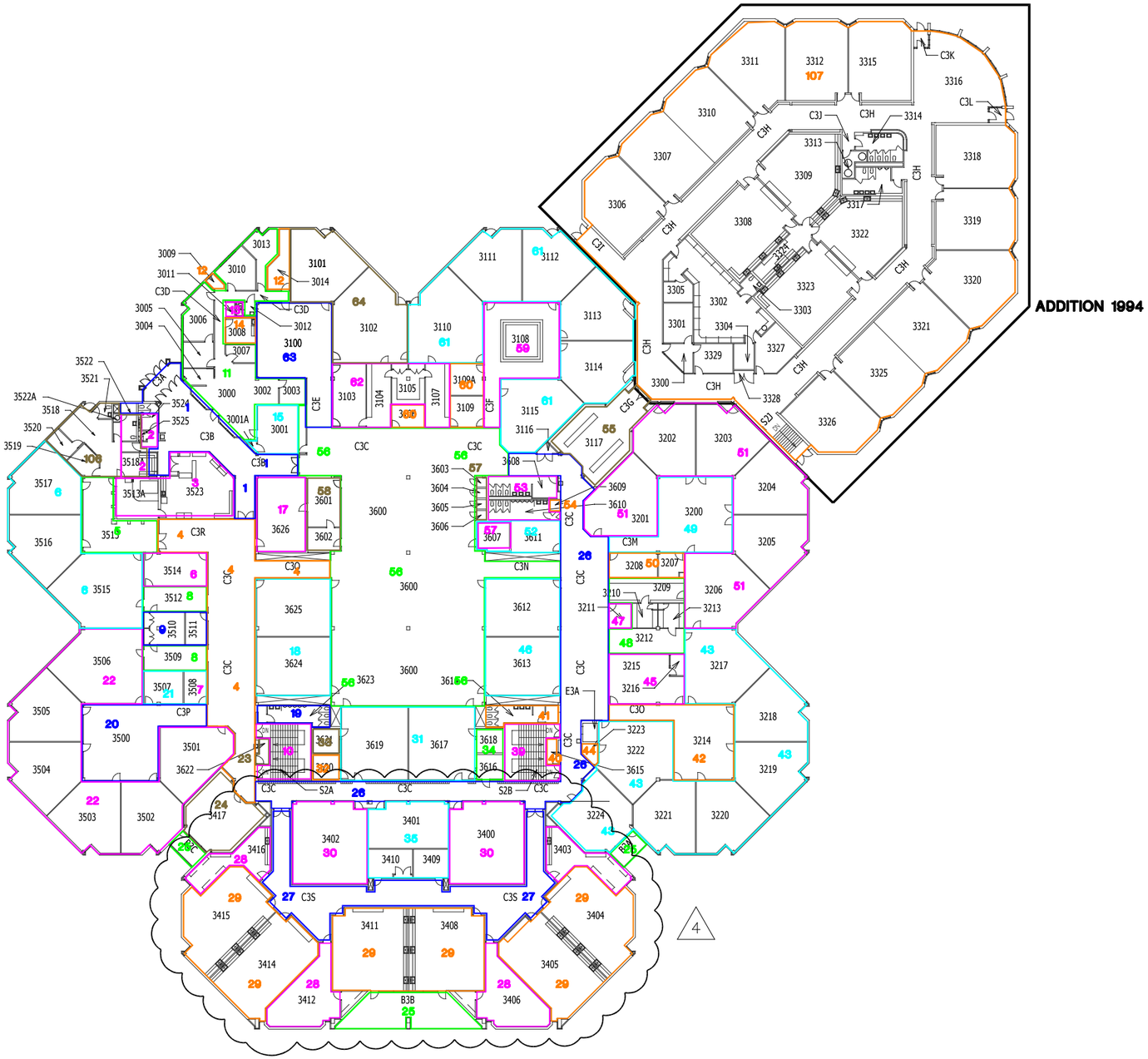
FEET

psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

TITLE:
ASBESTOS – FUNCTIONAL SPACES
WEST MIDDLE SCHOOL – SECOND LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN: DRB	DES: MCD	PROJECT NO: 00291604	
CHKD: MCD	APPD: MCD	PARKWAY SCHOOL DIST. ST.LOUIS COUNTY, MO.	
DATE: 04-09-20	REV: 2	F1-02	



LEGEND

1	HALLWAYS/CORRIDORS
2	RESTROOMS
3	SPECIAL EDUCATION
4	HALLWAYS/CORRIDORS
5	COMMON AREA
6	CLASSROOMS
7	COPY ROOM
8	TEACHER PREPARATION AREA
9	OFFICES
10	STAIRWELL
11	OFFICES
12	OFFICE STORAGE
13	RESTROOMS
14	KITCHENETTE
15	CONFERENCE ROOMS
16	RESERVED
17	AUDIO/VISUAL ROOM
18	CLASSROOMS
19	RESTROOM
20	COMMON AREA
21	OFFICES
22	CLASSROOMS
23	CUSTODIAL CLOSET
24	LOCKER AREA
25	EXTERIOR BALCONY'S
26	HALLWAYS/CORRIDORS
27	CORRIDOR
28	STORAGE
29	CLASSROOMS
30	CLASSROOM
31	CLASSROOMS
32	COMPUTER ROOM
33	OFFICE
34	OFFICES
35	STORAGE
36	RESERVED
37	RESERVED
38	RESERVED
39	STAIRWELL
40	CUSTODIAL CLOSET
41	RESTROOM
42	COMMON AREA
43	CLASSROOMS
44	STORAGE CLOSET
45	INDIVIDUAL INSTRUCTION
46	CLASSROOMS
47	COUNSELORS OFFICE
48	TEACHER PREPARATION AREA
49	COMMON AREA
50	OFFICES
51	CLASSROOMS
52	SPEECH ROOMS
53	RESTROOMS
54	CUSTODIAL CLOSET
55	LOCKER AREA
56	LIBRARY
57	STORAGE CLOSETS
58	LIBRARY OFFICES
59	COMMON AREA
60	INDIVIDUAL INSTRUCTION
61	CLASSROOMS
62	TEACHER PREPARATION AREA
63	COMMON AREA
64	CLASSROOMS
106	NURSES OFFICE (3518/3520)
107	1994 ADDITION

NOTE:

1. Revision 1 prepared by PSC Industrial Outsourcing, LP.

N

0 50

FEET

psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

TITLE:

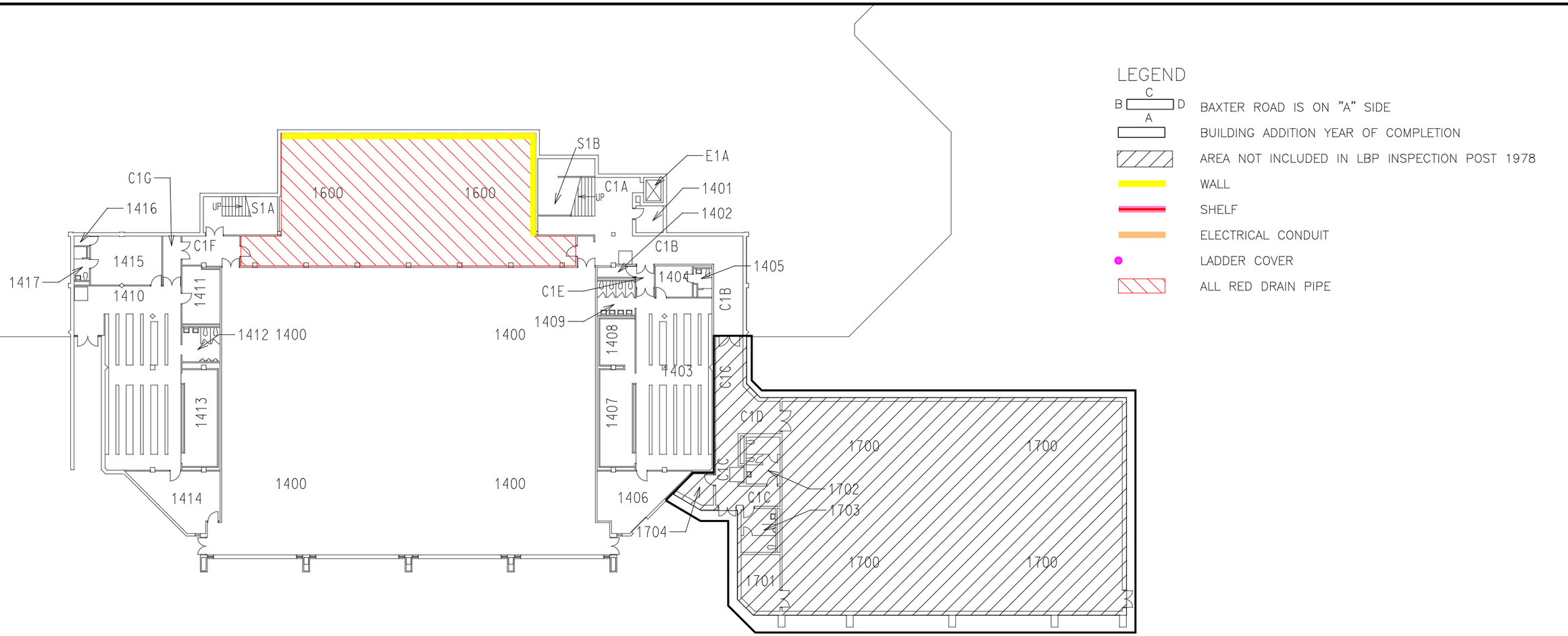
ASBESTOS – FUNCTIONAL SPACES
WEST MIDDLE SCHOOL – THIRD LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN: TDA	DES: MCD
CHKD: MCD	APPD: MCD
DATE: 04-09-20	REV: 4

PROJECT NO: 00291604
PARKWAY SCHOOL DIST.
ST.LOUIS COUNTY, MO.

F1-03



ADDITION 2000

LEGEND

- BAXTER ROAD IS ON "A" SIDE
- BUILDING ADDITION YEAR OF COMPLETION
- AREA NOT INCLUDED IN LBP INSPECTION POST 1978
- WALL
- SHELF
- ELECTRICAL CONDUIT
- LADDER COVER
- ALL RED DRAIN PIPE

NOTES:

1. This drawing must be used in conjunction with the LBP Testing Data Sheet. Do not disturb LBP materials without reviewing the LBP Inspection Report.
2. Building components with surface coatings/paints that have lead content equal to or greater than 1.0 milligrams of lead per square centimeter (1.0 mg/cm2) or 0.5% by weight are considered Lead Based Paint (LBP) by the United States Environmental Protection Agency (USEPA) and the Department of Housing and Urban Development (HUD). The Occupational Health and Safety Administration (OSHA) considers surface coatings/paints with any detectable level of lead to be "lead containing coatings or paint" having regulatory requirements.

N

0 30

FEET

psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

TITLE:

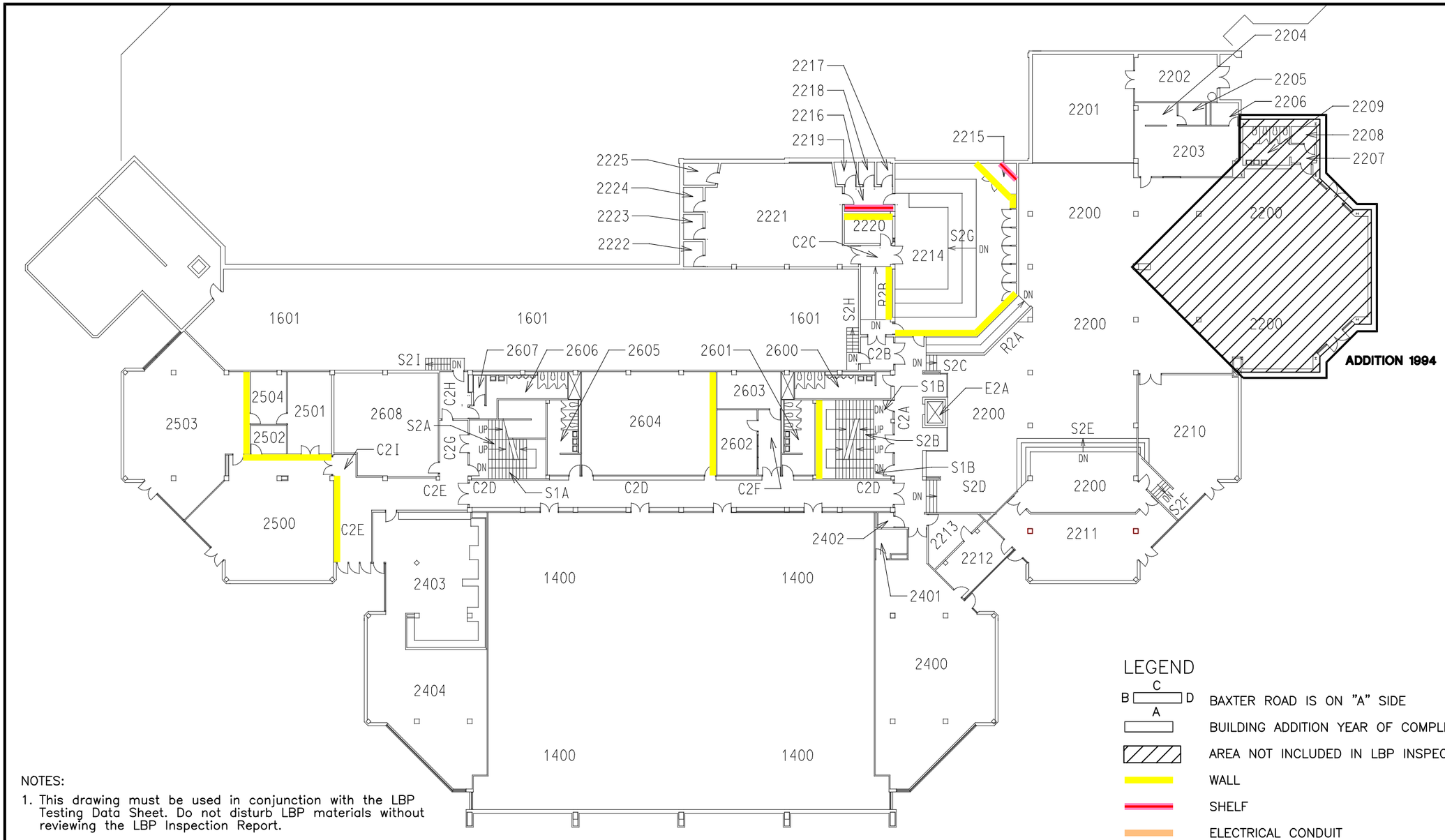
APPROXIMATE LOCATION OF LEAD BASED PAINT (LBP) – LOWER LEVEL
WEST MIDDLE SCHOOL – FIRST LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN: TDA	DES: MCD
CHKD: MCD	APPD: MCD
DATE: 05-08-14	REV: 1

PROJECT NO: 00291604
PARKWAY SCHOOL DIST.
ST.LOUIS COUNTY, MO.

L1-01



NOTES:

1. This drawing must be used in conjunction with the LBP Testing Data Sheet. Do not disturb LBP materials without reviewing the LBP Inspection Report.
2. Building components with surface coatings/paints that have lead content equal to or greater than 1.0 milligrams of lead per square centimeter (1.0 mg/cm2) or 0.5% by weight are considered Lead Based Paint (LBP) by the United States Environmental Protection Agency (USEPA) and the Department of Housing and Urban Development (HUD). The Occupational Health and Safety Administration (OSHA) considers surface coatings/paints with any detectable level of lead to be "lead containing coatings or paint" having regulatory requirements.

ORIGINAL BUILDING BUILT IN 1969

LEGEND

- BAXTER ROAD IS ON "A" SIDE (B / C / A / D)
- BUILDING ADDITION YEAR OF COMPLETION
- AREA NOT INCLUDED IN LBP INSPECTION POST 1978
- WALL
- SHELF
- ELECTRICAL CONDUIT
- LADDER COVER
- ALL RED DRAIN PIPE

N

0 30

FEET

psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

TITLE:

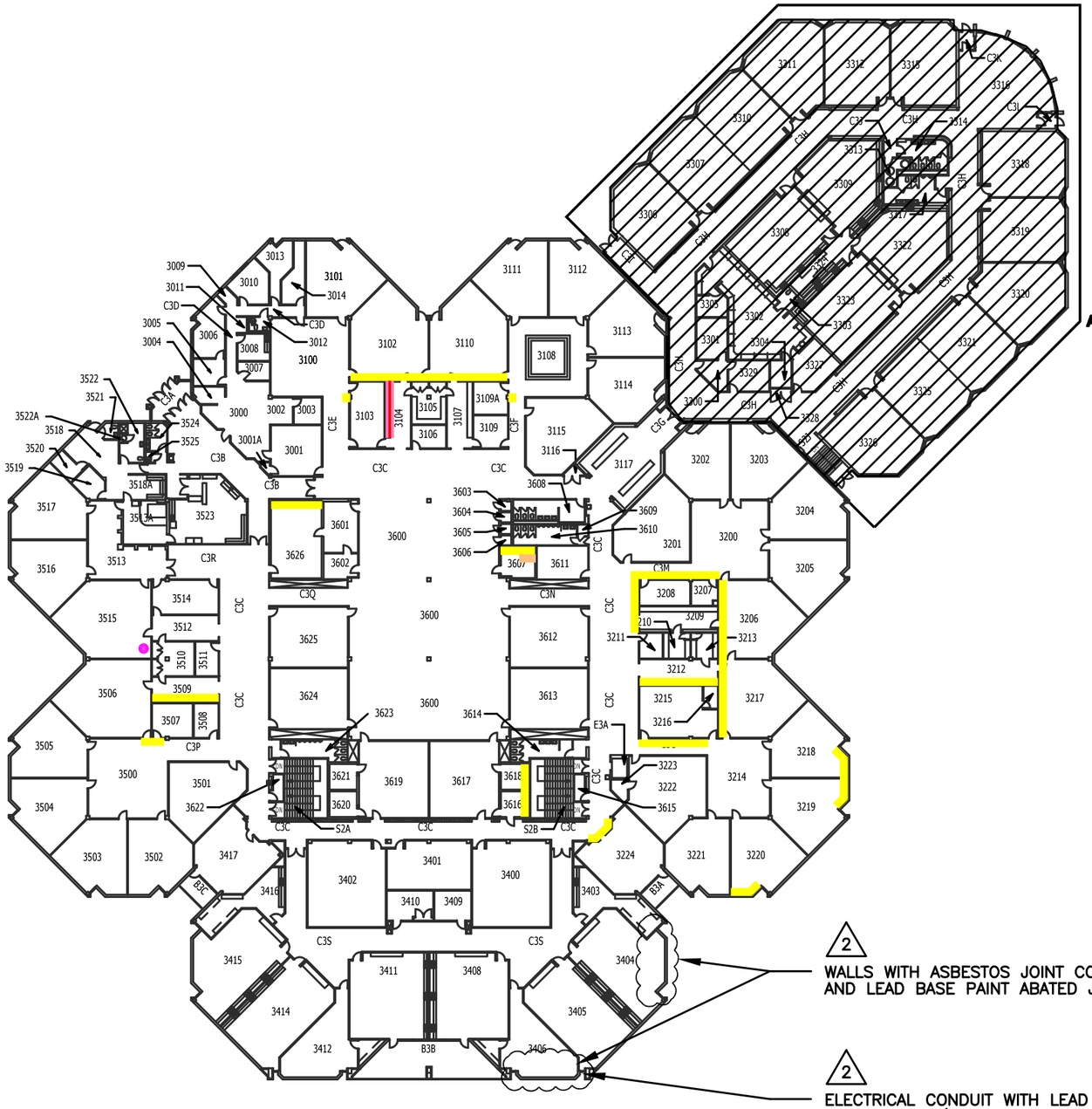
APPROXIMATE LOCATION OF LEAD BASED PAINT (LBP) – LOWER LEVEL
WEST MIDDLE SCHOOL – SECOND LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN:	DES:
DRB	MCD
CHKD:	APPD:
MCD	MCD
DATE:	REV:
05–08–14	1

PROJECT NO: 00291604
PARKWAY SCHOOL DIST.
ST.LOUIS COUNTY, MO.

L1–02



2 WALLS WITH ASBESTOS JOINT COMPOUND AND LEAD BASE PAINT ABATED JUNE 2018

2 ELECTRICAL CONDUIT WITH LEAD BASE PAINT ABATED/DEMOLISHED JUNE 2018

LEGEND

- BAXTER ROAD IS ON "A" SIDE
- BUILDING ADDITION YEAR OF COMPLETION
- AREA NOT INCLUDED IN LBP INSPECTION POST 1978
- WALL
- SHELF
- ELECTRICAL CONDUIT
- LADDER COVER
- ALL RED DRAIN PIPE

NOTES:

1. This drawing must be used in conjunction with the LBP Testing Data Sheet. Do not disturb LBP materials without reviewing the LBP Inspection Report.
2. Building components with surface coatings/paints that have lead content equal to or greater than 1.0 milligrams of lead per square centimeter (1.0 mg/cm2) or 0.5% by weight are considered Lead Based Paint (LBP) by the United States Environmental Protection Agency (USEPA) and the Department of Housing and Urban Development (HUD). The Occupational Health and Safety Administration (OSHA) considers surface coatings/paints with any detectable level of lead to be "lead containing coatings or paint" having regulatory requirements.

N

0 50

FEET

psi Information To Build On
Engineering • Consulting • Testing
8669 Olive Boulevard St. Louis, MO 63132
Tel (314) 432-8073 Fax (314) 432-5119

TITLE:

APPROXIMATE LOCATION OF LEAD BASED PAINT (LBP)
WEST MIDDLE SCHOOL – THIRD LEVEL
2312 BAXTER ROAD – CHESTERFIELD, MO. 63017

PARKWAY SCHOOLS

DWN:	DES:
TDA	MCD
CHKD:	APPD:
MCD	MCD
DATE:	REV:
08–21–18	2

PROJECT NO: 00291604
PARKWAY SCHOOL DIST.
ST.LOUIS COUNTY, MO.

L1–03

SECTION 004000
PROCUREMENT FORMS AND SUPPLEMENTS

PART 1 GENERAL

1.01 CONTRACTOR IS RESPONSIBLE FOR OBTAINING A VALID LICENSE TO USE ALL COPYRIGHTED DOCUMENTS SPECIFIED BUT NOT INCLUDED IN THE PROJECT MANUAL.

1.02 FORMS

A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in the procurement requirements.

B. Instructions to Bidders: AIA A701.

C. Substitution Request Form (During Procurement): Bidder's Discretion.

D. Bid Form: Section 004100 - Bid Form.

E. Procurement Form Supplements:
   1. Bid Security Form: AIA A310.
      a. Form AIA A310 is attached at end of Section 006000.
   2. Substitution Request Form (for substitutions requested with bid) : _____.
   3. Proposed Subcontractors Form: Section 004336 - Proposed Subcontractors Form.

F. Representations and Certifications:
   1. Bidder's Qualifications: AIA A305.
      a. Form AIA A305 is attached at end of Section 006000.

1.03 REFERENCE STANDARDS

A. AIA A305 - Contractor's Qualification Statement.

B. AIA A310 - Bid Bond.

C. AIA A701 - Instructions to Bidders; 2018.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 004000

SECTION 004100
BID FORM

THE PROJECT AND THE PARTIES

1.01 TO:

A. Parkway School District (Owner)
   1. 363 North Woods Mill Road
   2. Chesterfield Missouri 63017

1.02 FOR:

A. The project PN432501B - WEM Cooling Tower & Chiller Replacement at West Middle | 2312 Baxter Road, Chesterfield, MO 63017

B. Bid Number 26-145

1.03 DATE: _____ (BIDDER TO ENTER DATE)

1.04 SUBMITTED BY: (BIDDER TO ENTER COMPANY NAME, ADDRESS, AND CONTACT INFORMATION)

A. Bidder's Full Name:

_____

1. Address:

   _____

2. City, State, Zip:

   _____

3. Telephone Number:

   _____

4. Fax Number:

   _____

5. E-mail Address:

   _____

1.05 ACKNOWLEDGEMENTS:

A. We acknowledge:
   1. Examination of the site and all Bidding Documents and familiarity with the conditions pertaining to the site of the work and the requirements of the Bidding Documents as they pertain to the work has been made.
   2. Responsibility for performing all the work required of the Bidding Documents.
   3. Understanding that the Owner may reserve the right to reject any or all bids and to waive any informalities in the bidding.
   4. Understanding that by submitting a bid the representations in Article 2 of the Instructions to Bidders have been made.

1.06 OFFER

A. Bidders must show bid amount in both words and figures. In case of discrepancy, amount in words shall govern.

B. Having examined the Place of The Work and all matters referred to in the Instructions to Bidders and the Contract Documents prepared by Architect and Owner for the above mentioned project, we, the undersigned, hereby offer to enter into a Contract to perform the Work. Modifications to this bid form will not be accepted. Qualifications to the scope of work for each bid package bid will not be accepted. By submitting a bid, Bidder is agreeing to perform the complete scope of work for the bid package being bid as outlined in the project documents for the Sum:

   _____

   dollars ($_____), in lawful money of the United States of America.

C. We have included the required security Bid Bond or cashier's check at 5 percent of the Bid Sum as required by the Instruction to Bidders.

D. All applicable federal taxes are included and State of Missouri taxes are included in the Bid Sum except those exempted by Missouri statutes.

E. All Cash and Contingency Allowances described in Section 012100 - Allowances are included in the Bid Sum.

1.07 ACCEPTANCE

A. This offer shall be open to acceptance and is irrevocable for forty-five days from the bid closing date.

B. If this bid is accepted by Owner within the time period stated above, we will:
   1. Execute the Agreement in the form available to Contractor as part of the Bidding Documents without further modifications within seven days of receipt of Notice of Award.
   2. Furnish the required bonds within seven days of receipt of Notice of Award.
   3. Commence work within three days after written Notice to Proceed of this bid.

C. If this bid is accepted within the time stated, and we fail to commence the Work or we fail to provide the required Bond(s), the security deposit shall be forfeited as damages to Owner by reason of our failure.

D. In the event our bid is not accepted within the time stated above, the required security deposit shall be returned to the undersigned, in accordance with the provisions of the Instructions to Bidders; unless a mutually satisfactory arrangement is made for its retention and validity for an extended period of time.

1.08 CONTRACT TIME

A. If this Bid is accepted, we will:

B. Substantially complete the Work by April 16th, 2027.

1.09 ADDENDA

A. The following Addenda have been received. The modifications to the Bid Documents noted below have been considered and all costs are included in the Bid Sum.
   1. Addendum # _____ Dated _____.
   2. Addendum # _____ Dated _____.
   3. Addendum # _____ Dated _____.
   4. Addendum # _____ Dated _____.

1.10 BID FORM SUPPLEMENTS

A. The following Supplements are attached to this Bid Form and are considered an integral part of this Bid Form:
   1. Document 004322 - Unit Prices Form: Include a listing of unit prices specifically requested by Contract Documents.
   2. Document 004336 - Proposed Subcontractors Form: Include the names of all Subcontractors and the portions of the Work they will perform.

1.11 BID FORM SIGNATURE(S)

A. _____

(Bidder - print the full name of your Proprietorship, Partnership, or Corporation)

B. _____

(Authorized signing officer, Title)

C. _____

D. (Typed or printed name of authorized signing officer)

1.12 IF THE BID IS A JOINT VENTURE OR PARTNERSHIP, ADD ADDITIONAL FORMS OF EXECUTION FOR EACH MEMBER OF THE JOINT VENTURE IN THE APPROPRIATE FORM OR FORMS AS ABOVE.

END OF SECTION 004100

SECTION 004301
BID FORM SUPPLEMENTS COVER SHEET

PARTICULARS

1.01 TO (OWNER): PARKWAY SCHOOL DISTRICT

A. 363 North Woods Mill Road

B. Chesterfield, Missouri 63017

1.02 BID NUMBER 26-145

1.03 PROJECT NUMBER: PN432501B

1.04 PROJECT NAME: WEM COOLING TOWER & CHILLER REPLACEMENT

1.05 PROJECT LOCATION: WEST MIDDLE SCHOOL

1.06 DATE: _____

1.07 SUBMITTED BY: (BIDDER TO INSERT FULL COMPANY NAME AND ADDRESS)

A. _____

B. _____

C. _____

D. _____

E. In accordance with Section 002113 - Instructions to Bidders and Section 004100 - Bid Form - , we include the Supplements To Bid Form listed below. The information provided shall be considered an integral part of the Bid Form.

1.08 SUPPLEMENTS TO BID FORM

A. Section 004322 - Unit Prices Form

B. Section 004336 - Proposed Subcontractors Form

SIGNATURE(S)

2.01 _____

2.02 (BIDDER - PRINT THE FULL NAME OF YOUR PROPRIETORSHIP, PARTNERSHIP, OR CORPORATION)

2.03 _____

2.04 (AUTHORIZED SIGNING OFFICER, TITLE)

2.05 _____

2.06 (TYPED OR PRINTED NAME OF AUTHORIZED SIGNING OFFICER)

END OF SECTION 004301

SECTION 004322
UNIT PRICES FORM

PARTICULARS

1.01 THE FOLLOWING IS THE LIST OF UNIT PRICES REFERENCED IN THE BID:

A. SUBMITTED BY: (Bidder Name)_____

B. TO (Owner): Parkway School District
   1. 363 North Woods Mill Road
   2. Chesterfield, Missouri 63017

C. dated _____ and which is an integral part of the Bid Form.

1.02 THE FOLLOWING ARE UNIT PRICES FOR SPECIFIC PORTIONS OF THE WORK AS LISTED, AND ARE APPLICABLE TO AUTHORIZED VARIATIONS FROM THE CONTRACT DOCUMENTS.

A. Quantities indicated below are for bid evaluation purposes only.

B. The unit quantity will be multiplied by the unit price and the product added to the base bid and any accepted alternate bids to determine the low bidder.

C. Actual quantities supplied or placed in the Work shall determine actual adjustment to the Contract Sum.

1.03 UNIT PRICE LIST:

A. ITEM DESCRIPTION : UNIT QUANTITY : UNIT PRICE

B. Item A - Excavating Unsuitable Soil & Replacement With General Fill; Section 312316 - Excavation and Section 312323 - Fill : Quantity 250 cubic yards : $_____/cubic yard.

C. Item B - Excavating Unsuitable Soil In Trench & Replacement With General Fill; Section 312316.13 - Trenching : Quantity 250 cubic yards : $_____/cubic yard.

D. Item C - Provide and Install Geotechnical Stabilization Fabric; Section 312323 - Fill and Section 312316.13 - Trenching : Quantity 250 square yards : $_____/square yard.

E. Item G - Excavating Rock & Replacement With General Fill; Section 312316 - Excavation and Section 312323 Fill - : Quantity 250 cubic yards : $_____/square yard.

F. Item H - 4 Inch Concrete Paving Outside of Designed Area; Section 321313 - Concrete Paving : Quantity 1,000 square feet : $_____/square foot.

END OF SECTION 004322

SECTION 004336
PROPOSED SUBCONTRACTORS FORM

PARTICULARS

1.01 HEREWITH IS THE LIST OF SUBCONTRACTORS REFERENCED IN THE BID:

A. SUBMITTED BY:

(Bidder Name)_____

B. TO (Owner): Parkway School District
   1. 363 North Woods Mill Road
   2. Chesterfield, Missouri 63017

C. dated _____ (Bidder to enter date), which is an integral part of the Bid Form.

1.02 BIDDER AGREES THAT THE FOLLOWING SUBCONTRACTORS SHALL NOT BE CHANGED WITHOUT THE WRITTEN CONSENT OF THE OWNER PRIOR TO AWARD OF THE CONTRACT.

1.03 THE FOLLOWING WORK WILL BE PERFORMED (OR PROVIDED) BY SUBCONTRACTORS AND COORDINATED BY US.

1.04 LIST OF SUBCONTRACTORS:

A. WORK SUBJECT -- SUBCONTRACTOR NAME

B. Earthwork -- _____

C. Site Concrete -- _____

D. Segmental Block Retaining Walls -- _____

E. Site Plumbing -- _____

F. Landscaping -- _____

G. Masonry -- _____

H. Painting -- _____

I. Mechanical -- _____

J. Electrical -- _____

END OF SECTION 004336

SECTION 005000
CONTRACTING FORMS AND SUPPLEMENTS

PART 1 GENERAL

1.01 CONTRACTOR IS RESPONSIBLE FOR OBTAINING A VALID LICENSE TO USE ALL COPYRIGHTED DOCUMENTS SPECIFIED BUT NOT INCLUDED IN THE PROJECT MANUAL.

1.02 AGREEMENT AND CONDITIONS OF THE CONTRACT

A. See Section 005200 - Agreement Form for the Agreement and General Conditions.

B. The Agreement is based on AIA A101.

C. The General Conditions are based on AIA A201.

1.03 FORMS

A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in Contract Documents.

B. See Section 0060000 - Project Forms for forms specifically required following.

C. Bond Forms:
   1. Bid Bond Form: AIA A310.
   2. Performance and Payment Bond Form: AIA A312.

D. Post-Award Certificates and Other Forms:
   1. Submittal Transmittal Form: Owner's electronic document management system form.
   2. Certificate of Insurance Form: ACORD Certificate of Insurance 25.
   3. Schedule of Values Form: Owner's standard form.
   4. Application for Payment Form: Owner's standard form.
   5. Sales Tax Exemption Form: State of Missouri standard form.
   6. Consent of Surety to Reduction of Retainage Form: Surety's standard form.
   7. Stored Material Form: Contractor's discretion.
   8. Contractor's Daily Report Form: Owner's electronic document management system form.

E. Clarification and Modification Forms:
   1. Request for Information Form: Owner's electronic document management system form.
   2. Supplemental Instruction Form: Owner's electronic document management system form.
   3. Written Amendment Form: Owner's standard form.
   4. Proposal Worksheet Summary Form: Owner's Service Contractor Not-To-Exceed Proposal form.
   5. Proposal Worksheet Detail Form: Contractor's discretion.
   6. Claim Request Form: Owner's electronic document management system form.
   7. Change Order Form: Owner's electronic document management system form.

F. Closeout Forms:
   1. Certificate of Substantial Completion Form: AIA G704-2017
   2. Affidavit of Release of Liens Form: CM/Contractor's discretion
   3. Affidavit of Compliance With the Prevailing Wage Law: State of Missouri standard form.
   4. OSHA 10-Hour Construction Safety Training Log: Owner's standard form.
   5. Consent of Surety to Final Payment Form: Surety's standard form.

1.04 REFERENCE STANDARDS

A. AIA A101 - Standard Form of Agreement Between Owner and Contractor where the basis of Payment is a Stipulated Sum.

B. AIA A201 - General Conditions of the Contract for Construction.

C. AIA A305 - Contractor's Qualification Statement.

D. AIA A310 - Bid Bond.

E. AIA A312 - Performance Bond and Payment Bond.

F. AIA G704-2017 - Certificate of Substantial.

G. AIA G714 - Construction Change Directive.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 005000

SECTION 005200
AGREEMENT FORM

PART 1 GENERAL

1.01 FORM OF AGREEMENT

A. The Agreement to be executed and Exhibits are attached at the end of this document.

1.02 RELATED DOCUMENTS

A. Document 007200 - General Conditions.

B. Section 014216 - Definitions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 005200

DRAFT

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 the « » day of « » in the year « »
(In words, indicate day, month and year.)

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

Parkway School District
455 North Woods Mill Road
Chesterfield, Missouri 63017
Telephone Number: 314-415-8100

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

« »« »
« »
« »
« »

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

432501B – WEM Cooling Tower and Chiller Replacement
West Middle School
2312 Baxter Road
Chesterfield, Missouri 63017
Bid No. 26-145

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

Bond Architects
222 South Central Avenue; Suite 501
St. Louis, Missouri 63105
Telephone Number: 314-863-4994

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.

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.

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

AIA Document A101 – 2017. Copyright © 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1967, 1974, 1977, 1987, 1991, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This draft was produced at 15:09:28 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1232495479)

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:

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:

By the following date: « »

§ 3.3.2 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:

AIA Document A101 – 2017. Copyright © 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1967, 1974, 1977, 1987, 1991, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This draft was produced at 15:09:28 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1232495479)

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.)

Liquidated damages are established for this project as provided in Section 9.11.of the AIA Document A201™-2017, General Conditions of the Contract for Construction

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

Early completion incentives are established for this project as provided in Section 9.11.of the AIA Document A201™-2017, General Conditions of the Contract for Construction

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

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

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

Every two weeks on a Friday as an alternative.

§ 5.1.3 ***The Owner shall make payment within thirty (30) days after receipt of verified and approved Application for Payment.***
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

AIA Document A101 – 2017. Copyright © 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1967, 1974, 1977, 1987, 1991, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This draft was produced at 15:09:28 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1232495479)

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

.1 That portion of the Contract Sum properly allocable to completed Work;

.2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and

.3 That portion of Construction Change Directives that the ***Owner*** determines, in the ***Owner's*** judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

.1 The aggregate of any amounts previously paid by the Owner;

.2 The amount, if any, for Work that remains uncorrected and for which the ***Owner*** has previously withheld ***approval of an Application*** for Payment as provided in Article 9 of AIA Document A201–2017;

.3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;

.4 For Work performed or defects discovered since the last payment application, any amount for which the ***Owner*** may withhold payment, or nullify ***an Application for*** Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and

.5 Retainage withheld pursuant to Section 5.1.7.

§ 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.)

Five Percent (5%)

§ 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.)

Insurance and Bonds

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:
(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

As provided in in Article 9, Section 9.3.1.3 and 9.3.1.4 of the AIA Document A201™-2017, General Conditions of the Contract for Construction

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:
(Insert any other conditions for release of retainage upon Substantial Completion.)

The amount of retainage established in the Certificate of Substantial Completion for the list of items to be completed or corrected prior to final payment as provided in Section 9.8.4 of the AIA Document A201-2017. If the amount of retainage established in the Certificate of Substantial Completion is greater than the retainage withheld from prior Applications for Payment, the retainage will not be released. If the amount of retainage

AIA Document A101 – 2017. Copyright © 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1967, 1974, 1977, 1987, 1991, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This draft was produced at 15:09:28 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1232495479)

established in the Certificate of Substantial Completion is less than the retainage withheld from prior Applications for Payment, the retainage will be released, but only in the amount in excess of the amount of retainage established in the Certificate of Substantial Completion.

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 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 AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the ***Owner***.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the Owner's approval of the final Application for Payment.

§ 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.)

1.5 % Monthly

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of 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, ***non-binding dispute resolution methods*** pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:

Litigation in ***accordance with requirements of Section 15.5 of AIA Document A201-2017.***

ARTICLE 7 TERMINATION OR SUSPENSION

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

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

15% of the value of the Work not completed.

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

AIA Document A101 – 2017. Copyright © 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1967, 1974, 1977, 1987, 1991, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This draft was produced at 15:09:28 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1232495479)

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of 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)

John Blanton
Manager of Planning and Construction
Parkway School District
363 North Woods Mill Road
Chesterfield, Missouri 63017
Telephone Number: 314-415-8289
Email: jblanton@parkwayschools.net

§ 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 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 AIA Document A101™–2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Other provisions:

§ 11.5.1 Indemnification
The Construction Manager shall be responsible for and shall indemnify and save harmless Owner and all of its Board, Officers, Employees and Representatives against any and all bodily injury, personal injury, and property damage due to Construction Manager's negligent acts, error, or omissions or those of Construction Manager's officers, employees, agents, or representatives in connection with Construction Manager's performance under this Agreement, and will be responsible for all costs, losses, or expenses including attorney fees arising out of such negligent acts, errors, or omissions. The Construction Manager shall require this provision in all subcontracts with Construction Manager's Subcontractors.

§ 12.8 Exclusiveness of Prescribed Remedies
No remedy herein conferred upon or reserved to Owner is intended to be exclusive of any other remedy or remedies; but each and every such remedy shall be cumulative, and shall be in addition to every other remedy given hereunder, or now hereafter existing at law or in equity or by statute. The Owner's written approval, acceptance, use, or payment for all or any part of the Architect's services hereunder or the Project itself shall in no way diminish or limit the Architect's obligations and liabilities or the Owner's rights.

§ 12.17 Attorney's Fees

AIA Document A101 – 2017. Copyright © 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1967, 1974, 1977, 1987, 1991, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This draft was produced at 15:09:28 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1232495479)

In the event the Owner files a court proceeding to enforce the terms or provisions of this Agreement or to recover damages from the Construction Manager for breach of the Agreement, the Owner shall be entitled to recover its reasonable attorneys' fees and/or legal expenses in the event the Owner is the prevailing party.

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 amended.***

.2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds***, as amended.***

.3 AIA Document A201™–2017, General Conditions of the Contract for Construction***, as amended.***

.4

.4 Drawings

Number	Title	Date

.5 Specifications

Section	Title	Date	Pages

.6 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.

.7 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

.8 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 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.)

Document 006000 - Project Forms Summary and attached Project Forms

AIA Document A101 – 2017. Copyright © 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1967, 1974, 1977, 1987, 1991, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This draft was produced at 15:09:28 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1232495479)

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

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
« »	« »« »
(Printed name and title)	*(Printed name and title)*

DRAFT

AIA Document A101 – 2017. Copyright © 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1967, 1974, 1977, 1987, 1991, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This draft was produced at 15:09:28 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1232495479)

DRAFT

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 the « » day of « » in the year « »
(In words, indicate day, month and year.)

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

432501B – WEM Cooling Tower and Chiller Replacement
West Middle School
2312 Baxter Road
Chesterfield, Missouri 63017
Bid No. 26-145

THE OWNER:
(Name, legal status and address)

Parkway School District
455 North Woods Mill Road
Chesterfield, Missouri 63017
Telephone Number: 314-415-8100

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 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 ***written*** request, provide a copy of the property insurance policy or policies required by

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.

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.

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

AIA Document A101 – 2017 Exhibit A. Copyright © 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This draft was produced at 15:16:52 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1112818258)

Section A.2.3. The copy of the policy or policies provided shall contain all applicable conditions, definitions, exclusions, and endorsements.

§ A.2.2 Liability Insurance
The Owner shall be responsible for purchasing and maintaining the Owner's usual general liability insurance.

§ 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 "all-risks" completed value 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 as insureds. This insurance shall include the interests of mortgagees as loss payees.

§ 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. The insurance shall also provide coverage for ensuing loss or resulting damage from error, omission, or deficiency in construction methods, design, specifications, workmanship, or materials. Sub-limits, if any, are as follows:
(Indicate below the cause of loss and any applicable sub-limit.)

Causes of Loss	Sub-Limit

§ A.2.3.1.2 Specific Required Coverages. The insurance required by this Section A.2.3.1 shall provide coverage for loss or damage to falsework and other temporary structures, and to building systems from testing and startup. The insurance shall also cover debris removal, including demolition occasioned by enforcement of any applicable legal requirements, and reasonable compensation for the Architect's and Contractor's services and expenses required as a result of such insured loss, including claim preparation expenses. Sub-limits, if any, are as follows:
(Indicate below type of coverage and any applicable sub-limit for specific required coverages.)

Coverage	Sub-Limit

§ 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. If the insurance required by this Section A.2.3 is subject to deductibles or self-insured retentions, the Owner shall be responsible for all loss not covered because of such deductibles or retentions ***unless the Contractors negligent acts, omissions, or intentional misconduct resulted in the damages covered under the property insurance, in which event the Contractor shall pay any costs not covered because of such deductibles***.

§ A.2.3.2 Occupancy or Use Prior to Substantial Completion. The Owner's occupancy or use of any completed or partially completed portion of the Work prior to Substantial Completion shall not commence until the insurance company or companies providing the insurance under Section A.2.3.1 have consented in writing to the continuance of coverage. 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.

AIA Document A101 – 2017 Exhibit A. Copyright © 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This draft was produced at 15:16:52 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1112818258)

§ 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, "all-risks" 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 Optional Extended Property Insurance.

The Owner shall purchase and maintain the insurance selected and described below.

(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. For each type of insurance selected, indicate applicable limits of coverage or other conditions in the fill point below the selected item.)

[« »] **§ A.2.4.1 Loss of Use, Business Interruption, and Delay in Completion Insurance**, to reimburse the Owner for loss of use of the Owner's property, or the inability to conduct normal operations due to a covered cause of loss.

« »

[« »] **§ A.2.4.2 Ordinance or Law Insurance**, for the reasonable and necessary costs to satisfy the minimum requirements of the enforcement of any law or ordinance regulating the demolition, construction, repair, replacement or use of the Project.

« »

[« »] **§ A.2.4.3 Expediting Cost Insurance**, for the reasonable and necessary costs for the temporary repair of damage to insured property, and to expedite the permanent repair or replacement of the damaged property.

« »

[« »] **§ A.2.4.4 Extra Expense Insurance**, to provide reimbursement of the reasonable and necessary excess costs incurred during the period of restoration or repair of the damaged property that are over and above the total costs that would normally have been incurred during the same period of time had no loss or damage occurred.

« »

[« »] **§ A.2.4.5 Civil Authority Insurance**, for losses or costs arising from an order of a civil authority prohibiting access to the Project, provided such order is the direct result of physical damage covered under the required property insurance.

« »

[« »] **§ A.2.4.6 Ingress/Egress Insurance**, for loss due to the necessary interruption of the insured's business due to physical prevention of ingress to, or egress from, the Project as a direct result of physical damage.

« »

[« »] **§ A.2.4.7 Soft Costs Insurance**, to reimburse the Owner for costs due to the delay of completion of the Work, arising out of physical loss or damage covered by the required property insurance: including construction loan fees; leasing and marketing expenses; additional fees, including those of architects, engineers, consultants, attorneys and accountants, needed for the completion of the construction, repairs, or reconstruction; and carrying costs such as property taxes, building permits, additional

AIA Document A101 – 2017 Exhibit A. Copyright © 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This draft was produced at 15:16:52 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1112818258)

interest on loans, realty taxes, and insurance premiums over and above normal expenses.

« »

§ A.2.5 Other Optional Insurance.
The Owner shall purchase and maintain the insurance selected below.
(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance.)

[« »] **§ A.2.5.1 Cyber Security Insurance** for loss to the Owner due to data security and privacy breach, including costs of investigating a potential or actual breach of confidential or private information.
(Indicate applicable limits of coverage or other conditions in the fill point below.)

« »

[« »] **§ A.2.5.2 Other Insurance**
(List below any other insurance coverage to be provided by the Owner and any applicable limits.)

Coverage	Limits

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 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.3.1.1.1 Certificates of Insurance shall show the additional insureds required by Section A.3.1.3. The Contractor shall provide the required policy endorsements for the additional insureds to the Owner with the certificates of insurance.

§ 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.3.2 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.

AIA Document A101 – 2017 Exhibit A. Copyright © 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This draft was produced at 15:16:52 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1112818258)

§ 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 of not less than ***two million dollars*** ($***2,000,000***) each occurrence, ***three million dollars*** ($***3,000,000***) general aggregate, and ***three million dollars*** ($***3,000,000***) aggregate 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.
- **.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***) per accident ***and two million dollars ($2,000,000) in the aggregate***, 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 ***as required by the State of Missouri***.

§ A.3.2.6 Employers' Liability with policy limits not less than ***one million dollars*** ($***1,000,000***) each accident, ***one million dollars*** ($***1,000,000***) each employee, and ***two million dollars*** ($***2,000,000***) policy limit.

§ A.3.2.7 ***Not used.***

AIA Document A101 – 2017 Exhibit A. Copyright © 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This draft was produced at 15:16:52 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1112818258)

§ 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 of not less than ***two million dollars*** ($***2,000,000***) per claim and ***three million dollars*** ($***3,000,000***) in the aggregate.

§ 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 ***two million dollars*** ($***2,000,000***) per claim and ***three million dollars*** ($***3,000,000***) 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 ***three million dollars*** ($***3,000,000***) per claim and ***five million dollars*** ($***5,000,000***) in the aggregate.

§ A.3.2.11 ***Not used.***

§ A.3.2.12 ***Not used.***

§ 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. 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.

§ 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.

§ A.3.3.2.3 Asbestos Abatement Liability Insurance, ***if the Work involves asbestos encapsulation or removal or both*** with policy limits of not less than ***two million dollars*** ($***2,000,000***) per claim and ***three million dollars*** ($***3,000,000***) 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 an "all-risks" completed value form.

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

§ 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:
(Specify type and penal sum of bonds.)

Type	**Penal Sum ($0.00)**
Payment Bond	***The Contract Sum including adjustments by approved Change Orders***
Performance Bond	***The Contract Sum including adjustments by approved Change Orders***

Payment and Performance Bonds shall be AIA Document A312™, Payment Bond and Performance Bond, or contain provisions identical to AIA Document A312™, current as of the date of this Agreement.

ARTICLE A.4 SPECIAL TERMS AND CONDITIONS

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

§ A.4.1 Bonds may be obtained through the Contractor's usual source and the cost thereof shall be included in the Contract Sum and in each approved Change Order.

AIA Document A101 – 2017 Exhibit A. Copyright © 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This draft was produced at 15:16:52 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1112818258)

§ A.4.2 The Contractor shall deliver the required bonds to the Owner no later than seven (7) days following the date the Agreement is entered into, or if the Work is to be commenced prior thereto in response to a letter of intent, the Contractor shall prior to the commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished.

§ A.4.3 The Contractor shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of the power of attorney.

§ A.4.4 As set forth in 107.170 RSMo, the Contractor shall deliver with the bonds a letter that certifies the bonding company is solvent and that the representations made in the purported bonds are true and correct.

DRAFT

AIA Document A101 – 2017 Exhibit A. Copyright © 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This draft was produced at 15:16:52 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1112818258)

SECTION 006000
PROJECT FORMS

PART 1 GENERAL

1.01 PROJECT FORMS

A. The Forms to be executed that are referenced in Section 005000 - Contracting Forms and Supplements and in the various sections of this Project Manual are attached at the end of this document.

B. The forms attached are as follows:
   1. Contractor's Qualification Statement: AIA A305
   2. Bid Bond: AIA A310
   3. Performance and Payment Bond: AIA A312
   4. Owner's Standard Schedule of Values Form
   5. Owner's Standard Application for Payment Form
   6. Substance Abuse and Safety Program Supplier/Vendor/Visitor Acknowledgement Form
   7. Refrigerant Management Contractor Information and Licensing Input Form
   8. Refrigerant Management Service Order Form
   9. Refrigerant Management Equipment Installation/Removal Form
   10. OSHA 10-Hour Construction Safety And Health Training Log Form
   11. Affidavit of Compliance With the Prevailing Wage Law
   12. Affidavit of Record Document Completion
   13. Asbestos and Lead Based Paint Notification to Contractors
   14. Notification of Asbestos and Lead Based Paint Containing Materials Contractor Acknowlegment
   15. Project Information Form (PIF)
       a. PIF-Addendum
       b. PIF-Change to Scope of Work
   16. Certificate of Visual Inspection

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 006000

AIA® Document A305® – 2020

Contractor's Qualification Statement

THE PARTIES SHOULD EXECUTE A SEPARATE CONFIDENTIALITY AGREEMENT IF THEY INTEND FOR ANY OF THE INFORMATION IN THIS A305-2020 TO BE HELD CONFIDENTIAL.

SUBMITTED BY:
(Organization name and address.)

SUBMITTED TO:
(Organization name and address.)

TYPE OF WORK TYPICALLY PERFORMED
(Indicate the type of work your organization typically performs, such as general contracting, construction manager as constructor services, HVAC contracting, electrical contracting, plumbing contracting, or other.)

THIS CONTRACTOR'S QUALIFICATION STATEMENT INCLUDES THE FOLLOWING:
(Check all that apply.)

- [X] Exhibit A – General Information
- [X] Exhibit B – Financial and Performance Information
- [X] Exhibit C – Project-Specific Information
- [X] Exhibit D – Past Project Experience
- [ ] Exhibit E – Past Project Experience (Continued)

CONTRACTOR CERTIFICATION
The undersigned certifies under oath that the information provided in this Contractor's Qualification Statement is true and sufficiently complete so as not to be misleading.

Organization's Authorized Representative Signature

Date

Printed Name and Title

NOTARY
State of:
County of:
Signed and sworn to before me this day of

Notary Signature

My commission expires:

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.

AIA Document A305 – 2020. Copyright © 1964, 1969, 1979, 1986, and 2020. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 16:26:15 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1666476131)

AIA® Document A305® – 2020 Exhibit A

General Information

This Exhibit is part of the Contractor's Qualification Statement, submitted by and dated the day of in the year
(In words, indicate day, month and year.)

§ A.1 ORGANIZATION
§ A.1.1 Name and Location
§ A.1.1.1 Identify the full legal name of your organization.

§ A.1.1.2 List all other names under which your organization currently does business and, for each name, identify jurisdictions in which it is registered to do business under that trade name.

§ A.1.1.3 List all prior names under which your organization has operated and, for each name, indicate the date range and jurisdiction in which it was used.

§ A.1.1.4 Identify the address of your organization's principal place of business and list all office locations out of which your organization conducts business. If your organization has multiple offices, you may attach an exhibit or refer to a website.

§ A.1.2 Legal Status
§ A.1.2.1 Identify the legal status under which your organization does business, such as sole proprietorship, partnership, corporation, limited liability corporation, joint venture, or other.

.1 If your organization is a corporation, identify the state in which it is incorporated, the date of incorporation, and its four highest-ranking corporate officers and their titles, as applicable.

.2 If your organization is a partnership, identify its partners and its date of organization.

.3 If your organization is individually owned, identify its owner and date of organization.

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.

AIA Document A305 – 2020 Exhibit A. Copyright © 2020. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 16:27:31 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1429697323)

.4 If the form of your organization is other than those listed above, describe it and identify its individual leaders:

§ **A.1.2.2** Does your organization own, in whole or in part, any other construction-related businesses? If so, identify and describe those businesses and specify percentage of ownership.

§ A.1.3 Other Information

§ **A.1.3.1** How many years has your organization been in business?

§ **A.1.3.2** How many full-time employees work for your organization?

§ **A.1.3.3** List your North American Industry Classification System (NAICS) codes and titles. Specify which is your primary NAICS code.

§ **A.1.3.4** Indicate whether your organization is certified as a governmentally recognized special business class, such as a minority business enterprise, woman business enterprise, service disabled veteran owned small business, woman owned small business, small business in a HUBZone, or a small disadvantaged business in the 8(a) Business Development Program. For each, identify the certifying authority and indicate jurisdictions to which such certification applies.

§ A.2 EXPERIENCE

§ **A.2.1** Complete Exhibit D to describe up to four projects, either completed or in progress, that are representative of your organization's experience and capabilities.

§ **A.2.2** State your organization's total dollar value of work currently under contract.

§ **A.2.3** Of the amount stated in Section A.2.2, state the dollar value of work that remains to be completed:

§ **A.2.4** State your organization's average annual dollar value of construction work performed during the last five years.

§ A.3 CAPABILITIES

§ **A.3.1** List the categories of work that your organization typically self-performs.

§ **A.3.2** Identify qualities, accreditations, services, skills, or personnel that you believe differentiate your organization from others.

AIA Document A305 – 2020 Exhibit A. Copyright © 2020. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 16:27:31 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1429697323)

§ **A.3.3** Does your organization provide design collaboration or pre-construction services? If so, describe those services.

§ **A.3.4** Does your organization use building information modeling (BIM)? If so, describe how your organization uses BIM and identify BIM software that your organization regularly uses.

§ **A.3.5** Does your organization use a project management information system? If so, identify that system.

§ A.4 REFERENCES

§ **A.4.1** Identify three client references:
(Insert name, organization, and contact information)

§ **A.4.2** Identify three architect references:
(Insert name, organization, and contact information)

§ **A.4.3** Identify one bank reference:
(Insert name, organization, and contact information)

§ **A.4.4** Identify three subcontractor or other trade references:
(Insert name, organization, and contact information)

AIA Document A305 – 2020 Exhibit A. Copyright © 2020. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 16:27:31 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1429697323)

AIA® Document A305® – 2020 Exhibit B

Financial and Performance Information

This Exhibit is part of the Contractor's Qualification Statement, submitted by and dated the day of in the year
(In words, indicate day, month and year.)

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.

§ B.1 FINANCIAL
§ B.1.1 Federal tax identification number:

§ B.1.2 Attach financial statements for the last three years prepared in accordance with Generally Accepted Accounting Principles, including your organization's latest balance sheet and income statement. Also, indicate the name and contact information of the firm that prepared each financial statement.

§ B.1.3 Has your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management, been the subject of any bankruptcy proceeding within the last ten years?

§ B.1.4 Identify your organization's preferred credit rating agency and identification information.
(Identify rating agency, such as Dun and Bradstreet or Equifax, and insert your organization's identification number or other method of searching your organization's credit rating with such agency.)

§ B.2 DISPUTES AND DISCIPLINARY ACTIONS
§ B.2.1 Are there any pending or outstanding judgments, arbitration proceedings, bond claims, or lawsuits against your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management, or any of the individuals listed in Exhibit A, Section 1.2, in which the amount in dispute is more than $75,000?
(If the answer is yes, provide an explanation.)

§ B.2.2 In the last five years has your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management:
(If the answer to any of the questions below is yes, provide an explanation.)

.1 failed to complete work awarded to it?

.2 been terminated for any reason except for an owners' convenience?

AIA Document A305 – 2020 Exhibit B. Copyright © 2020. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 16:29:05 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (795357041)

.3 had any judgments, settlements, or awards pertaining to a construction project in which your organization was responsible for more than $75,000?

.4 filed any lawsuits or requested arbitration regarding a construction project?

§ B.2.3 In the last five years, has your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management; or any of the individuals listed in Exhibit A Section 1.2:
(If the answer to any of the questions below is yes, provide an explanation.)

.1 been convicted of, or indicted for, a business-related crime?

.2 had any business or professional license subjected to disciplinary action?

.3 been penalized or fined by a state or federal environmental agency?

AIA Document A305 – 2020 Exhibit B. Copyright © 2020. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 16:29:05 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (795357041)

AIA® Document A305® – 2020 Exhibit C

Project Specific Information

This Exhibit is part of the Contractor's Qualification Statement, submitted by and dated the day of in the year
(In words, indicate day, month and year.)

PROJECT:
(Name and location or address.)

432501B - Cooling Tower and Chiller Replacement
West Middle School
2312 Baxter Road
Chesterfield, Missouri 63017
Bid No. 26-145

CONTRACTOR'S PROJECT OFFICE:
(Identify the office out of which the contractor proposes to perform the work for the Project.)

TYPE OF WORK SOUGHT
(Indicate the type of work you are seeking for this Project, such as general contracting, construction manager as constructor, design-build, HVAC subcontracting, electrical subcontracting, plumbing subcontracting, etc.)

CONFLICT OF INTEREST
Describe any conflict of interest your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management, or any of the individuals listed in Exhibit A Section 1.2, may have regarding this Project.

§ C.1 PERFORMANCE OF THE WORK
§ C.1.1 When was the Contractor's Project Office established?

§ C.1.2 How many full-time field and office staff are respectively employed at the Contractor's Project Office?

§ C.1.3 List the business license and contractor license or registration numbers for the Contractor's Project Office that pertain to the Project.

§ C.1.4 Identify key personnel from your organization who will be meaningfully involved with work on this Project and indicate (1) their position on the Project team, (2) their office

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.

AIA Document A305 – 2020 Exhibit C. Copyright © 2020. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 16:31:08 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1936811591)

location, (3) their expertise and experience, and (4) projects similar to the Project on which they have worked.

§ **C.1.5** Identify portions of work that you intend to self-perform on this Project.

§ **C.1.6** To the extent known, list the subcontractors you intend to use for major portions of work on the Project.

§ C.2 EXPERIENCE RELATED TO THE PROJECT

§ **C.2.1** Complete Exhibit D to describe up to four projects performed by the Contractor's Project Office, either completed or in progress, that are relevant to this Project, such as projects in a similar geographic area or of similar project type. If you have already completed Exhibit D, but want to provide further examples of projects that are relevant to this Project, you may complete Exhibit E.

§ **C.2.2** State the total dollar value of work currently under contract at the Contractor's Project Office:

§ **C.2.3** Of the amount stated in Section C.2.2, state the dollar value of work that remains to be completed:

§ **C.2.4** State the average annual dollar value of construction work performed by the Contractor's Project Office during the last five years.

§ **C.2.5** List the total number of projects the Contractor's Project Office has completed in the last five years and state the dollar value of the largest contract the Contractor's Project Office has completed during that time.

§ C.3 SAFETY PROGRAM AND RECORD

§ **C.3.1** Does the Contractor's Project Office have a written safety program?

§ **C.3.2** List all safety-related citations and penalties the Contractor's Project Office has received in the last three years.

§ **C.3.3** Attach the Contractor's Project Office's OSHA 300a Summary of Work-Related Injuries and Illnesses form for the last three years.

§ **C.3.4** Attach a copy of your insurance agent's verification letter for your organization's current workers' compensation experience modification rate and rates for the last three years.

§ C.4 INSURANCE

§ **C.4.1** Attach current certificates of insurance for your commercial general liability policy, umbrella insurance policy, and professional liability insurance policy, if any. Identify deductibles or self-insured retentions for your commercial general liability policy.

AIA Document A305 – 2020 Exhibit C. Copyright © 2020. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 16:31:08 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1936811591)

§ **C.4.2** If requested, will your organization be able to provide property insurance for the Project written on a builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis?

§ **C.4.3** Does your commercial general liability policy contain any exclusions or restrictions of coverage that are prohibited in AIA Document A101-2017, Exhibit A, Insurance A.3.2.2.2? If so, identify.

§ C.5 SURETY

§ **C.5.1** If requested, will your organization be able to provide a performance and payment bond for this Project?

§ **C.5.2** Surety company name:

§ **C.5.3** Surety agent name and contact information:

§ **C.5.4** Total bonding capacity:

§ **C.5.5** Available bonding capacity as of the date of this qualification statement:

AIA Document A305 – 2020 Exhibit C. Copyright © 2020. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 16:31:08 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1936811591)

AIA® Document A305® – 2020 Exhibit D

Contractor's Past Project Experience

	1	2	3	4
PROJECT NAME				
PROJECT LOCATION				
PROJECT TYPE				
OWNER				
ARCHITECT				
CONTRACTOR'S PROJECT EXECUTIVE				
KEY PERSONNEL (include titles)				
PROJECT DETAILS	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work
PROJECT DELIVERY METHOD	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:
SUSTAINABILITY CERTIFICATIONS				

AIA Document A305 – 2020 Exhibit D. Copyright © 2020. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 16:32:29 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (3B9ADA4E)

AIA® Document A310™ – 2010

Bid Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)
Parkway School District
455 North Woods Mill Road
Chesterfield, Missouri 63017
Telephone Number: 314-415-8200

BOND AMOUNT: $

PROJECT:
(Name, location or address, and Project number, if any)
432501B - WEM Cooling Tower and Chiller Replacement
West Middle School
2312 Baxter Road
Chesterfield, Missouri 63017
Bid No. 26-145

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.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such

Init.
/
AIA Document A310 – 2010. Copyright © 1963, 1970 and 2010. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:48:52 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (943285870)

statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

Signed and sealed this day of ,

	(Contractor as Principal) *(Seal)*
(Witness)	*(Title)*
	(Surety) *(Seal)*
(Witness)	*(Title)*

AIA Document A310 – 2010. Copyright © 1963, 1970 and 2010. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:48:52 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (943285870)

AIA® Document A312® – 2010

Performance Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)
Parkway School District
455 North Woods Mill Road
Chesterfield, Missouri 63017
Telephone Number: 314-415-8100

CONSTRUCTION CONTRACT
Date:
Amount: $ 0.00
Description:
(Name and location)
432501B – WEM Cooling Tower and Chiller Replacement West Middle School
2312 Baxter Road
Chesterfield, Missouri 63017
Bid No. 26-145

BOND
Date:
(Not earlier than Construction Contract Date)

Amount: $
Modifications to this Bond: ☐ None ☐ See Section 16

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	

(Any additional signatures appear on the last page of this Performance Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or **BROKER:**

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)

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.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

Init.
/

AIA Document A312 – 2010 Performance Bond. Copyright © 2010. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 16:03:07 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1902522466)

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

§ 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

.1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

.2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

.3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

§ 4 Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

§ 5 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

§ 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

§ 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

§ 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

§ 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

§ 6 If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

AIA Document A312 – 2010 Performance Bond. Copyright © 2010. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 16:03:07 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1902522466)

§ 7 If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

.2 additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and

.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

§ 8 If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

§ 9 The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors and assigns.

§ 10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 11 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

§ 13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 14 Definitions

§ 14.1 Balance of the Contract Price. The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

§ 14.2 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

§ 14.3 Contractor Default. Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

§ 14.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 14.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

AIA Document A312 – 2010 Performance Bond. Copyright © 2010. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 16:03:07 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1902522466)

§ 15 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 16 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:	_____	Signature:	_____
Name and Title:		Name and Title:	
Address:		Address:	

AIA Document A312 – 2010 Performance Bond. Copyright © 2010. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 16:03:07 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1902522466)

AIA® Document A312® – 2010

Payment Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)
Parkway School District
455 North Woods Mill Road
Chesterfield, Missouri 63017
Telephone Number: 314-415-8100

CONSTRUCTION CONTRACT
Date:
Amount: $ 0.00
Description:
(Name and location)
432501B - WEM Cooling Tower and Chiller
Replacement West Middle School
2312 Baxter Road
Chesterfield, Missouri 63017
Bid No. 26-145

BOND
Date:
(Not earlier than Construction Contract Date)

Amount: $
Modifications to this Bond: ☐ None ☐ See Section 18

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	

(Any additional signatures appear on the last page of this Payment Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or **BROKER:**

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)

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.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

AIA Document A312 – 2010 Payment Bond. Copyright © 2010. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 16:08:47 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1462448751)

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

§ 2 If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

§ 4 When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

§ 5 The Surety's obligations to a Claimant under this Bond shall arise after the following:

§ 5.1 Claimants, who do not have a direct contract with the Contractor,

.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and

.2 have sent a Claim to the Surety (at the address described in Section 13).

§ 5.2 Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

§ 6 If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 5.1.1.

§ 7 When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

§ 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

§ 7.2 Pay or arrange for payment of any undisputed amounts.

§ 7.3 The Surety's failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

§ 8 The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 9 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

AIA Document A312 – 2010 Payment Bond. Copyright © 2010. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 16:08:47 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1462448751)

§ 10 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

§ 11 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 12 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 13 Notice and Claims to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

§ 14 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 15 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

§ 16 Definitions

§ 16.1 Claim. A written statement by the Claimant including at a minimum:

- **.1** the name of the Claimant;
- **.2** the name of the person for whom the labor was done, or materials or equipment furnished;
- **.3** a copy of the agreement or purchase order pursuant to which labor, materials or equipment was furnished for use in the performance of the Construction Contract;
- **.4** a brief description of the labor, materials or equipment furnished;
- **.5** the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
- **.6** the total amount earned by the Claimant for labor, materials or equipment furnished as of the date of the Claim;
- **.7** the total amount of previous payments received by the Claimant; and
- **.8** the total amount due and unpaid to the Claimant for labor, materials or equipment furnished as of the date of the Claim.

§ 16.2 Claimant. An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

§ 16.3 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

AIA Document A312 – 2010 Payment Bond. Copyright © 2010. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 16:08:47 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1462448751)

§ 16.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 16.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 17 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 18 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:	_____	Signature:	_____
Name and Title:		Name and Title:	
Address:		Address:	

AIA Document A312 – 2010 Payment Bond. Copyright © 2010. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 16:08:47 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1462448751)

SCHEDULE OF VALUES

APPLICATION AND CERTIFICATE FOR PAYMENT is attached.

Contractor's signed Off Site Stored Products Affidavits are attached as necessary.

In tabulations below, amounts are stated to the nearest dollar.

Use Column I on Contracts where variable retainage for line items may apply.

Application No.:
Application Date:
Period To:
Owner's Project No.:
Owner's Purchase Order No.:

A	B	C	D	E	F	G		H	I
			Work Completed			Total Completed And Stored To Date			
Item Number	Description of Work	Scheduled Value	D + E + F From Previous Application Period	This Period	Materials Presently Stored (not in D or E)	(D + E + F)	% Completed To Date (100 X G / C)	Balance To Finish (C - G)	Retainage
						$0.00	#DIV/0!	$0.00	
						$0.00	#DIV/0!	$0.00	
						$0.00	#DIV/0!	$0.00

APPLICATION AND CERTIFICATE FOR PAYMENT

TO: Parkway School District
Facilities Department
363 North Woods Mill Road
Chesterfield, Missouri 63017

FROM:
(Contractor)

Project:

Owner's Project No.:

Application No.:

Period To:

Owner's Purchase Order No.:

Contract Date:

CONTRACTOR'S APPLICATION FOR PAYMENT

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total combined Change Orders approved in previous months by Owner	$ -	$ -
Change Orders approved this period		
Number Date Approved		
	$ -	$ -
	$ -	$ -
	$ -	$ -
	$ -	$ -
CURRENT MONTH TOTALS	$ -	$ -
NET CHANGE BY CHANGE ORDERS……	$	-

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

CONTRACTOR _____

By: _____ Date: _____

Application is made for Payment, as shown below, in connection with the Contract Schedule of Values attached.

1. ORIGINAL CONTRACT SUM……	$ -
2. NET CHANGE BY CHANGE ORDERS……	$ -
3. CONTRACT SUM TO DATE (LINES 1 +/- 2)……	$ -
4. TOTAL COMPLETED AND STORED TO DATE (Column G on Schedule of Values)……	$ -
5. RETAINAGE:	
a. 0 % of Completed Work $ - (Columns D+E on Schedule of Values)	
b. 0 % of Stored Material $ - (Column F on Schedule of Values)	
c. TOTAL RETAINAGE…… (Line 5a+5b or total in column I on Schedule of Values)	$ -
6. TOTAL EARNED LESS RETAINAGE (Lines 4 less 5.c)……	$ -
7. LESS PREVIOUS CERTIFICATES FOR PAYMENT (Line 6 from prior certificate)……	$ -
8. CURRENT PAYMENT DUE (Lines 6 less 7)……	$ -
9. BALANCE TO FINISH, PLUS RETAINAGE (Lines 3 less 6)……	$ -

Stare of: _____ County of: _____

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

Notary Public: _____

My Commission Expires: _____

OWNER'S CERTIFICATE FOR PAYMENT

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

AMOUNT CERTIFIED TO PAY CONTRACTOR: $ _____

OWNER'S REPRESENTATIVE:

By: _____ Date: _____

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

Substance Abuse and Safety Program
Supplier/Vendor/Visitor Acknowledgement

I,_____, acknowledge and understand that a Substance Abuse and Safety Program is in effect on this job site and that I will be expected to abide by these job site rules.

I agree not to use, possess, sell or distribute alcoholic beverages, drugs, or drug paraphernalia, drug look-alikes, firearms, weapons, explosives, ammunition, or other prohibited items on this job site. I understand that violations will result in expulsion from this job site.

I understand my involvement in an accident or other circumstances may cause the Owner, Contractor or Subcontractor to require me to have urine, blood, or saliva drug and/or alcohol test as called for in the Program. While my cooperation is voluntary, I understand that failure to cooperate will result in expulsion from this job site. This document does not supersede other job site rules, but is in addition to them.

ACKNOWLEDGEMENT AND ACCEPTANCE:

Signature _____ Date_____

Print Name _____

Company _____

Contractor Information and Licensing Input Form

Parkway School District Refrigerant Management System

This form must be completed for each project performed by the Contractor and returned to Parkway School District. Enter the information requested in the boxes below. Complete all boxes. Enter "N/A" if the information requested is not applicable.

Company:			
Address 1:			
Address 2:			
Contact:			
Phone No.:		**Fax No.:**	
Owner's Project No.:			
Owner's Project Title:			
Project Start Date:		**Project Stop Date:**	

Enter the refrigerant technician certification information for each technician that will work on this project. Attach a copy of each technician's certificate.

Technician's Full Name	Certification Level	Certification Number

Service Order Form

Service ID: _____
Work Order #: _____
Date: Issued: _____ **Completed:** _____
Technicians: _____
_____
_____

Owner: _____
Facility: _____
Appliance ID: _____
Location: _____ **Model:** _____
Manufact: _____ **Serial #:** _____
Refrigerant Type: _____ **Charge:** _____ **lbs** _____ **oz**

Service Request

Service Description

☐ Confirm Charge ☐ Upgrades Installed ☐ Minor Maintenance Vacuum: _____
☐ Dispose of Unit ☐ Refrigerant Conversion ☐ Major Maintenance inches ☐ microns ☐

Refrigerant	Cylinder ID	Type	Condition	Quantity
Recovered				**Lbs** **oz**
				Lbs **oz**
				Lbs **oz**
	Recovery Unit ID # _____:			
Added				**Lbs** **oz**
				Lbs **oz**
				Lbs **oz**
	☐ **Startup Charge**		**Net Refrigerant Added:**	**Lbs** **oz**

Parts Used

Parts No	Description	Quantity

Material Notes

Total Hours on this Service: _____

Leaks
☐ Leak Found Date: _____
☐ Leak Repaired Date: _____
☐ Initial Leak Test Method: _____
☐ Follow-up Test Method: _____
☐ AQMD Leak Audit Date: _____

Leak Notes:

Trace Gas Used _____ Cylinder ID _____ Quantity _____ Lbs _____ oz

☐ Accidental Release Occurred

Description:

Estimated Amount Released _____ lbs _____oz

Oil Removed _____ gallons Type of Oil _____

Accumulation Drum # oil put In _____

Equipment Installation/Removal Input Form

Parkway School District Refrigerant Management System

Complete this form and return it to Parkway School District for each piece of equipment containing refrigerant that is removed or installed. Enter all the information requested in the form below. ***Complete page 1 for removal and complete page 1 and 2 for installation. Double outlined boxes are check boxes.***

REMOVAL ☐	**Removal Date**		**INSTALLATION** ☐	**Installation Date**	
Your Company Name			**Unit Field Tag Number**		
Technician's Name			**Unit Manufacturer**		
Building Name			**Unit Model Number**		
Owner's Project No			**Unit Serial Number**		
Owner's Project Name					
General Location:	Classroom ☐	Mechanical Room ☐	Rooftop ☐	Site ☐	
Detailed Equipment Location (Room No., Roof Area No., Etc.)					
EPA Approved Method Used to Determine Charge:	Measurement (Weight) ☐		Manufacturer's Data ☐		
Refrigerant Recovered From Equipment	Yes ☐		No ☐		
Equipment Tagged "Refrigerant Recovered"	Yes ☐		No ☐		

Refrigerant Charge (See Below):			**Refrigerant Type**						
Compressor 1		Lbs.		Ozs.	Compressor 2		Lbs.		Ozs.
Compressor 3		Lbs.		Ozs.	Compressor 4		Lbs.		Ozs.

Appliance Type (check one below)

☐	**Air Handling Unit; Cooling**	☐	**Freezer – Walk-in**
☐	**Chiller – Centrifugal**	☐	**Heat Pump**
☐	**Chiller – Reciprocating**	☐	**Ice Machine**
☐	**Chiller – Screw**	☐	**Refrigerated Air Dryer**
☐	**Condensing Unit/Unit Ventilator**	☐	**Refrigerator**
☐	**Edpac Unit (McKelvey)**	☐	**Roof Top Unit**
☐	**Electric Water Cooler**	☐	**Self Contained Unit Ventilator**
☐	**Food Case**	☐	**Walk-in cooler**
☐	**Freezer**	☐	**Window Unit**
☐	**Freezer – Stand Up**	☐	**Other (describe in notes below)**

Notes:

New Equipment Data (complete below for new installations)													
Duty Type:	Comfort		Under 50 Lbs.		Other Refrigeration								
Capacity Quantity		**Capacity Units:**	BTUH		Tons								
Lubricant		**Unit Voltage/Phase/Hertz**											
Comp. 1 Mfr.													
Serial Number		**Model No.**											
Pressure:	Head		Suction		**Amps:**	L1		L2		L3			
Comp. 2 Mfr.													
Serial Number		**Model No.**											
Pressure:	Head		Suction		**Amps:**	L1		L2		L3			
Comp. 3 Mfr.													
Serial Number		**Model No.**											
Pressure:	Head		Suction		**Amps:**	L1		L2		L3			
Comp. 4 Mfr.													
Serial Number		**Model No.**											
Pressure:	Head		Suction		**Amps:**	L1		L2		L3			
Supply Fan Mfr.													
Serial Number		**Model No.**											
Amps:	L1		L2		L3								
Return Fan Mfr.													
Serial Number		**Model No.**											
Amps:	L1		L2		L3								
Cond. Fan 1 Mfr.													
Serial Number		**Model No.**											
Amps:	L1		L2		L3								
Cond. Fan 2 Mfr.													
Serial Number		**Model No.**											
Amps:	L1		L2		L3								
Cond. Fan 3 Mfr.													
Serial Number		**Model No.**											
Amps:	L1		L2		L3								
Cond. Fan 4 Mfr.													
Serial Number		**Model No.**											
Amps:	L1		L2		L3								

SECURITY BADGE & OSHA 10 HOUR CONSTRUCTION SAFETY & HEALTH TRAINING LOG

Parkway Project Number _____

The undersigned certify that they have obtained a security badge from the Owner's security office and that they have successfully completed the OSHA 10 Hour Safety Training program pursuant to Section 292.675 RSMo and understand that they shall carry the issued security badge and documentation of successful completion of the OSHA 10 Hour Safety Training program at all times while working on the Project site.

Print Name	Signature	First Date On Site	Company	Owner's Security Badge Number	OSHA 10 Hour Training Certification Number

DIVISION OF LABOR STANDARDS

MISSOURI DEPARTMENT OF LABOR AND INDUSTRIAL RELATIONS

AFFIDAVIT
COMPLIANCE WITH THE PREVAILING WAGE LAW

I, _____, upon being duly sworn upon my oath state that: (1) I am the
(Name)

_____ of _____; (2) all requirements of
(Title) *(Name of Company)*

§§ 290.210 to 290.340, RSMo, pertaining to the payment of wages to workers employed on public works projects have been fully satisfied with regard to this company's work on _____;
(Name of Project)

(3) I have reviewed and am familiar with the prevailing wage rules in 8 CSR 30-3.010 to 8 CSR 30-3.060; (4) based upon my knowledge of these rules, including the occupational titles set out in 8 CSR 30-3.060, I have completed full and accurate records clearly indicating (a) the names, occupations, and crafts of every worker employed by this company in connection with this project together with an accurate record of the number of hours worked by each worker and the actual wages paid for each class or type of work performed, (b) the payroll deductions that have been made for each worker, and (c) the amounts paid to provide fringe benefits, if any, for each worker; (5) the amounts paid to provide fringe benefits, if any, were irrevocably made to a fund, plan, or program on behalf of the workers; (6) these payroll records are kept and have been provided for inspection to the authorized representative of the contracting public body and will be available, as often as may be necessary, to such body and the Missouri Department of Labor and Industrial Relations; (7) such records shall not be destroyed or removed from the state for one year following the completion of this company's work on this project; and (8) there has been no exception to the full and complete compliance with the provisions and requirements of Annual Wage Order No. _____ Section _____ issued by the Missouri Division of Labor Standards and applicable to this project located in _____ County, Missouri, and completed on the ____ day of _____, _____.

The matters stated herein are true to the best of my information, knowledge, and belief. I acknowledge that the falsification of any information set out above may subject me to criminal prosecution pursuant to §§290.340, 570.090, 575.040, 575.050, or 575.060, RSMo.

_____
Signature

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

My commission expires _____, _____.

_____
Notary Public

_____
Receipt by Authorized Public Representative

Missouri Department of Labor and Industrial Relations is an equal opportunity employer/program.

AFFIDAVIT
RECORD DOCUMENT COMPLETION

Before me, the undersigned Notary Public, in and for the County of _____, in the State of _____, personally came and appeared (Name), _____-(Title)_____ of the (Name of Company)_____ (a corporation)(a partnership)(a proprietorship) and after being duly sworn did depose and say that the Record (Drawings)(Specifications) have been marked-up in the Owner's electronic document management system with all known as-constructed variations from the Bid Documents, with the exception of those variations officially issued in the form of sketches, drawings, or specification changes by the Architect and Owner through Supplemental Instructions, Change Directives, or Change Orders, which variations have been completed by the Architect in the performance of their contractual services to the Owner, as required in the Specifications for the Project known as:

(Owner's Project Number)_____

(Project Title)_____

(Project Facility Name)_____

Signature: _____ Date: _____

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

My commission expires _____ , _____

Notary seal and signature:

ASBESTOS AND LEAD BASED PAINT
NOTIFICATION TO CONTRACTORS
At
Parkway School District
Building: #, *Name of Building/School*
Address of Building/School
Address of Building
Date

Contact Name
Name of Contractor
Address
Address

Dear *Contact Name*:

As a contractor for the Parkway School District (PSD), your employees and subcontractors have access to and will be working in the PSD building (*School Name*) All PSD buildings, except for Early Childhood North, Southwest Middle and Oakbrook Elementary contain some amount of asbestos containing building materials. All Parkway School District Buildings built in or previous to 1978 were tested for the presence of lead based paint. In compliance with U.S. Environmental Protection Agency asbestos notification requirements (40 CFR 763.84), and the Lead Renovation Repair and Painting Rule (40 CFR 745) the PSD is submitting this notification package to *Name of Contractor*. Attached is the *Name of Building/School* asbestos and lead based paint information package for you to review with your employees and subcontractors prior to beginning work in *Name of Building/School*. The asbestos materials identified in this notification are for interior building materials only. Exterior and inaccessible building materials may not have been sampled or identified as asbestos or lead containing. Should exterior or hidden suspect building materials be encountered, work in this area should not begin until additional sampling and materials identification is performed by PSD. This package includes asbestos and lead based paint summary sheet(s) for *Name of Building/School* and the Contractor Notification Signature Sheet that must be signed by all *Name of Contractor* personnel and subcontractor personnel that will be working at *Name of Building/School*. Each employee must sign the signature sheet to be able to conduct work in the buildings. Employees are required to sign signature sheet only one time.

Asbestos & Lead Based Paint Notification
Name of Contractor
Name of Building/School
Date

Asbestos and lead based paint materials denoted on the asbestos and lead based paint summaries are not to be disturbed. Only Certified Lead Renovators can perform work with lead based paint using approved renovation, repair and painting practices. If your employees should discover any disturbed asbestos containing materials or lead based paint; or if they disturb these materials while they are in the building; all work must stop and *Name of Contractor* must notify me (573-201-5067) immediately. Additional notification must be made to the district construction supervisor or maintenance supervisor that manages the project. If your employees discover a material that they are unsure of its asbestos or lead based paint content, they must not disturb it without authorization form PSD.

Original signed signature sheets must be submitted to the District Construction Supervisor on a weekly basis. Copies of the signature sheet may be made as needed for each successive week. A copy of the signature sheet and the asbestos and lead based paint material summaries must be available on site during any work within a specific building so that *Name of Contractor* employees, subcontractor employees, and PSD can review them at any time. PSD reserves the right to review these documents when *Name of Contractor* employees or subcontractors are working in a building. If these documents are not available, or *Name of Contractor* personnel working in the building have not signed the signature sheet, PSD can stop work until the required documents and signatures are available. If you have any questions concerning the asbestos and lead based paint summary sheets or the contractor notification signature sheets that we have included in this package please call me at 314-415-8260.

Stephanie Kline-Tissi, ASP
Safety Manager, District Operations
Parkway School District
Phone: 314-415-8260
24-Hour Emergency Number: 314-415-8200

CONTRACTOR NOTIFICATION OF ASBESTOS AND LEAD BASED PAINT CONTAINING BUILDING MATERIALS

Retain Copy in Asbestos Files

Month Ending Date: _____

Company Name: _____*Name of Contractor*_____.

Parkway Building: _____*Name of Building/School*_____

Name & Title of
Company Representative: _____*Name of Contact*_____

Type of Work to be Performed: *Type of Work to be Performed* Bid No. *Project #*

I have reviewed the Asbestos information for *Name of Building/School* and have been advised of the types and locations of asbestos materials that I may potentially come into contact with while performing my work. I have been given the opportunity to review the Asbestos Management Plan for this facility, if requested. I will perform my work without disturbing the asbestos containing materials or will inform the Construction Supervisor and the Asbestos Program Manager if unable to do so. In such case, the Asbestos Program Manager will give instructions as required prior to any work that may potentially disturb asbestos-containing materials. If asbestos-containing materials are inadvertently disturbed or if disturbed materials are discovered, work will cease immediately, and the Construction Supervisor and Safety Manager, Stephanie Kline-Tissi (573-201-5067) will be contacted. The Construction or Maintenance Supervisor managing the project will also be contacted if the Parkway supervisor is not available.

COMPANY NAME	**PRINTED NAME & SIGNATURE**	**DATE**
_____	_____	_____
	_____	
_____	_____	_____
	_____	

Asbestos & Lead Based Paint Notification
Name of Contractor
Name of Building/School
Date

COMPANY NAME	PRINTED NAME & SIGNATURE	DATE

CERTIFICATION OF VISUAL INSPECTION

Project Number: _____ Project Name: _____

Building Name: _____

Building Owner: _____

Specific Area: _____

In accordance with customary work practices, the Contractor hereby certifies that he has visually inspected the work area (all surfaces including pipes, beams, ledges, walls, ceiling and floor, decontamination unit, sheet plastic, etc.) and has found no dust, debris, or residue.

By: (Signature) _____ Date: _____

(Print Name) _____ Title: _____

Company Name: _____

OWNER REPRESENTATIVE'S COMPLETION OF VISUAL INSPECTION __ Pass __Fail

The Owner's Representative has performed a visual inspection in accordance with ASTM E1368-14 and hereby verifies that he has visually inspected the work area (all surfaces including pipes, beams, ledges, walls, ceiling and floor, decontamination unit, sheet plastic, etc.) and has found no dust, debris, or residue.

___ The contractor will apply a lock down encapsulant and clearance will be ran when dry

___ Lockdown encapsulation is not being applied - clearances to be ran now

Clearance sampling to be performed: __ Visual Inspection Only __ In-Progress __ TEM __ PCM-5 __ PCM-2

Comments: _____

_____

_____

By: (Signature) _____ Date: _____

(Print Name) _____ Time: _____

Ameren MISSOURI | BizSavers

Business Energy Efficiency Programs

2026 STANDARD INCENTIVES PROGRAM

The BizSavers program offers several standard measures that can take your energy savings even further. These measures include VFDs, rooftop HVAC units, air cooled chillers, among many more. Incentive amounts are predetermined and paid on a per-unit basis. These HVAC equipment upgrades are incentivized based on the amount of energy saved and must receive pre-approval prior to purchase or installation.

To get started with a Standard Pre-Approval project, contact the BizSavers team or learn more at AmerenMissouri.com/GetStarted.

BUILDING CONDITIONING

Chillers [1, 2, 3, 4, 5, 6]

Inefficient Equipment Condition/ Equipment	Efficient Equipment	Incentive
Baseline IPLV: 0.88 kW/ton	High-Efficiency Air-Cooled (AC) Chiller	$167 Per Ton
Baseline IPLV: 0.54 kW/ton	High-Efficiency Water-Cooled (WC) Chiller	$58 Per Ton

- IPLV_base: AC Chiller Baseline IPLV assumes the 13.7 EER Minimum Requirement for < 150 ton unit.
- WC Chiller Baseline IPLV assumes the 0.54 kW/ton Minimum Requirement for 150-300 ton WC Chiller.

Controls [7]

Inefficient Equipment Condition/ Equipment	Efficient Equipment	Incentive
Space with no demand control capability	Demand Controlled Ventillation (Electric Heat)	$0.57 Per Controlled Sq. Ft
	Demand Controlled Ventillation (Gas Heat)	$0.18 Per Controlled Sq. Ft
	Demand Controlled Ventillation (Heat Pump)	$0.32 Per Controlled Sq. Ft
Constant speed supply fan on packaged heating and cooling equipment	Advanced RTU Controls	$1500 Per HP

Heat Pumps [8]

Inefficient Equipment Condition/ Equipment	Efficient Equipment	Incentive
12.1 EER	GSHP Retrofit	$80 Per HP
13.4 SEER2	ASHP <65kBTUh	$108 Per Ton
13.9 IEER	ASHP ≥65kBTUh and <135 kBTUh	$110 Per Ton
13.3 IEER	ASHP ≥135kBTUh and <240 kBTUh	$153 Per Ton
12.3 IEER	ASHP >240kBTUh	$214 Per Ton
12.2 EER	WSHP <17 kBTUh	$120 Per Ton
13 EER	WSHP ≥17 kBTUh and <65 kBTUh	$130 Per Ton
13 EER	WSHP ≥65kBTUh and <135 kBTUh	$140 Per Ton

High Volume Fans [9]

Inefficient Equipment Condition/ Equipment	Efficient Equipment	Incentive
Multiple non-high volume low speed fans	High Volume Low Speed Fan, 16	$700 Per Fan
	High Volume Low Speed Fan, 18	$1,100 Per Fan
	High Volume Low Speed Fan, 20	$1,450 Per Fan
	High Volume Low Speed Fan, 22	$1,850 Per Fan
	High Volume Low Speed Fan, 24	$2,200 Per Fan

Unitary AC/DX [4, 5, 6, 8]

Inefficient Equipment Condition/ Equipment	Efficient Equipment	Incentive
13.4 SEER2	Single Package or Split System Unitary AC/DX <65kbtu	$149 Per Ton
14.6 IEER	Single Package or Split System Unitary AC/DX 65 -135kbtu	$102 Per Ton
14.0 IEER	Single Package or Split System Unitary AC/DX 135 - 240kbtu	$117 Per Ton
13.0 IEER	Single Package or Split System Unitary AC/DX 240 - 760kbtu	$175 Per Ton
11.0 IEER	Single Package or Split System Unitary AC/DX >760kbtu	$10 Per Ton

Variable Frequency Drives (VFDs) [10, 11, 12, 13]

Inefficient Equipment Condition/ Equipment	Efficient Equipment	Incentive
No VFD Installed	VFD on Chilled Water Pump >=1HP	$270 Per HP
	VFD on Condenser Water Pump >= 1HP	
	VFD on Cooling Tower Fan >= 1HP	$350 Per HP
	VFD on Hot Water Pump >= 1HP	$250 Per HP
	VFD on HVAC Fans >= 1HP	$200 Per HP

COMPRESSED AIR

Air Nozzle

Inefficient Equipment Condition/ Equipment	Efficient Equipment	Incentive
Inefficient Air Nozzle	Compressed Air Nozzle (Reciprocating - Load/Unload)	$100 Per Nozzle
	Compressed Air Nozzle (Reciprocating - On/off Control)	
	Compressed Air Nozzle (Screw - Inlet Modulation w/ blowdown)	
	Compressed Air Nozzle (Screw - Inlet Modulation)	
	Compressed Air Nozzle (Screw - Load/Unload)	
	Compressed Air Nozzle (Screw - Variable Displacement)	
	Compressed Air Nozzle (Screw - VFD)	

No Loss Drain

Inefficient Equipment Condition/ Equipment	Efficient Equipment	Incentive
Open Valve or Timer Condensate Drain	No Loss Condensate Drain (Reciprocating - Load/Unload)	$240 Per Drain
	No Loss Condensate Drain (Reciprocating - On/off Control)	
	No Loss Condensate Drain (Screw - Inlet Modulation w/ Unloading)	
	No Loss Condensate Drain (Screw - Inlet Modulation)	
	No Loss Condensate Drain (Screw - Load/Unload)	
	No Loss Condensate Drain (Screw - Variable Displacement)	
	No Loss Condensate Drain (Screw - VFD)	

VSD Compressor

Inefficient Equipment Condition/ Equipment	Efficient Equipment	Incentive
Constant speed air compressor	VSD Air Compressor 5-40 HP	$120 Per HP
Constant speed air compressor	VSD Air Compressor >40-<50 HP	
Constant speed air compressor	VSD Air Compressor 50-200 HP	$107 Per HP

COOKING

Demand Control Ventilation

Inefficient Equipment Condition/ Equipment	Efficient Equipment	Incentive
Kitchen ventilation with constant speed motor	Kitchen Demand Ventilation Controls, Retrofit	$450 Per HP

- System should include installation of a new temperature sensor in the hood exhaust collar and/or a an optic sensor on the end of the hood that senses cooking conditions which allows the system to automatically vary the rate of exhaust to what is needed by adjusting the fan speed accordingly

Hot Food Holding Cabinet

Inefficient Equipment Condition/ Equipment	Efficient Equipment	Incentive
Non-ENERGY STAR equivalent size unit	ENERGY STAR Hot Holding Cabinet (0 < V <13)	$75 Per Cabinet
	ENERGY STAR Hot Holding Cabinet (13 ≤ V <28)	$350 Per Cabinet
	ENERGY STAR Hot Holding Cabinet (28 ≤ V)	$530 Per Cabinet

Steam Cooker

Inefficient Equipment Condition/ Equipment	Efficient Equipment	Incentive
Non-ENERGY STAR equivalent size unit	3 Pan ENERGY STAR Steam Cooker	$900 Per Cooker
	4 Pan ENERGY STAR Steam Cooker	$980 Per Cooker
	5 Pan ENERGY STAR Steam Cooker	$1,000 Per Cooker
	6 Pan ENERGY STAR Steam Cooker	$1,200 Per Cooker

POOL PUMP

Pool Pump with VFD [10, 11, 12, 13]

Inefficient Equipment Condition/ Equipment	Efficient Equipment	Incentive
Pool pump with no VFD installed	Pool Pump w/ Variable Frequency Drive	$134 Per HP

REFRIGERATION

Anti-Sweat Heater Controls

Inefficient Equipment Condition/ Equipment	Efficient Equipment	Incentive
Non-ENERGY STAR equivalent size unit	Anti-Sweat Heater Controls Freezer	$90 Per Controller
	Anti-Sweat Heater Controls Refrigerator	$65 Per Controller

Vertical Closed Freezers and Refrigerators

Inefficient Equipment Condition/ Equipment	Efficient Equipment	Incentive
Non-ENERGY STAR equivalent size unit	0 < V < 15 - Vertical Closed - Glass Door Freezer	$105 Per Freezer
	15 ≤ V < 30 - Vertical Closed - Glass Door Freezer	$210 Per Freezer
	30 ≤ V < 50 - Vertical Closed - Glass Door Freezer	$360 Per Freezer
	V ≥ 50 - Vertical Closed - Glass Door Freezer	$570 Per Freezer
	15 ≤ V < 30 - Vertical Closed - Solid Door Freezer	$90 Per Freezer
	30 ≤ V < 50 - Vertical Closed - Solid Door Freezer	$160 Per Freezer
	V ≥ 50 - Vertical Closed - Solid Door Freezer	$300 Per Freezer
	0 < V < 15 - Vertical Closed - Solid Door Refrigerator	$35 Per Refrigerator

Horizontal Closed Refrigerators

Inefficient Equipment Condition/ Equipment	Efficient Equipment	Incentive
Non-ENERGY STAR equivalent size unit	Horizontal Closed - Solid Door Refrigerator - All Volumes	$85 Per Refrigerator
	Horizontal Closed - Glass Door Refrigerator - All Volumes	$50 Per Refrigerator

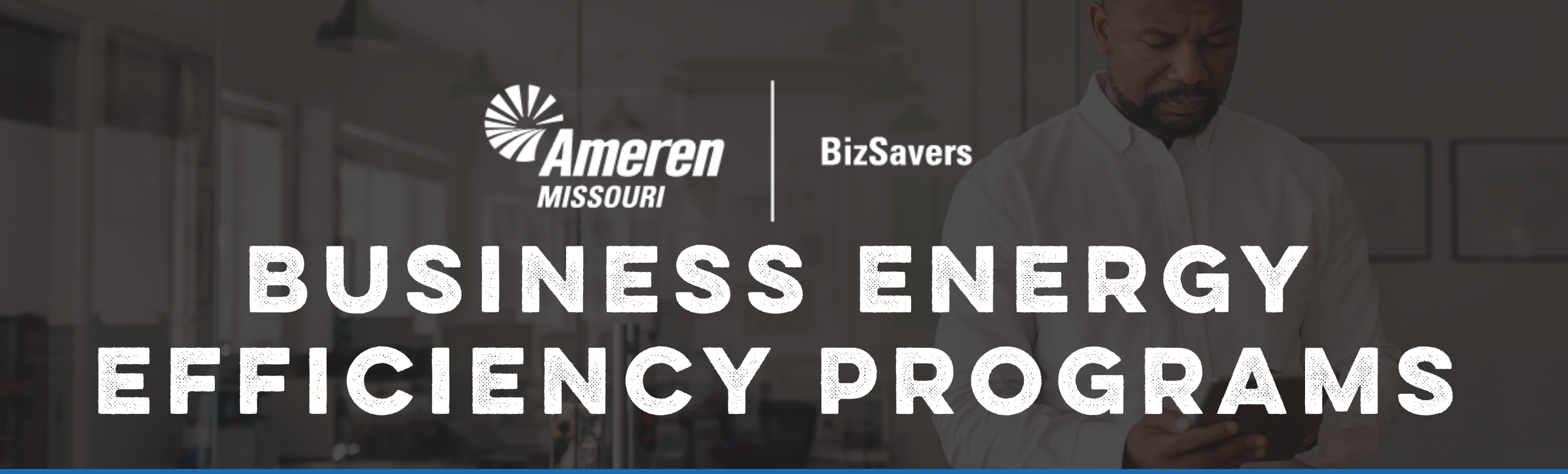
WATER HEATING

Heat Pump

Inefficient Equipment Condition/ Equipment	Efficient Equipment	Incentive
Electric resistance commercial water heater	Heat Pump Water Heater 2.9-14.6 kW (10 to 50 MBH)	$1,400 Per Heater
	Heat Pump Water Heater 14.7-29.3 kW (50 to 100 MBH)	$3,500 Per Heater
	Heat Pump Water Heater 29.4-87.9 kW (100 to 300 MBH)	$9,000 Per Heater
	Heat Pump Water Heater 88-146.5 kW (300 to 500 MBH)	$19,000 Per Heater
	Heat Pump Water Heater >146.6 kW (above 500 MBH)	$25,000 Per Heater
	Heat Pump Water Heater ≤55 gal, medium draw	$220 Per Heater
	Heat Pump Water Heater >55 gal and ≤ 120 gal, medium draw	$360 Per Heater

PROGRAM GUIDELINE NOTES:

1. "High Efficiency" is considered a unit more efficient than IECC 2018.
2. All chiller measures are intended for single chiller systems (back-up chillers will not qualify).
3. To qualify for the chiller measure, the chiller must be able to serve 100% of the zone's cooling load.
4. Equipment being replaced must be less than or equal to the inefficient equipment baseline.
5. Tons are defined as the Net Cooling Capacity of a unit.
6. In the case where the HVAC equipment is not replacing an existing unit, the higher of the inefficient equipment baseline in the table above or local code baseline will be used.
7. Advanced Roof Top Controls must integrate air-side economization, supply-fan speed control (by installing a variable speed drive), and demand controlled ventilation. This measure is for retrofit of an existing HVAC unit.
8. EER = Full Load Efficiency, IEER = Part Load Efficiency
9. HVLS fan must have VFD.
10. Existing motor must not already have a VFD.
11. System must have a variable or reduced load.
12. In systems with lead/lag setups or redundant equipment, the number of VFDs incented cannot exceed the number of motors needed to perform the work.
13. Installation to have necessary control points and parameters.



Ameren MISSOURI | BizSavers

BUSINESS ENERGY EFFICIENCY PROGRAMS

2026 CUSTOM INCENTIVES PROGRAM

The Ameren Missouri BizSavers® program provides Custom Incentives for energy-efficient equipment that is not eligible for Standard Incentives. Custom Incentives are calculated based on the estimated annual energy savings of the proposed energy efficiency measures. Some of the most popular Custom Incentive projects include air compressor upgrades, building control systems and chiller upgrades. Customers must provide calculations quantifying energy savings and all equipment purchases must receive pre-approval prior to purchase and installation to qualify for Custom Incentives. Visit **AmerenMissouri.com/GetStarted** for more details on starting your project.

End Use (Savings Type)	Unit of Measure	Incentive Per Unit
Cooling	kWh reduced	35¢
Building Shell	kWh reduced	24¢
HVAC	kWh reduced	29¢
Cooking	kWh reduced	15¢
Water Heating	kWh reduced	15¢
Facility – Grow Conditioning	kWh reduced	16¢
Lighting Controls	kWh reduced	16¢
Compressed Air	kWh reduced	13¢
Miscellaneous	kWh reduced	12¢
Motors	kWh reduced	12¢
Process	kWh reduced	12¢
Refrigeration	kWh reduced	12¢

Start saving today at AmerenMissouri.com/GetStarted.

Project Information Form

This Project Information Form is provided to assist in defining the asbestos abatement scope of work and to convey information necessary for the abatement contractor to prepare a proposal. This document is intended as a supplement to the contract documents and does not supersede, nor relieve the contractor of, its obligations and responsibilities under applicable federal, state, and local regulations, or the requirements identified in the Project Manual.

BID DUE DATE / TIME: See invitation to bid
PROJECT TITLE: Parkway West Middle School – Cooling Tower & Chillers Replacement

Today's Date: June 16, 2026 **Drawings Attached:** Yes, included in Project Manual



Megan Kienker
Missouri Accredited Project Designer #7118073025MOPDI21662

1. INTRODUCTION

This project has been designed by an Asbestos Hazard Emergency Response Act (AHERA) accredited and State of Missouri licensed asbestos project designer.

This Asbestos Abatement Project Information Form has been prepared to comply with applicable regulatory requirements, including the U.S. Environmental Protection Agency (EPA) Asbestos National Emission Standards for Hazardous Air Pollutants (NESHAP), 40 CFR Part 61, Subpart M**,** the Asbestos Hazard Emergency Response Act (AHERA**),** 40 CFR Part 763**,** the Missouri Department of Natural Resources (MDNR), and the St. Louis County Asbestos Abatement Rules and Regulations.

2. SCOPE OF WORK

The Scope of Work includes the proper abatement and disposal of all asbestos-containing materials (ACM) as noted in the project documents and additional abatement and disposal of these materials necessary to facilitate changes in the scope of work should they occur.

The scope of work includes the proper removal, cleanup, and disposal of the following approximate quantities of asbestos:

- 12 each of pipe insulation fittings in Mechanical Room 1601
- 40 linear feet of exterior caulking around the louver outside of Mechanical Room 1601

The above quantities are estimates only. The Asbestos Abatement Contractor is responsible for field verifying quantities and site conditions.

3. CONTAINMENT

It is anticipated that negative pressure glovebags will be utilized for the removal of pipe fitting insulation in Mechanical Room 1601. The containment/work area for this work will be defined by installing barrier tape and drop cloths. Additionally, a localized washing station will be installed near the work area. Once abatement is completed and a visual inspection has been conducted by Parkway's representative, the

Contractor will encapsulate the exposed pipe. It should be noted that there is one (1) damaged pipe fitting insulation that is included in the Scope of Work. The containment/work area will consist of barrier tape, one (1) layer of 6-mil polyethylene drop cloth, a localized negative air machine, negative pressure glovebags, and proper signage at all entries.

It is anticipated that a regulated area will be utilized for the removal of exterior louver caulking. A critical barrier will be installed on the interior side of the louver opening, which includes a door entry. Additionally, drop cloths will be installed on the interior and exterior side of the louver opening. The Contractor will salvage the louver and return to Parkway. Additionally, the Contractor will install a plywood hard barrier at the louver opening for security purposes. The containment/work area will consist of a critical barrier on the inside of the louver opening, one (1) layer of 6-mil polyethylene drop cloth, localized negative air machines, barrier/warning tape, and proper signage.

HEPA-filtered negative air machines will be exhausted to the exterior, where possible, via windows (which shall have a plywood barrier installed for security purposes, if necessary. Proper signage, barrier tape, etc. shall be installed at all entrance/exit locations to the work areas.

There may be electrical, mechanical, plumbing, low-voltage/data, or fire alarm systems that serve areas outside the Scope of Work or are intended to remain in service. The Contractor shall protect all such systems. The Contractor shall provide temporary power panel(s) for its use, if required, and shall inform Parkway of the panel's electrical requirements. Parkway will perform connection and disconnection of power to the temporary panel(s); the Contractor shall provide all required cabling. Advance notice is required, preferably a minimum of 48 hours.

Access to water shall be coordinated between the Contractor and Parkway.

After completion of the removal work and clean-up, the Contractor shall request a visual inspection from Parkway's representative. Phase Contrast Microscopy (PCM) in-progress clearance samples will be utilized for final clearance air samples in each containment/work area.

4. SCHEDULE

Timing is very important for this project so that renovation activities may proceed. A 10-day notification may be required for this project. The Contractor is responsible for submitting the notification to the St. Louis County Department of Health, including waiver requests, if necessary.

Multiple Shifts Allowed: Yes: **X** No: ____ Extended Shifts: _____

It is the Contractor's responsibility to include in its bid all overtime and/or shift differential premium costs necessary to perform the Work within the time scheduled established in the Project Manual. No claims for overtime or shift differential premium costs required to perform the Work as specified in the bid documents will be allowed. This provision does not apply to claims associated with changes to the Contract Documents issued after award of the Contract.

5. CLEARANCE SAMPLING

TEM (Minimum 6-hour Turnaround after receipt acknowledged by laboratory) Yes: ____ No: **X**
(Whenever asbestos quantities exceed 160 sf or 260 lf)

PCM In-Progress (Project Specific – Minimum 2-hour Turnaround) *(At Consultant's discretion)*	Yes: **X**	No:
PCM (Minimum 6-hour Turnaround after receipt acknowledged by laboratory)	Yes:	No: **X**

6. WORKER PROTECTION

All workers entering the work areas shall wear, at a minimum, disposable suits and 1/2 mask respirators equipped with HEPA filters. When leaving the work area for any reason, all workers shall perform proper decontamination procedures. All applicable NESHAP, OSHA, State, and local requirements shall be strictly followed.

7. MINIMUM REGULATED AREA REQUIREMENTS

These minimum requirements do not supersede applicable regulations.

- **Mechanical Room 1601:** Glovebag – Barrier tape, negative pressure glovebags, 6-mil polyethylene drop cloths, washing station, localized HEPA-filtered negative air machine vented outside, and proper signage.
- **Mechanical Room 1601 Louver Opening:** Regulated Area – Critical barrier, barrier tape, 6-mil polyethylene drop cloths (interior and exterior), localized HEPA-filtered negative air machine vented outside, and proper signage. If approved as an outdoor abatement by St. Louis County, the HEPA-filtered negative air machine is not needed.

8. DISPOSAL

The Contractor shall label all bags, drums, closed top poly-lined lockable dumpsters, box trucks, and any and all other waste containers in accordance with AHERA, OSHA, Department of Transportation, the National Emission Standards for Hazardous Air Pollutants (NESHAP) issued by USEPA, and any other regulations pertaining to the disposal of asbestos-containing materials and/or debris. Waste Shipment Records shall be prepared and maintained in accordance with NESHAP and any State or local regulations governing the disposal of asbestos. These Waste Shipment Records shall be signed legibly by all required parties. All asbestos-containing material and wastes shall be disposed of at a landfill authorized to accept such wastes. The Waste Manifest shall identify the grid area where the asbestos from this Project is disposed.

9. ADDITIONAL INFORMATION

Special Health and Safety Concerns:

Confined Space		Hot Work (Fire Watch)	
Heat Stress / Stroke	**X**	Electrical – Lock & Tag	
Heights / Fall Protection	**X**	Chemical	
Parkway Approved Solvents *(Attack 2000, MA-22, MA-24)*		Other:	

Special Requirements:

All contractor personnel must have completed OSHA 10 or 30-hour training and have a current badge issued by Parkway prior to arriving onsite. If the Contractor uses solvents to abate mastic, they must use on of the approved solvents listed above. The Contractor shall secure openings with lumber where negative air machine exhaust tubing exits building.

Coordination:

Other contractors working in the area?	Yes:	_____	No:	**X**

Other contractors will be working simultaneously throughout the facility.

Coordination with other contractors required?	Yes:	_____	No:	**X**

Comments:

The Contractor shall perform asbestos abatement work in accordance with this Project Information Form (PIF), the Asbestos Abatement Drawings assembled on June 16, 2026, the Project Manual for Parkway West Middle School Cooling Tower & Chillers Replacement Project 432501B, the Bond Architects, Inc. reference drawings titled West Middle School – Cooling Tower and Chillers Replacement, and all Addenda issued.

The Contractor is advised that if it identifies any condition that it believes constitutes a change or addition to the Scope of Work that may require additional compensation, the Contractor shall notify Parkway School District immediately by email, but no later than twenty-four (24) hours after discovery of the condition.

The Contractor shall document, photograph, and promptly notify Parkway's Representative of any pre-existing damage observed within or adjacent to the work areas prior to the start of work. The Contractor may be held responsible for damages identified after completion of the work that were not documented before work commenced.

The photographs included are representative and are provided to illustrate the work and/or work areas and provide the Contractor with additional information.

The Contractor shall have an authorized representative available to attend a pre-construction meeting and for weekly progress meetings following the commencement of work.

10. CLOSEOUT DOCUMENTATION

The abatement contractor shall submit the following documentation to the Owner's Representative prior to beginning preparatory activities and at the end of the project and prior to final payment:

Contract Administration

A. Contractor's Name and Address
B. Contractor's Proof of Missouri State Registration
C. Notification to MDNR/St. Louis County along with the approval letter, if required
D. Insurance Certificates

Project Summary

A. Locations and Quantities of the Work performed
B. Dates when the work was performed
C. Methods used to complete the work (Work Plan)
D. Name of Contractor's Supervisor
E. Name and Missouri Certifications of all Supervisors and Workers
F. Supervisors' and Workers' Medicals and Certificates of Acknowledgement
G. Respirator fit tests for all Supervisors and Workers
H. Contractor's daily log report
I. Enclosure entry/exit log
J. Fully executed Waste Manifest(s), landfill receipts and Chain of Custody
K. Air monitoring results

The items listed in the Contract Administration section and items D, E, F and G in the Project Summary section must be reviewed prior to beginning work on this project. Any supervisor(s) or worker(s) not having this documentation will not be allowed to work on this project until such documentation is provided to the on-site representative.

The Abatement Contractor’s project closeout documentation must be submitted to Owner’s Consultant no later than 45 days after the last date worked by Abatement Contractor at the subject project site.

Parkway West Middle School – Cooling Tower & Chiller Replacement
Abatement Scope of Work Photographs
Pinchin File No. R262.00457.000
Location: 2313 Baxter Road, Chesterfield, MO 63017

Photograph 1



Abate approximately 11 asbestos-containing pipe fittings above the current Chiller. View facing east.

Photograph 2



Abate approximately 11 asbestos-containing pipe fittings above the current Chiller. View facing west.

Parkway West Middle School – Cooling Tower & Chiller Replacement
Abatement Scope of Work Photographs
Pinchin File No. R262.00457.000
Location: 2313 Baxter Road, Chesterfield, MO 63017

Photograph 3



Abate approximately 11 asbestos-containing pipe fittings above the current Chiller.

Photograph 4



Abate damaged asbestos-containing pipe fitting.

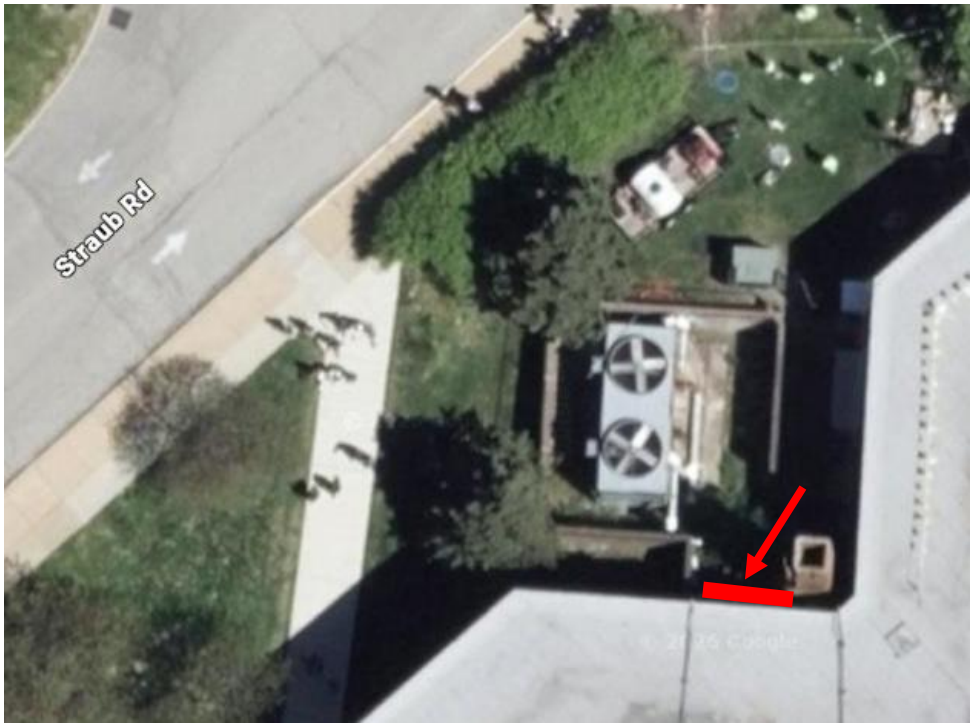
Parkway West Middle School – Cooling Tower & Chiller Replacement
Abatement Scope of Work Photographs
Pinchin File No. R262.00457.000
Location: 2313 Baxter Road, Chesterfield, MO 63017

Photograph 5



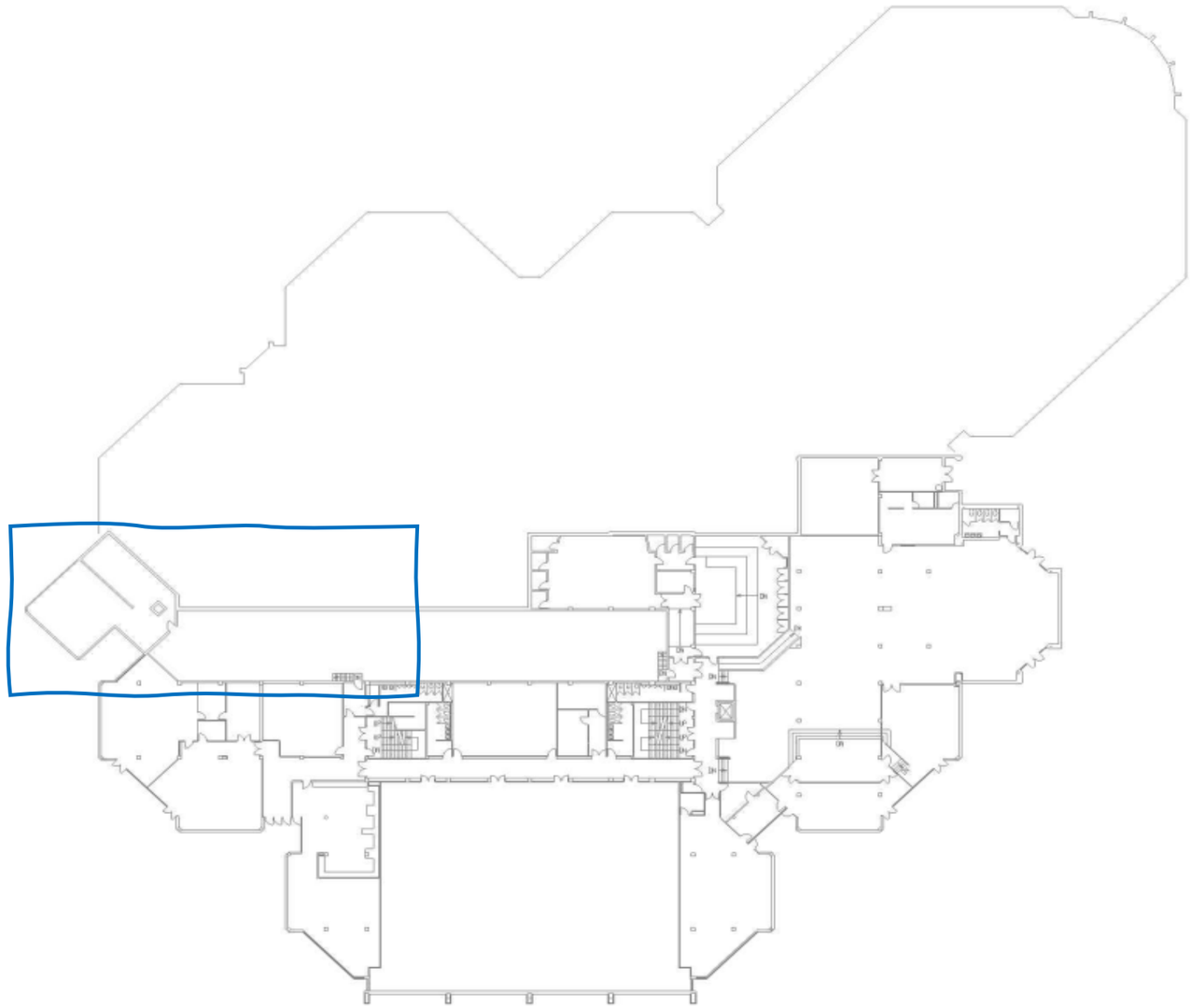
Abate approximately 40 linear feet of asbestos-containing exterior louver caulking.

Photograph 6



Location of the louver with exterior caulking.

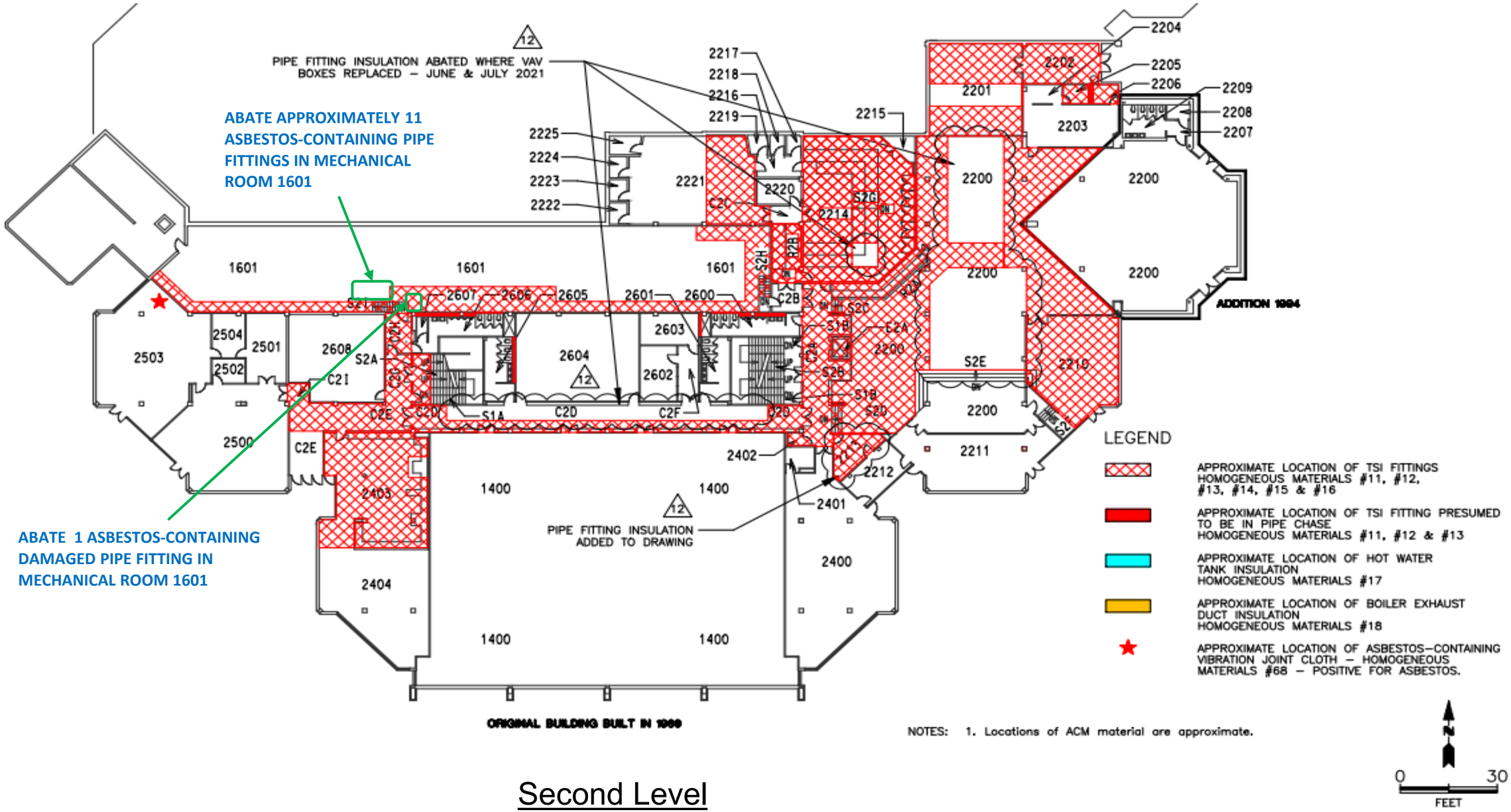
= ABATEMENT AREA



Second Level

Not to Scale

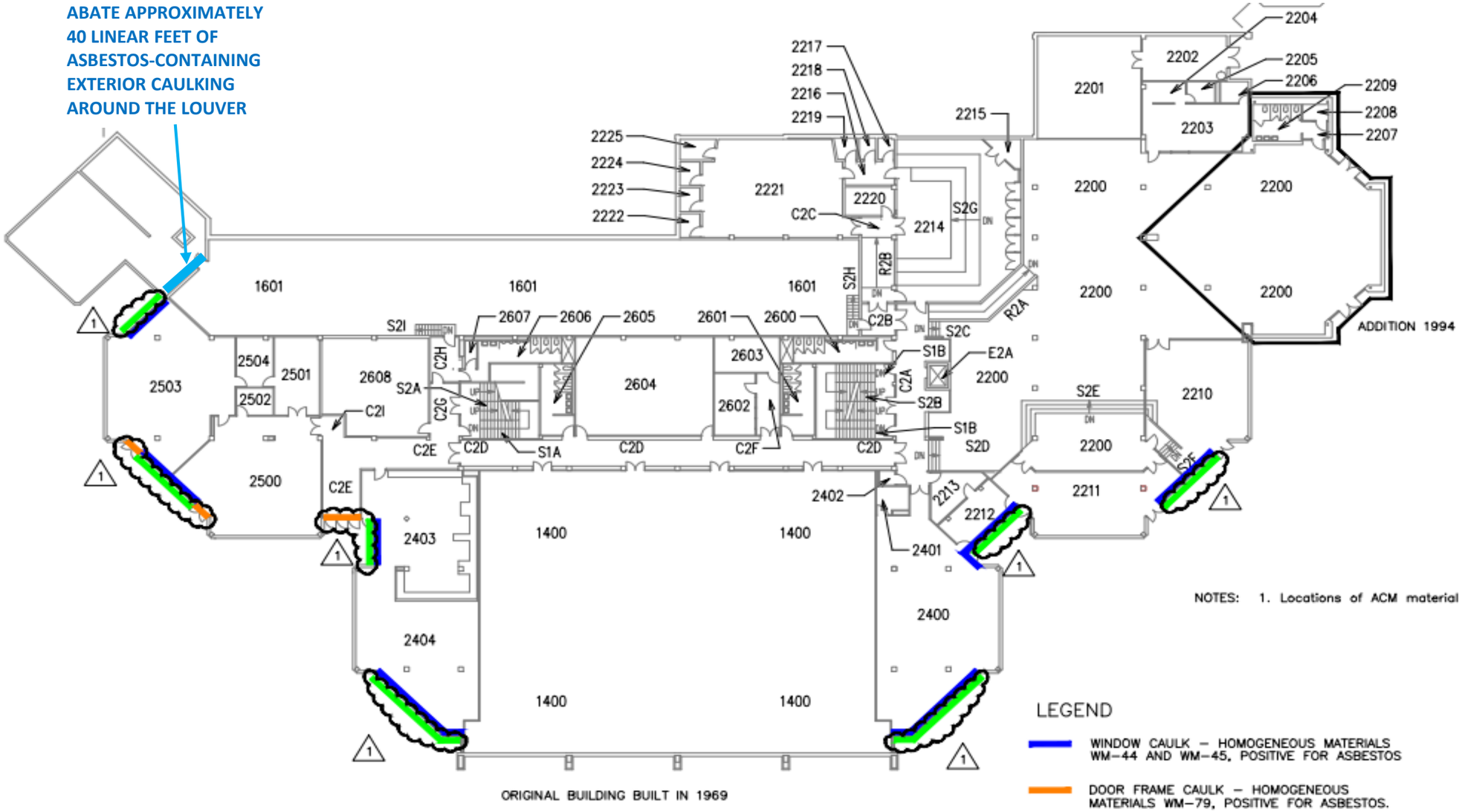
PINCHIN	Bond Architects - Parkway School District Parkway West Middle School 2312 Baxter Road Chesterfield, Missouri 63017	Pinchin File No.: R262.00457.000 Asbestos Abatement Drawings Date: June 16, 2026 Drawn by: MKSK



Second Level

PINCHIN	Bond Architects - Parkway School District Parkway West Middle School 2312 Baxter Road Chesterfield, Missouri 63017	Pinchin File No.: R262.00457.000 Asbestos Abatement Drawings - Thermal System Insulation Date: June 16, 2026 Drawn by: MKSK

ABATE APPROXIMATELY
40 LINEAR FEET OF
ASBESTOS-CONTAINING
EXTERIOR CAULKING
AROUND THE LOUVER



Not to Scale

Second Level

PINCHIN	**Bond Architects - Parkway School District** **Parkway West Middle School** **2312 Baxter Road** **Chesterfield, Missouri 63017**	**Pinchin File No.: R262.00457.000** **Asbestos Abatement Drawings - Caulk** **Date:** **Drawn by:** **June 16, 2026** **MKSK**

SECTION 007200
GENERAL CONDITIONS

PART 1 GENERAL

1.01 FORM OF GENERAL CONDITIONS

A. The General Conditions applicable to this contract is attached at the end of this document.

1.02 RELATED DOCUMENTS

A. Document 005200 - Agreement Form.

B. Section 014216 - Definitions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 007200

AIA® Document A201® – 2017

General Conditions of the Contract for Construction

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

432501B - WEM Cooling Tower and Chiller Replacement West Middle School
2312 Baxter Road
Chesterfield, Missouri 63017
Bid No. 26-145

THE OWNER:
(Name, legal status and address)

Parkway School District
455 North Woods Mill Road
Chesterfield, Missouri 63017
Telephone Number: 314-415-8100

THE ARCHITECT:
(Name, legal status and address)

Bond Architects
222 South Central Avenue; Suite 501
St. Louis, Missouri 63105
Telephone Number: 314-863-4994

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.

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

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

13 MISCELLANEOUS PROVISIONS

14 TERMINATION OR SUSPENSION OF THE CONTRACT

15 CLAIMS AND DISPUTES

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. “The American Institute of Architects,” “American Institute of Architects,” “AIA,” the AIA Logo, and “AIA Contract Documents” are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

INDEX
(Topics and numbers in bold are Section headings.)

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
Building Permit
3.7.1
Capitalization
1.3
Certificate of Substantial Completion
9.8.3, 9.8.4, 9.8.5

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

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
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

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

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

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

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**

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

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
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

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

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

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

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

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

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, ***expertise,*** 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***,*** the Architect's consultants***, and any other design professionals retained by the Owner for the Project*** under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

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

§ 1.1.9 Hazardous Materials

Hazardous Materials are those materials or substances regulated as a hazardous substance, hazardous material, toxin, pollutant, or hazardous waste under applicable federal, state, or local laws, ordinances, rules, or regulations governing the protection of human health or the environment.

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

§ 1.2 Correlation and Intent of the Contract Documents

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

§ 1.2.1.1 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**,** the Architect's consultants***, and any other design professionals retained by the Owner for the Project*** shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, 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 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 ***certified or registered*** mail, by courier ***providing proof of delivery***, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 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 ***electronic transmission to the centralized electronic document management system***.

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

§ 1.7 Digital Data Use and Transmission
The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance
Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, 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 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Not used. **§ 2.2.2** Not used. **§ 2.2.3** Not used. **§ 2.2.4** Not used.

(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 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 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 ***upon Contractor's written request for such information***. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but ***only after the Contractor diligently reviews such surveys and notifies the Owner of any discrepancies or problems observed by the Contractor. The Contractor*** shall exercise proper precautions relating to the safe performance of the Work ***when relying upon Owner supplied surveys***.

§ 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 ***reasonably necessary which are*** 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.

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish ***free of charge*** to the Contractor ***up to twenty (20) copies*** of the Contract Documents. ***Additional copies will be furnished upon request by the Contractor at the cost of reproduction, postage, and handling.***

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is ***defective or otherwise*** 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 ***or fails to supply sufficient skilled labor, suitable materials, or appropriate equipment***, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 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 ten-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 default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior ***written*** approval of the Architect. ***In such case, an appropriate Change Order shall be issued*** to reimburse the Owner for 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 current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity ***lawfully licensed or registered as a Contractor in St. Louis County, Missouri and the State of Missouri and*** 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.

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

§ 3.2.2.1 In all cases where the Work abuts or interconnects with existing or other work, Contractor shall verify at the site all grades, elevations, locations, or dimensions relating to such existing or other work. Any errors in the Work due to Contractor's failure to verify all such grades, elevations, locations, or dimensions shall be promptly rectified at Contractor's sole cost, without any additional cost to the Owner.

§ 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, subject to Section 15.1.7, 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 ***Owner and*** Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the ***Owner or*** 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.

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

§ 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 ***Owner or*** 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

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

§ 3.6.2 As set forth in 144.030RSMo and 144.062RSMo, Contractors who purchase materials and/or supplies for the purpose of construction, repairing, or remodeling facilities for the Owner are exempt from paying sales tax on those materials and/or supplies. The official state tax exemption certificate will be furnished to the Contractor by the Owner.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 ***The Owner shall secure and pay the building permit from St. Louis County, Missouri or the local municipality, whichever has jurisdiction, the building permit from the local Fire District, and the permit and connection fees required by the Metropolitan St. Louis Sewer District, as applicable. The Contractor will be required to pick up the permits from the government agencies. The Contractor will be reimbursed by the Owner for the actual direct cost of these permits without any additional costs except for a reasonable amount of project management time required to pick up the permits. The*** Contractor shall secure and pay for ***any*** other permits, fees, licenses, and inspections by government agencies necessary for proper execution, completion***, and occupancy*** of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

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

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

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than ***7*** 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. ***The Contractor's failure to advise the Owner and the Architect of such concealed conditions within 7 days of discovery by the Contractor or any party claiming under the Contractor shall preclude the Contractor's right to seek costs related to such conditions.*** 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.

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

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

§ 3.8 Allowances

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,

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

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

§ 3.9 Superintendent

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

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the ***Owner*** may notify the Contractor, stating whether the Owner (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the ***Owner*** to provide notice 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 has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the ***Owner's*** approval. The ***Owner's*** approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect ***and the Owner*** 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.

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

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

§ 3.10.4 Whenever it becomes apparent from the latest schedule or otherwise that any completion date on the original schedule, subject to adjustment as provided under the Contract Documents, may not be met, the Contractor shall take some or all of the following actions at no additional cost to the Owner to put the Project back on schedule: (1) increase construction manpower in such quantities as will eliminate the backlog of work; (2) increase the number of working hours per shift, shifts per working day, working days per week, or the amount of construction equipment, or a combination of the aforesaid, which will substantially eliminate the backlog of work; (3) reschedule activities to achieve maximum practical accomplishment of activities. If the Contractor fails to take any of the above within seventy-two (72) hours after receiving written notice from the Owner or Architect of the slip in schedule, the Owner may, but shall not be obligated, to take action to attempt to put the Project back on the original schedule, subject to the adjustments permitted hereunder, and deduct the cost of such actions from the Contract Sum.

§ 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, ***illustrations,*** 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 ***and the Owner*** is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect ***and the Owner are*** 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 ***and the Owner*** without action.

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

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

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

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

§ 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 ***and the Owner's*** approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect ***and the Owner*** of such deviation at the time of submittal and (1) the Architect ***and the Owner have*** 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 ***and the Owner'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 ***and the Owner*** on previous submittals. In the absence of such notice, the Architect's ***and the Owner'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 be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. ***Such design professionals shall obtain and maintain through their provisions of Work under this Agreement, professional errors and omissions liability insurance in the amount of two million dollars ($2,000,000) per claim and three million dollars ($3,000,000) in the aggregate.*** 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 and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect ***and the Owner*** will review and 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.

§ 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 ***and the Owner*** at the time and in the form specified by the Architect ***and the Owner***.

§ 3.13 Use of Site

The Contractor shall confine operations ***and the storage of materials and equipment*** 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.

§ 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

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

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 ***continuously*** 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.

§ 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.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located. ***Other representatives of the Owner, such as testing agencies and governmental agencies shall have access to the project at reasonable times for their observation, inspection, and testing. The Contractor will provide proper and safe conditions for such access.***

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

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

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The 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.

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

§ 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 ***Owner approves*** the final ***Application*** 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.

§ 4.2.4 Communications

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

§ 4.2.5 Not used***.***

§ 4.2.6 The Architect***, in consultation with the Owner,*** has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect***, in consultation with the Owner,*** 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 concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the ***Owner*** or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

precautions or 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 ***assist the Owner in preparing*** 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***, made with the concurrence of the Owner,*** on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

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

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or 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, 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 ***Owner*** may notify the Contractor whether the Owner (1) has objection to any such proposed person or entity or (2) requires additional time for review. Failure of the ***Owner*** to provide notice within the 14-day period shall constitute notice of no objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner has made 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 objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner has no objection. If the proposed but rejected Subcontractor was reasonably

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 ***The Contractor shall not change the initial list of Subcontractors approved by the Owner without written approval.*** The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner makes 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. ***Subcontractors shall be required, unless otherwise agreed to in writing by the Owner, to carry the same types and amounts of insurance as the Contractor, and shall name the Owner, Architect, and Architect's consultants as additional insured with respect to the Project.*** Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

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

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

§ 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.

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each ***Owner's*** 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, ***the Owner's*** Separate Contractors, and the Owner until subsequently revised ***and agreed to by the Owner***.

§ 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 Owner and*** 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.

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

§ 7.2 Change Orders

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

.1 The change in the Work;

.2 The amount of the adjustment, if any, in the Contract Sum; and

.3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the ***Owner or*** Architect ***or both*** and ***approved*** by the Owner***, Contractor,*** 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 ***preparing a proposal for*** the change in the Work involved and advise the ***Owner*** of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.6.1 The Contractor shall promptly proceed with the change in the Work described in the Construction Change Directive only if the Contractor is explicitly directed to proceed in the Construction Change Directive.

§ 7.3.6.2 If the Construction Change Directive does not contain an explicit direction to proceed, the Contractor shall promptly proceed with the change in the Work only upon receipt of a Change Order that references the Construction Change Directive.

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

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

§ 7.3.10 When the Owner***, Architect,*** and Contractor agree 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 ***Owner*** 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***, in consultation with the Owner*** 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 the Owner*** 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. ***The date of commencement of the Work shall not be changed by the effective date of such insurance.***

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

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

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

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

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 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 Not used.

§ 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 ***Owner*** 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 ***Owner***. This schedule, unless objected to by the ***Owner***, 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 ***Owner*** and supported by such data to substantiate its accuracy as the ***Owner*** may require, and unless objected to by the ***Owner***, 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 ***Owner*** 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 ***may*** 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 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the ***Owner***, but not yet included in Change Orders.

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

§ 9.3.1.3 The Owner will not withhold retainage on account of progress payment provided the Contractor shall have met identified target dates in the Contractor's CPM network analysis schedule for the Project.

§ 9.3.1.4 The Owner reserves the right to withhold retainage on account of progress payments in the amount not to exceed five percent (5%) of the total completed and stored to date amount as identified in the Application for Payment if the Contractor has not met identified target dates in the Contractor's CPM network analysis schedule for the Project.

§ 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.

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

§ 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.

§ 9.4 Certificates for Payment

§ 9.4.1 The ***Owner*** will, within seven days after receipt of the Contractor's Application for Payment, either ***approve the Application for Payment*** or withhold ***the*** Application for Payment, and notify the Contractor of the ***Owner's*** reason for withholding certification in whole ***or in part*** as provided in Section 9.5.1.

§ 9.4.2 ***Not used.***

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The ***Owner*** may withhold ***an Application*** for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the ***Owner's*** opinion the ***Work has not progressed to the point indicated or quality of the Work is not in accordance with the Contract Documents***. If the ***Owner*** is unable to ***approve*** payment in the amount of the Application ***for Payment***, the ***Owner*** will notify the Contractor as provided in Section 9.4.1. If the Contractor and ***Owner*** cannot agree on a revised amount, the ***Owner*** will promptly issue ***an Application*** for Payment for the amount for which the ***Owner*** is able to ***approve***. The ***Owner*** may also withhold ***an Application*** for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of ***an Application*** for Payment previously issued, to such extent as may be necessary in the ***Owner'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; or
- **.7** repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When ***the Contractor*** disputes the ***Owner's*** decision regarding ***an Application*** for Payment under Section 9.5.1, in whole or in part, ***the Contractor*** may submit a Claim in accordance with Article 15.

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

§ 9.5.4 If the ***Owner*** withholds ***an Application*** 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 Contractor ***and the Contractor*** shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

§ 9.6.1 ***The*** Owner shall make payment ***on an approved Application for Payment*** in the manner and within the time provided in the Contract Documents.

§ 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.

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

§ 9.6.3 The ***Owner*** 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 ***An Application for*** Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

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

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend**,** indemnify***, and hold harmless*** the Owner ***as provided in Section 3.18 for*** 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

If the ***Owner*** does not ***approve an Application*** for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount ***approved*** by the ***Owner*** or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner ***and the Owner's failure to cure such a delinquent payment within the seven (7) day period***, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

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

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

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

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

§ 9.8.3.1 If the Architect's and the Owner's inspection discloses and item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents, but does not preclude the Owner from occupying or utilizing the Work or designated portion thereof for its intended use, then the Architect shall append the items to the list prepared by the Contractor. The appended list of items to be completed or corrected prior to final payment shall be attached to the Certificate of Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the ***Owner*** 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 ***and fix the value of the amount of retainage to be withheld until the Contractor shall finish all items*** on the list ***of items to be completed or corrected prior to final payment*** 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.

§ 9.8.4.1 Warranties required by the Contract Documents shall commence on the date of acceptance by the Architect and the Owner for any items on the list of items to be completed or corrected prior to final payment.

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

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

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

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance, the ***Owner*** will promptly make such inspection. When the ***Owner*** finds the Work acceptable under the Contract Documents and the Contract fully performed, the ***Owner*** will promptly ***approve the*** final ***Application*** for Payment ***upon receipt. If the Owner does not find the Work acceptable or completed, the Owner shall notify the Contractor of the details in which the inspections reveal that the Work is incomplete or defective. The Contractor shall immediately take such measures as are necessary to complete the Work or remedy the incomplete or defective Work.***

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the ***Owner*** (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, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers'

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor, and 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 ***Owner*** 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.

§ 9.11 Liquidated Damages and Incentives

§ 9.11.1 Because the Owner has scheduled use of the completed project, time is an essential and material factor of this Agreement. Failure to complete the work on or before the date of Substantial Completion will subject the Owner to loss and damage. Since the measure of such loss or damage is not readily ascertainable, it is hereby established that the loss according to the Owner from any failure on the part of the Contractor to date shall be liquidated and fixed at sum of $N/A per calendar day or portion of day that the work remains incomplete past the date of Substantial Completion in accordance with the terms of this Agreement.

§ 9.11.2 The Owner shall reward the Contractor for early completion of the project before the date of Substantial Completion at the sum of $N/A per calendar day up to a sum that shall not exceed $N/A.

§ 9.11.3 The Contractor agrees that this is a reasonable amount for liquidated damages due to delays and is not a penalty. Owner may deduct this sum from any sum that may be due to the Contractor.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

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

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable ***and necessary*** 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.

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

§ 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.

§ 10.2.4.1 When use or storage of explosives, hazardous materials, equipment, or unusual methods are necessary, the Contractor shall give the Owner advance notice and shall receive written approval from the Owner for such use or storage.

§ 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. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

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

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

§ 10.2.8 Injury or Damage to Person or Property

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

§ 10.3 Hazardous Materials and Substances

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

§ 10.3.1.1 The Owner will notify the Contractor prior to beginning the Work of the location for known asbestos containing materials and lead containing materials within the limits of the Work. The Contractor shall be required to notify all of the Contractor's employees, Subcontractors, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable that may come in contact with asbestos containing materials and lead containing materials within the limits of the Work. Information presented to the Contractor by the Owner identifying the location for all known asbestos containing materials and lead containing materials within the limits of the Work shall be displayed prominently at the work site for all workers to review.

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

§ 10.3.1.2 Prior to being allowed on the work site, the Contractor's employees, Subcontractors, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable that may come in contact with the asbestos containing materials and lead containing materials shall be required to sign an acknowledgement form indicating that they have been informed of the presence and location for all known asbestos containing materials and lead containing materials and that the known asbestos containing materials and lead containing materials shall not be disturbed in any manner.

§ 10.3.1.3 The Contractor shall indemnify and hold harmless the Owner for any disturbance of the disclosed known asbestos containing materials and lead containing materials by the Contractor's employees, Subcontractors, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable that may come in contact with the asbestos containing and lead containing materials under the Contractor's obligations in Section 3.18. Failure to fulfill the Contractor's requirements under Section 10.3.1.2 shall not relieve the Contractor of obligations under this Section10.3.1.3 or Section 3.18

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

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

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

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

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

§ 10.4 Emergencies

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

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The 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 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 Owner 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.

§ 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 delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. 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 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

§ 11.3 Waivers of Subrogation
§ 11.3.1 ***There are no waivers of subrogation.***

§ 11.3.2 Not used.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance
The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss.
§11.5 Adjustment and Settlement of Insured Loss
§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 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 14 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. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. 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.

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. During the one-year period for correction of Work, if the Owner fails***, after discovery of the condition*** to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

correction by the Contractor and to make a claim for breach of warranty. ***The waiver of the rights by the Owner to require correction of non-conforming work and make a claim for breach of warranty by the Contractor is not applicable to non-conforming work discovered after the one year period, but within statutory limitation period provided by law.*** If the Contractor fails to ***commence and continue correction of such*** nonconforming Work ***with diligence and promptness*** within ***the ten-day 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.

§ 12.2.2.3 ***A new*** one-year period for correction of Work shall ***exist for all corrective work performed by the Contractor pursuant to this Section 12.2, but such a new one-year period shall apply only to the specific item, component, or system corrected.***

§ 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 Missouri.

§ 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.

§ 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.

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

§ 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 acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the ***Owner and*** Architect timely notice of when and where tests and inspections are to be made so that the ***Owner and*** Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 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 ***Owner*** will, upon written authorization, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the ***Owner and*** Architect of when and where tests and inspections are to be made so that the ***Owner and*** Architect 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 ***Owner and*** Architect.

§ 13.4.5 If the ***Owner and*** Architect ***are*** to observe tests, inspections, or approvals required by the Contract Documents, the ***Owner and*** 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 ***governed by the law of the state of Missouri.***.

§ 13.6 Equal Opportunity

§ 13.6.1 The Contractor shall maintain policies of employment as follows:

§ 13.6.1.1 The Contractor and the Contractor's Subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, or national origin. The Contractor shall take affirmative action to insure that applicants are employed, and that employees are treated during employment without regard to their race, religion, color, sex, or national origin. Such action shall include, but not be limited to: employment, promotions, demotions, transfers, recruitment, recruitment advertising, layoffs, terminations, rates of pay or compensation, and selection of training, including apprenticeships. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the policies of non-discrimination.

§ 13.6.1.2 The Contractor and the Contractor's Subcontractors shall, in all solicitations or advertisements for employees placed by them or on their behalf, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex, or national origin.

§ 13.7 Domestic Products Procurement

§ 13.7.1 The Owner encourages Contractors and Subcontractors to purchase or lease products manufactured, assembled, or produced in the United States when providing goods and services to the Owner.

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

§ 13.7.2 As set forth in 171.181 RSMo, the Owner will give preference to commodities manufactured, mined, produced, or grown within the state of Missouri and will give preference to all firms, corporations, or individuals doing business as Missouri firms, corporations, or individuals when quality and price are approximately the same.

§ 13.8 Americans with Disabilities Act

§ 13.8.1 The Owner is bound by and complies with the Americans with Disabilities Act (ADA). The Owner has designated the following individual to oversee the ADA requirements for the Owner: John Blanton, Manager of Planning and Construction Services, 314-415-8289.

§ 13.9 Alternative Dispute Resolution

§ 13.9.1 Alternative Dispute Resolution (ADR) methodologies will be encouraged in place of more formal dispute resolution procedures. ADR will assist in promoting and maintaining an amicable working relationship between parties. ADR is to be a voluntary, non-binding procedure available for use by the parties to this Contract to resolve any dispute that may arise during performance of the Work.

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
- **.4** The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 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 ***authorized*** Work ***properly*** 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 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 reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

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 Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

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.

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the ***time period specified by the laws of the state of Missouri.***

§ 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 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 under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 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.

§ 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. ***The Contractor shall make allowance in the Contract Time and schedule for 10 adverse weather condition days. Claims for additional costs or time extensions due to adverse weather conditions will not be entertained until after these 10 adverse weather condition days have been claimed and resolved according to Section 15.2***

§ 15.1.7 Waiver of Claims for Consequential Damages

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

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

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

This mutual waiver excludes

.1 damages incurred by the Owner or Contractor as the result of either party's gross negligence or willful misconduct, and

.2 damages incurred by the Owner or Contractor covered by insurance in accordance with requirements as outlined in Article 11.

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 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 ***litigation*** 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 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 binding dispute resolution.

§ 15.2.6 Not used.

§ 15.2.6.1 Not used.

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

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

§ 15.3 Mediation

§ 15.3.1 ***Binding mediation will not be allowed under this Contract as a method to resolve any claim, dispute or other matter in question arising out of or related to this Contract.*** Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to ***non-binding alternative dispute resolution methods or by*** binding dispute resolution.**§ 15.3.2** The parties shall endeavor to resolve their Claims, ***disputes, or other matter in question arising out of or related to the Contract*** by ***non-binding alternative dispute resolution methods.*** A request for ***non-binding alternative dispute***

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

resolution methods shall be made in writing, delivered to the other party to the Contract. The request may be made concurrently with the filing of binding dispute resolution proceedings.

(Paragraph deleted)
§ 15.3.3 ***Not used.***

§ 15.3.4 ***Not used.***
§ 15.4 Arbitration
§ 15.4.1 ***Arbitration will not be allowed under this Contract as a method to resolve any Claim, dispute or other matter in question arising out of or related to this Contract.***

§ 15.4.1.1 ***Not used.***

§ 15.4.2 ***Not used.***

§ 15.4.3 ***Not used.***

§ 15.4.4 ***Not Used***
§ 15.4.4.1 ***Not used.***

§ 15.4.4.2 ***Not used.***

§ 15.4.4.3 ***Not used.***

§ 15.5 Binding Dispute Resolution
§ 15.5.1 Any unresolved controversy or claim arising out of or related to the contract, or the breach thereof, shall be settled by litigation in accordance with the laws of the state of Missouri, except controversies or claims relating to aesthetic effect as provided in Section 4.2.13 and except those waived as provided for in Sections 9.10.4, and 9.10.5, and 15.1.7. Such controversies or claims upon which the Initial Decision Maker has given notice and rendered a decision as provided in Section 15.2.5 shall be subject to litigation.

§ 15.5.2 Any litigation shall be filed in the Circuit Court of St. Louis County in the state of Missouri.

AIA Document A201 – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017. All rights reserved. "The American Institute of Architects," "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are trademarks of The American Institute of Architects. This document was produced at 15:59:58 ET on 07/08/2026 under Order No.3104239559 which expires on 12/31/2026, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail docinfo@aiacontracts.com.
User Notes: (1363694150)

SECTION 011000
SUMMARY

PART 1 GENERAL

1.01 PROJECT

A. Project Name: WEM Cooling Tower & Chiller Replacement

B. Owner's Name: Parkway School District.

C. Architect's Name: Bond Architects.

D. The Project consists of the construction of Abatement of ACM materials, replacement of cooling tower, chillers, and all necessary supporting systems addressed in the drawings. Enlarging of existing mechanical courtyard retaining wall, yard drainage, and concrete sitework for the installation of a new ice storage system..

1.02 CONTRACT DESCRIPTION

A. Contract Type: A single prime contract based on a Stipulated Price as described in Document 005200 - Agreement Form.

1.03 DESCRIPTION OF ALTERATIONS WORK

A. Scope of demolition and removal work is indicated on drawings and specified in Section 024100.

B. Scope of alterations work is indicated on drawings.

C. Plumbing: Alter existing system and add new construction, keeping existing in operation.

D. HVAC: Replace existing system with new construction, keeping existing in operation until ready for changeover.

E. Electrical Power and Lighting: Alter existing system and add new construction, keeping existing in operation.

1.04 WORK BY OWNER

A. Owner will award a contract for supply of HVAC Units listed in Mechanical Schedule which will commence on July, 2026.

1.05 OWNER OCCUPANCY

A. Owner intends to continue to occupy adjacent portions of the existing building during the entire construction period.

B. Owner intends to occupy the Project upon Substantial Completion.

C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

D. Schedule the Work to accommodate Owner occupancy.

1.06 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas noted on Drawings.
   1. Locate and conduct construction activities in ways that will limit disturbance to site.

B. Arrange use of site and premises to allow:
   1. Owner occupancy.
   2. Work by Others.
   3. Work by Owner.
   4. Use of site and premises by the public.

C. Provide access to and from site as required by law and by Owner:
   1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
   2. Do not obstruct roadways, sidewalks, or other public ways without permit.

D. Existing building spaces may not be used for storage.

E. Time Restrictions:
   1. Limit conduct of especially noisy exterior work to the hours of 7:00am to 11:00pm.
   2. No heavy vehicle traffic allowed during student drop-off or pick up times .

F. Utility Outages and Shutdown:
   1. Limit disruption of utility services to hours the building is unoccupied.
   2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
   3. Prevent accidental disruption of utility services to other facilities.

1.07 WORK SEQUENCE

A. Coordinate construction schedule and operations with Owner.

END OF SECTION 011000

SECTION 012000
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

B. Documentation of changes in Contract Sum and Contract Time.

C. Change procedures.

D. Correlation of Contractor submittals based on changes.

E. Procedures for permit, municipal surety bonds, and utility connection fee reimbursements.

F. Procedures for preparation and submittal of application for final payment.

1.02 RELATED REQUIREMENTS

A. Section 005000 - Contracting Forms and Supplements: Forms to be used.

B. Section 005200 - Agreement Form: Contract Sum, retainages, payment period, monetary values of unit prices.

C. Section 007200 - General Conditions: Additional requirements for progress payments, final payment, changes in the Work.

D. Document 012100 - Allowances: Payment procedures relating to allowances.

E. Section 012200 - Unit Prices: Monetary values of unit prices; Payment and modification procedures relating to unit prices.

F. Section 017800 - Closeout Submittals: Project record documents.

1.03 SCHEDULE OF VALUES

A. Format: Submit required information either in typewritten form or on electronic media printout.
   1. Form is included in Section 006000.
   2. A blank electronic form for electronic media printout is provided on the Owner's electronic document management system - Forms & Standards tab - Project Forms Library table.

B. Forms filled out by hand will not be accepted.

C. Submit initial Schedule of Values within 28 days after date of Owner-Contractor Agreement to Owner's electronic document management system - Project Contracts tab - Submittal .
   1. Owner Review: After review by Owner, revise and resubmit corrected Schedule of Values within 7 days. Continue process until Owner accepts Schedule of Values in conformance with requirements of this section.
   2. Owner will not process Applications for Payment until Schedule of Values is approved.

D. Content: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section.
   1. Include separate line items for each of the following:
      a. Bonds.
      b. Insurance.
      c. General requirements.
      d. Overhead and profit.
      e. Record documents at 3 percent of Contract Sum.
      f. The amount of each Allowance identified in Section 012100.
         1) Draw down each Allowance only by authorized Change Orders issued against the Allowance.
   2. Round off figures to nearest one hundred dollars.
   3. Make sum of total costs of all items listed in Schedule of Values equal to Contract Sum.

E. Revise schedule to list approved Change Orders with each Application For Payment.

1.04 MONTHLY CASH FLOW PROJECTION

1.05 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.

B. Format: Submit required information either in typewritten form or on electronic media printout.
   1. Form is included in Section 006000.
   2. A blank electronic form for electronic media printout is provided on the Owner's electronic document management system - Forms & Standards tab - Project Forms Library table.

C. Forms filled out by hand will not be accepted.

D. Execute certification by signature of authorized officer.

E. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.

F. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.

G. Submit two copies of each Application for Payment to the Owner.
   1. Transmittal letter as specified for submittals in Section 013000.
   2. Include the following with the application:
      a. Two copies of updated Schedule of Values supporting Application for Payment.
      b. One copy of certified payroll forms for all Contractor and Subcontractor employees working on the Project Site during payment period.
      c. Once copy of construction progress schedule, revised and current as specified in Section 013000.
         1) Alternatively Contractor may submit progress schedule to Owner's electronic document management system - Project Contracts tab - Miscellaneous Documents Table no earlier than 5 days prior to submission of the Application for Payment and include a note stating such with the Application for Payment.
      d. One copy of partial release of liens from major Subcontractors and vendors beginning with second Application for Payment.
      e. Two copies of affidavits attesting to off-site stored products, if any.

H. When Owner requires substantiating information, submit data justifying dollar amounts in question.
   1. Substantiating information shall include actual vendor price quotes to Contractor.

I. Incorrect or incomplete Applications for Payment:
   1. Owner will promptly return to Contractor with a written description of which documents are incorrect or incomplete.
   2. If, in the opinion of the Owner, the incorrectness or incompleteness of the Application for Payment is minor in character, then the Owner will contact the Contractor to discuss the corrections necessary, make the corrections, and send a corrected copy of the Application for Payment to the Contractor to expedite the approval process.

1.06 MODIFICATION PROCEDURES

A. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in Contractor's employ or Subcontractors of changes to the Contract Documents.

B. Supplementary Instructions: Owner will issue a supplementary instruction prepared by the Architect for minor changes not involving an adjustment to the Contract Sum or Contract Time.
   1. Supplementary instructions will be issued through the Owner's electronic document management system.
   2. Supplementary instructions will be stored in the Owner's electronic document management system - Project Contracts tab - Supplementary Instructions table for this Project.

C. Owner Initiated Changes: Owner will issue a Change Directive document that includes a detailed description of a proposed change with, if necessary, supplementary or revised drawings and specifications, proposed method of price quotation, and proposed change in Contract Time for executing the change . Contractor shall prepare and submit a price quotation within 7 days.
   1. Execution of Change Directives:
      a. Change Directives will be issued through the Owner's electronic document management system.
      b. Approved Change Directives will be stored in the Owner's electronic document management system - Project Contracts tab - Change Requests table for this Project.
      c. Architect and Contractor shall review the Change Directive and:
         1) If in agreement with the proposed methods for changing the Contract Sum or Contract Time, the Architect and Contractor shall approve the Change Directive no later than 2 work days from receipt.
         2) If not in agreement with the proposed methods for changing the Contract Sum or Contract Time, Architect or Contractor shall reject the Change Directive and provide reason for the rejection no later than 2 work days from receipt.
         3) Owner will reissue Change Directive<> for approval upon conclusion of negotiations to satisfy the reason for the rejection by the Architect or Contractor.
      d. Issuance and approval of Change Directive is not an authorization to begin the Work unless the Contract Sum adjustment type is Time & Material.
   2. Execution of Proposals in Response to Change Directives:
      a. Proposals in response to Change Directives will be issued through the Owner's electronic document management system.
      b. Approved proposals will be stored in the Owner's electronic document management system - Project Contracts tab - Claims and Change Directive Response Proposals table for this Project.
      c. Contractor shall initiate New Claim or CD Proposal workflow by completing the required fields and attaching supporting documentation for proposal based on proposed method of price quotation and proposed change in Contract Time described in the approved Change Directive.
      d. Owner and Architect will review proposal and:
         1) If in agreement with the proposal, Owner will approve the proposal, notify Contractor, and initiate Change Order workflow no later than 2 work days from receipt.
         2) If not in agreement with the proposal, Owner will reject proposal and provide reason for the rejection no later than 2 work days from receipt.
         3) Contractor will resubmit the proposal upon conclusion of negotiations to satisfy the reason for rejection by the Owner or Architect.
         4) Owner will review resubmitted proposal and repeat execution steps described previously or cancel Change Directive if negotiations are unsuccessful.

D. Contractor Initiated Changes: Contractor may propose a change by submitting a Claim for change, with a statement describing the reason for the Claim, the effect on the Contract Sum or Contract Time or both, and with full documentation supporting the effect on Contract Sum or Contract Time or both and a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Section 01 6000.
   1. Execution of Contractor's Claims:
      a. Contractor's Claims will be issued through the Owner's electronic document management system.
      b. Approved Claims will be stored in the Owner's electronic document management system - Project Contracts tab - Claims and Change Directive Response Proposals table for this Project.
      c. Owner and Architect will review Claim and:

1) If in agreement with the Claim, Owner will approve the Claim, notify Contractor, and initiate Change Order workflow no later than 2 work days from receipt.
2) If not in agreement with the Claim, Owner will reject Claim and provide reason for the rejection no later than 2 work days from receipt.
3) Contractor will resubmit the Claim upon conclusion of negotiations to satisfy the reason for rejection by the Owner or Architect.
4) Owner will review Claim and repeat execution steps described previously or void Claim if negotiations prove Claim is invalid or if negotiations are unsuccessful.

E. Substantiation of Costs: Provide full information required for evaluation.
1. Provide following data:
a. Quantities of products, labor, and equipment.
b. Taxes, insurance, and bonds.
c. Overhead and profit.
d. Justification for any change in Contract Time.
e. Credit for deletions from Contract, similarly documented.
2. Support each Claim for additional costs or time with additional information:
a. Origin of Claim.
b. Dates and times work was performed, and by whom.
c. Time records and wage rates paid.
d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

F. Change Orders: Owner will issue a Change Order document that includes a detailed description of a proposed change with, if necessary supplementary or revised drawings and specifications, proposed change in Contract Sum, and proposed change in Contract Time.
1. Execution of Change Orders:
a. Change Orders will be issued through the Owner's electronic document management system.
b. Approved Change Orders will be stored in the Owner's electronic document management system - Project Contracts tab - Change Orders table for this Project.
c. Architect and Contractor shall review the Change Order and:
1) If in agreement with the proposed methods for changing the Contract Sum or Contract Time, the Architect and Contractor shall approve the Change Order no later than 2 work days from receipt.
2) If not in agreement with the proposed methods for changing the Contract Sum or Contract Time, Architect or Contractor shall reject the Change Order and provide reason for rejection no later than 2 work days from receipt.
3) Owner will reissue Change Order for approval upon conclusion of negotiations to satisfy the reason for the rejection by the Architect or Contractor.

G. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item in order at the end of the schedule and adjust the Contract Sum.
1. Change Orders Drawn From An Allowance:
a. Identify authorized Change Orders identified to be paid from an Allowance with the term "Allowance #" appended to the end of the Change Order description in the Description of Work column of the Schedule of Values, where # is the number of the Allowance identified in Section 012100 from which the Change Order is to be drawn
b. Record values of Work Completed as appropriate on the respective line in the Schedule of Values for each authorized Change Order.
c. Reduce the value in the Scheduled Value column of the Schedule of Values for the Allowance line item by the Scheduled Value of all authorized Change Orders to be drawn from the Allowance.

d. Do not show values of Completed Work for Allowance line items.

H. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

I. Promptly enter changes in Project Record Documents.

1.07 PERMIT, MUNICIPAL SURETY BONDS, AND UTILITY CONNECTION FEE REIMBURSEMENTS

1.08 APPLICATION FOR FINAL PAYMENT

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

B. Application for Final Payment will not be considered until the following have been accomplished:

1. All closeout procedures specified in Section 017000.

END OF SECTION 012000

SECTION 012100
ALLOWANCES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Contingency allowance.

B. Payment and modification procedures relating to allowances.

1.02 RELATED REQUIREMENTS

A. Section 012000 - Price and Payment Procedures: Additional payment and modification procedures.

1.03 CONTINGENCY ALLOWANCE

A. Contractor's costs for products, delivery, installation, labor, insurance, payroll, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Contingency Allowance.

B. Funds will be drawn from the Contingency Allowance only by Change Order.

C. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

1.04 ALLOWANCES SCHEDULE

A. Contingency Allowance: Include the stipulated sum/price of $140,000.00 for use upon Owner's instructions for the following:
   1. Modifications to existing building systems to correct code deficiencies not indicated on the drawings.
   2. Modifications to existing site to correct soil deficiencies not indicated on the drawings.
   3. Unit price items identified in Section 012200.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 012100

SECTION 012200
UNIT PRICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. List of unit prices, for use in preparing Bids.

B. Measurement and payment criteria applicable to Work performed under a unit price payment method.

C. Defect assessment and non-payment for rejected work.

1.02 RELATED REQUIREMENTS

A. Document 002113 - Instructions to Bidders: Instructions for preparation of pricing for Unit Prices.

B. Document 004322 - Unit Prices Form: List of Unit Prices as supplement to Bid Form

C. Section 012000 - Price and Payment Procedures: Additional payment and modification procedures.

1.03 COSTS INCLUDED

A. Unit Prices included on the Bid Form shall include full compensation for all required labor, products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

1.04 UNIT QUANTITIES SPECIFIED

A. Quantities indicated in the Bid Form are for bidding and contract purposes only. Quantities and measurements of actual Work will determine the payment amount.

1.05 MEASUREMENT OF QUANTITIES

A. Measurement methods delineated in the individual specification sections complement the criteria of this section. In the event of conflict, the requirements of the individual specification section govern.

B. Take all measurements and compute quantities. Measurements and quantities will be verified by Owner.

C. Assist by providing necessary equipment, workers, and survey personnel as required.

D. Measurement Devices:
   1. Weigh Scales: Inspected, tested and certified by the applicable state Weights and Measures department within the past year.
   2. Platform Scales: Of sufficient size and capacity to accommodate the conveying vehicle.
   3. Metering Devices: Inspected, tested and certified by the applicable state department within the past year.

E. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.

F. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.

G. Measurement by Area: Measured by square dimension using mean length and width or radius.

H. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord.

I. Stipulated Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as a completed item or unit of the Work.

J. Perform surveys required to determine quantities, including control surveys to establish measurement reference lines. Notify Architect prior to starting work.

1.06 PAYMENT

A. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work that is incorporated in or made necessary by the Work and accepted by the Architect, multiplied by the unit price.

B. Payment will not be made for any of the following:
   1. Products wasted or disposed of in a manner that is not acceptable.
   2. Products determined as unacceptable before or after placement.
   3. Products not completely unloaded from the transporting vehicle.
   4. Products placed beyond the lines and levels of the required Work.
   5. Products remaining on hand after completion of the Work.
   6. Loading, hauling, and disposing of rejected Products.

1.07 DEFECT ASSESSMENT

A. Replace Work, or portions of the Work, not complying with specified requirements.

B. If, in the opinion of Owner, it is not practical to remove and replace the Work, Owner will direct one of the following remedies:
   1. The defective Work may remain, but the unit price will be adjusted to a new unit price at the discretion of Owner.
   2. The defective Work will be partially repaired to the instructions of the Owner, and the unit price will be adjusted to a new unit price at the discretion of Owner.

C. The individual specification sections may modify these options or may identify a specific formula or percentage price reduction.

D. The authority of Owner to assess the defect and identify payment adjustment is final.

1.08 SCHEDULE OF UNIT PRICES

A. Item: A - Excavating Unsuitable Soil & Replacement With Granular Fill; Section 312316 - Excavation and Section 312323 - Fill.

B. Item: B - Excavating Unsuitable Soil In Trench & Replacement With Granular Fill; Section 312316.13 - Trenching.

C. Item: C - Provide and Install Geotechnical Stabilization Fabric; Section 312323 - Fill and 312316.13 - Trenching.

D. Item: E - Excavating Rock & Replacement With Granular Fill; Section 312316 - Excavation and Section 312323 - Fill.

E. Item: F - 4 Inch Concrete Paving Outside of Design Area; Section 321313 - Concrete Paving.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 012200

SECTION 012500
SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedural requirements for proposed substitutions.

1.02 RELATED REQUIREMENTS

A. Section 002113 - Instructions to Bidders: Restrictions on timing of substitution requests.

B. Section 013000 - Administrative Requirements: Submittal procedures, coordination.

C. Section 016000 - Product Requirements: Fundamental product requirements, product options, delivery, storage, and handling.

D. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions: Restrictions on emissions of indoor substitute products.

1.03 DEFINITIONS

A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
   1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
      a. The specified product becomes unavailable through no fault of the Contractor.
      b. The specified product or method of construction cannot be provided within the contract time.
         1) The request will not be considered if the product or method cannot be provided as a result of failure of the Contractor to pursue the Work promptly or coordinate activities properly.
      c. The specified product or method of construction cannot receive necessary approvalby authorities having jurisdiction, and the requested substitution can be approved.
   2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.
      a. Substitution requests offering advantages solely to the Contractor will not be considered.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
   2. Agrees to provide the same warranty for the substitution as for the specified product.
   3. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.
   5. Agrees to reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.

B. A Substitution Request for specified installer constitutes a representation that the submitter:
   1. Has acted in good faith to obtain services of specified installer, but was unable to come to commercial, or other terms.

C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
   1. Note explicitly any non-compliant characteristics.

D. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
   1. No specific form is required. Contractor's Substitution Request documentation must include the following:
      a. Project Information:
         1) Official project name and number, and any additional required identifiers established in Contract Documents.
      b. Substitution Request Information:
         1) Discrete and consecutive Substitution Request number, and descriptive subject/title.
         2) Indication of whether the substitution is for cause or convenience.
         3) Issue date.
         4) Reference to particular Contract Document(s) specification section number, title, and article/paragraph(s).
         5) Description of Substitution.
         6) Reason why the specified item cannot be provided.
         7) Differences between proposed substitution and specified item.
         8) Description of how proposed substitution affects other parts of work.
      c. Attached Comparative Data: Provide point-by-point, side-by-side comparison addressing essential attributes specified, as appropriate and relevant for the item:
         1) Physical characteristics.
         2) In-service performance.
         3) Expected durability.
         4) Visual effect.
         5) Warranties.
         6) Other salient features and requirements.
         7) Include, as appropriate or requested, the following types of documentation:
            (a) Product Data:
            (b) Samples.
            (c) Certificates, test, reports or similar qualification data.
            (d) Drawings, when required to show impact on adjacent construction elements.
      d. Impact of Substitution:
         1) Savings to Owner for accepting substitution.
         2) Change to Contract Time due to accepting substitution.

E. Limit each request to a single proposed substitution item.
   1. Submit an electronic document, combining the request form with supporting data into single document.

3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT

A. Submittal Time Restrictions:
   1. Section 002113 - Instructions to Bidders specifies time restrictions and the documents required for submitting substitution requests during the bidding period.

3.03 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

A. Submit request for Substitution for Cause within 14 days of discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.

B. Submit request for Substitution for Convenience within 14 days of discovery of its potential advantage to the project, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
   1. In addition to meeting general documentation requirements, document how the requested substitution benefits the Owner through cost savings, time savings, greater energy conservation, or in other specific ways.
   2. Document means of coordinating of substitution item with other portions of the work, including work by affected subcontractors.
   3. Bear the costs engendered by proposed substitution of:
      a. Owner's compensation to the Architect for any required redesign, time spent processing and evaluating the request.
      b. Other construction by Owner.
      c. Other unanticipated project considerations.

C. Substitutions will not be considered under one or more of the following circumstances:
   1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
   2. Without a separate written request.
   3. When acceptance will require revisions to Contract Documents.

3.04 RESOLUTION

A. Owner and Consultant may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.

B. Owner and Consultant will notify Contractor in writing of decision to accept or reject request.
   1. Ownerand Consultant's decision following review of proposed substitution will be noted on the submitted form.

3.05 ACCEPTANCE

A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

END OF SECTION 012500

SECTION 013000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General administrative requirements.

B. Electronic document management system.

C. Preconstruction meeting.

D. Site mobilization meeting.

E. Progress meetings.

F. Subcontractor listing.

G. Construction progress schedule.

H. Progress photographs.

I. Submittals for review, information, and project closeout.

J. Number of copies of submittals.

K. Requests for Information (RFI) procedures.

L. Submittal procedures.

M. Substance abuse testing.

1.02 RELATED REQUIREMENTS

A. Section 007200 - General Conditions: Dates for applications for payment.

B. Section 013216 - Construction Progress Schedule: Form, content, and administration of schedules.

C. Section 016000 - Product Requirements: General product requirements.

D. Section 017000 - Execution and Closeout Requirements: Additional coordination requirements.

E. Section 017800 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

1.03 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 017000 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT MANAGEMENT SYSTEM

A. Owner maintains an electronic document management system for the processing and storage of project documentation.

B. Access requirements:

1. To access the electronic document management system effectively Contractor shall maintain a minimum of one cable modem internet connection at Contractors's office from the Notice to Proceed date through the 1 year warranty period following the Substantial Completion date.
2. The electronic document management system is a web based application and is accessible through the internet with a web browser application.
3. Provide Windows Explorer version 8 or later on computers accessing the document management system as this is the only web browser supported by the system.
4. Owner will provide to the Contractor a maximum of 4 usernames to access the system.

C. Training:

1. Owner will provide an electronic version of the user manual to the General Contractor that instructs the user in a step-by-step basis how to set-up the user's web browser to access the system and to interact with the system.
2. General Contractor's shall be required to attend one two hour training session provided by Owner at Owner's facility.
    a. This requirement will be waived if the General Contractor has prior experience using Owner's electronic document management system.
3. Owner will schedule training session within 3 days from Notice to Proceed date.
4. General Contractor's attendees:
    a. Project Manager.
    b. Project Superintendent.
    c. Contract representative if different from Project Manager.
        1) Contract representative is emloyee empowered to approve Construction Change Directives and Change Orders.
    d. Project secretary at Contractor's option.

D. Support:
1. Any questions regarding functionality or problems experienced using the electronic document management system shall be directed to the Owner, not the software vendor.

E. Use:
1. The intent is to use the electronic document system for the following:
    a. Submission, review, comment, issuance, and filing of all contractual and technical submittals.
    b. Submission, review, response, issuance, and filing of all requests for information.
    c. Issuance and filing of all Supplementary Instructions.
    d. Submission, review, comment, approval, and filing of all Claims and Construction Change Directive response proposals.
    e. Issuance, approval, and filing of all Construction Change Directives.
    f. Issuance, approval, and filing of all Change Orders.
    g. Submission and filing of Daily Project Reports.
    h. Preparation and filing of Subcontractor's listing.
    i. Mark-up and filing of record documents.
    j. Issuance, approval, and filing of the Certificate of Substantial Completion and list of items required to be completed for Final Payment.
    k. Submission, issuance, and filing of miscellaneous documents including, but not limited to meeting minutes, telephone conversation confirmations, written correspondence converted to electronic format, photographs, updated progress schedules, and other documents pertaining to the project as required in these specifications.
2. Issuance is defined as notification of document availability on electronice document system for action or review.
3. Owner, Architect, and General Contractor shall be required to distribute documents to personnel under the respective authority of each that do not have access to the electronic document management system.
4. Approval of documents in the electronic document management system will be legally binding as if they had been signed by the approving party.

3.02 PRECONSTRUCTION MEETING

A. Owner will schedule a meeting after Notice to Proceed date.

B. Attendance Required:
1. Owner.
2. Architect.
3. Contractor.
4. Contractor's Superintendent.

5. Major Subcontractors.
6. Geotechnical Engineer.
7. Owner's Independent Testing Agency Representative if any.

C. Agenda:
1. Execution of Owner-Contractor Agreement.
2. Submission of executed bonds and insurance certificates.
3. Distribution of Contract Documents.
4. Creation of Subontractor list in Owner's electronic document management system, schedule of values, and progress schedule.
5. Designation of personnel representing the parties to the Contract; Owner, Architect, and Contractor .
6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
7. Scheduling.
8. Application for payment procedures.
9. Progress cleaning, waste removal, and waste recovery.
10. Procedures for maintaining record documents.
11. Hazardous materials notification and procedures.
12. Procedures for logging of worker OSHA 10 Hour Construction Safety & Health Training certification.
13. Scheduling activities of a Geotechnical Engineer.

D. Record minutes and submit within two days after meeting to Owner's electronic document management system as a Miscellaneous Document.
1. Meeting minutes will be stored in Owner's electronice document management system - Project Contracts tab - Miscellaneous Documents table for this Project.

3.03 SITE MOBILIZATION MEETING

A. Owner may schedule a meeting at the Project site prior to Contractor occupancy if warranted by the scope of the Work.

B. Attendance Required:
1. Contractor.
2. Owner.
3. Architect.
4. Special consultants.
5. Contractor's superintendent.
6. Major subcontractors.
7. Owner's Tenant Representative.

C. Agenda:
1. Use of premises by Owner and Contractor.
2. Owner's requirements and occupancy prior to completion.
3. Construction facilities and controls provided by Owner.
4. Temporary utilities provided by Owner.
5. Survey and building layout.
6. Security and housekeeping procedures.
7. Protection of existing facilities.
8. Waste removal and waste recovery collection locations.
9. Schedules.
10. Application for payment procedures.
11. Procedures for testing.
12. Procedures for maintaining record documents.
13. Requirements for start-up of equipment.
14. Inspection and acceptance of equipment put into service during construction period.

D. Record minutes and distribute copies within two days after meeting to participants, with one copy to Architect, Owner, participants, and those affected by decisions made.

3.04 PROGRESS MEETINGS

A. Schedule and administer meetings between Notice to Proceed and start of the Work at the site at bi-weekly intervals.

B. Schedule and administer meetings throughout progress of the Work at weekly intervals.

C. The Owner reserves the right to lengthen the interval between progress meetings as project requirements dictate.

D. The Owner reserves the right to call for special progress meetings if the Contractor is falling behind on schedule or is in non-compliance with Contract requirements.

E. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

F. Attendance Required:
   1. Contractor.
   2. Owner.
   3. Architect.
   4. Special Consultants as needed.
   5. Contractor's superintendent.
   6. Major Subcontractors as needed.

G. Agenda:
   1. Review minutes of previous meetings.
   2. Review of work progress.
   3. Field observations, problems, and decisions.
   4. Schedule
      a. Identification of problems that impede, or will impede, planned progress.
      b. Review of submittals schedule and status of submittals.
      c. Review of RFIs log and status of responses.
      d. Review of off-site fabrication and delivery schedules, if any.
      e. Maintenance of progress schedule.
      f. Corrective measures to regain projected schedules.
      g. Planned progress during succeeding work period.
      h. Coordination of projected progress.
   5. Maintenance of quality and work standards.
   6. Effect of proposed changes on progress schedule and coordination.
   7. Safety and security issues.
      a. Review of worker OSHA 10 Hour Construction Safety & Health Training certification logs status.
      b. Review of hazardous material notification acknowledgement logs status.
   8. Housekeeping and existing facility protection issues.
      a. Waste removal and waste recovery.
   9. Review of record document status.
   10. Other business relating to the Work.

H. Record minutes and distribute copies within two days after meeting to participants, with one copy to Architect, Owner, participants, and those affected by decisions made.

3.05 CLOSE-OUT PROGRESS MEETINGS

A. Schedule and administer meetings between Substantial Completion and Final Completion at the Owner's offices at bi-weekly intervals.

B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required:
   1. Contractor.
   2. Owner.
   3. Contractor's Superintendent as needed.
   4. Major Subcontractors as needed.

D. Agenda:
   1. Review minutes of previous meetings.
   2. Review of punch list Work progress.
   3. Field observations, problems, and decisions.
   4. Review of close-out submittals status.
      a. Extended warranties.
      b. Record document completion affidavits.
      c. Hazardous materials acknowledgement signature logs.
      d. OSHA ten hour construction safety training logs.
      e. Refrigerant management forms.
      f. Outstanding technical submittals.
      g. Consent of Surety.
   5. Other business relating to the close-out of the Work.

E. Record minutes and distribute copies within two days after meeting to participants, with one copy to Architect, Owner, participants, and those affected by decisions made.

3.06 SUBCONTRACTOR LISTING

A. Contractor shall provide a Subcontractor listing not later than 14 days after award of the Contract.

B. The listing will be input and stored in the Owner's electronic document management system - Project Contracts tab - Subcontractor table for this Project.

C. Provide the following information to complete the listing:
   1. Subcontractor company name.
   2. Primary contact name.
   3. Subcontract description identifying the work for which the Subcontractor is responsible.
   4. Subcontractor address.
   5. Telephone, cellular telephone, and facsimile numbers.
   6. Primary contact e-mail address.

3.07 CONSTRUCTION PROGRESS SCHEDULE - SEE SECTION 013216

3.08 PROGRESS PHOTOGRAPHS

A. Submit new photographs at least once a month or more often to show progress of the work, within 3 days after being taken.

B. Photography Type: Digital; electronic files.

C. Provide photographs of site and construction throughout progress of work produced by Contractor's photographer, acceptable to Owner.

D. Views:
   1. Provide non-aerial photographs from various views at each specified time, until date of Substantial Completion.
   2. Consult with Owner for instructions on views required.
   3. Provide factual presentation.
   4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.

E. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
   1. Delivery Medium: Owner's document management system as a miscellaneous document.

2. File Naming: Include project identification, date and time of view, and view identification.

3.09 REQUESTS FOR INFORMATION (RFI)

A. Definition: A request seeking one of the following:
   1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
   2. A resolution to an issue which has arisen due to field conditions and affects design intent.

B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.

C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
   1. Prepare a separate RFI for each specific item.
      a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
      b. Do not forward requests which solely require internal coordination between subcontractors.
   2. Contractor's shall issue the RFI through the Owner's electronic document management system.

D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
   1. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
      a. Approval of submittals (use procedures specified elsewhere in this section).
      b. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract and Section 012000 - Price and Payment Procedures).
      c. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
   2. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
   3. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
      a. The Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Architect, and any of its consultants, due to processing of such RFIs.

E. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.

F. Review Time: Architect will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
   1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

G. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.

1. The RFI with response will be stored in the Owner's electronic document management system - Project Contracts tab - RFI's table for this Project.

3.10 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
   1. Product data.
   2. Shop drawings.
   3. Samples for selection.
   4. Samples for verification.

B. Submit for Owner and Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

C. Samples will be reviewed for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below.

3.11 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
   1. Design data.
   2. Certificates.
   3. Test reports.
   4. Inspection reports.
   5. Manufacturer's instructions.
   6. Manufacturer's field reports.
   7. Refrigerant management Contractor Information and Licensing Input form and Service Order form.
   8. Hazardous materials acknowledgement signature logs.
   9. Other types indicated.

B. Submit for Owner's and Architect's review and knowledge in accordance with SUBMITTAL PROCEDURES article below.

3.12 SUBMITTALS FOR PROJECT CLOSEOUT

A. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 017800 - Closeout Submittals:
   1. Project record documents completion affidavit for drawings.
   2. Project record documents completion affidavit for specifications.
   3. Operation and maintenance data.
   4. Extended warranties (warranties greater than one year in length).
   5. Compliance with prevailing wage law affidavit.
   6. OSHA ten hour construction safety training log.
   7. Refrigerant management Equipment Installation/Removal Input form.
   8. Other types as indicated.

B. Submit for Owner's benefit during and after project completion.

3.13 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

B. Documents for Information: Submit one electronic document to the Owner's electronic document management system.

C. Samples: Deliver the number specified in individual specification sections, but not less than two, under transmittal to the Owner's and Architect's business address; two of which will be retained by the Owner and the Architect respectively.

1. Submit one electronic document of the delivery transmittal to the Owner's electronic document management system documenting physical sample delivery to Owner and Architect.
2. After review, produce duplicates.
3. Retained samples will not be returned to Contractor unless specifically so stated.

3.14 SUBMITTAL PROCEDURES

A. General Requirements:
   1. Submit to Owner's electronic document management system as a Submittal.
      a. Submittals and sample submittal transmittals will be stored in the Owner's electronic document management system - Project Contracts tab - Submittals table for this Project.
   2. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on submittal.
   3. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
      a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
   4. Schedule submittals to expedite the Project, and coordinate submission of related items.
      a. All submittals shall be due with 42 days from Notice to Proceed date unless specifically identified with a different due date in these specifications or under the following exceptions:
         1) The submittal cannot be made until a part of the Work is installed, in which case the submittal shall be made as specifically identified in these specifications, but in no case longer than 21 days from the completion of the installation.
         2) The submittal is a closeout submittal, in which case the submittal shall be made in accordance with the requirements of Section 017800 - Closeout Submittals.
   5. Schedule submittals to expedite the Project, and coordinate submission of related items.
      a. For each submittal for review, allow 14 days excluding delivery time to and from the Contractor.
   6. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
   7. When revised for resubmission, identify all changes made since previous submission.
   8. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
   9. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
   10. Submittals not requested will be recognized, and will be returned "Not Reviewed",

B. Product Data Procedures:
   1. Submit only information required by individual specification sections.
   2. Collect required information into a single submittal.
   3. Submit concurrently with related shop drawing submittal.
   4. Do not submit (Material) Safety Data Sheets for materials or products.

C. Shop Drawing Procedures:
   1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
   2. Use of reproductions of the Contract Documents in digital data form to create shop drawings is only permitted with the expressed consent of the Architect under the terms and conditions solely determined by the Architect.
      a. Contractor shall contact the Architect directly to obtain the required permissions.

3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

D. Samples Procedures:
   1. Transmit related items together as single package.
   2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.

3.15 SUBMITTAL REVIEW

A. Submittals for Review: Owner and Architect will review each submittal and comment on any exceptions, or take other appropriate action.

B. Submittals for Information: Owner and Architect will acknowledge receipt and review. See below for actions to be taken.

C. Owner's and Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.

D. Architect's and his consultants' actions on items submitted for review or information:
   1. Authorizing purchasing, fabrication, delivery, and installation:
      a. "Reviewed - No Exceptions"
      b. "Reviewed - Exceptions Noted"
         1) Contractor is authorized to proceed only if the review notations are incorporated.
   2. Not Authorizing fabrication, delivery, and installation:
      a. "Reviewed - Exceptions Noted - Resubmit"
         1) Submittal is not in compliance with some requirements of the Contract Documents or is lacking information necessary to fully review the submittal.
         2) Resubmit the submittal with revised item or items, with review notations acknowledged and incorporated.
         3) Non-responsive resubmittals may be rejected.
      b. "Reviewed - Rejected"
         1) Submittal is substantially not in compliance with requirements of the Contract Documents.
         2) Submit a new submittal complying with requirements of the Contract Documents.
      c. "Not Reviewed - Not Applicable"
         1) Submittal is not required or is not applicable to the Project.
         2) Submit a new submittal with applicable documentation, if necessary.

3.16 SUBSTANCE ABUSE TESTING

A. Objective:
   1. The objective of this Substance Abuse Testing Program is improved job site safety and morale.
   2. This is not intended as a substitute for the Contractor's or Subcontractors' complete written substance abuse policy that is recommended to include other important features, including an employee education and awareness program, a supervisor training program, and an employee assistance program.

B. Contractual Requirements:
   1. The Contractor shall have and enforce, as a minimum, a written Substance Abuse Program incorporating the testing requirements, terms and conditions set forth in this Substance Abuse Testing paragraph applicable to all its employees and prospective employees in order to be eligible to perform the Owner's work.
      a. The Contractor and all Subcontractors shall comply with this Substance Abuse Testing paragraph.
      b. Suppliers, vendors, and visitors are subject to confirmation of their abstinence from the possession or use of substances indicated in this Substance Abuse Testing paragraph.

2. Programs which meet the requirements of this Substance Abuse Testing paragraph include:
    a. St. Louis Construction Industry Substance Abuse Consortium.
    b. Unified Drug and Alcohol Testing Policy and Procedure for the Pipefitters Local Union Number 562 and the Mechanical Contractors Association of St. Louis
    c. Substance Abuse Testing Program for the Electricians Local Union Number 1 and the National Electrical Contractors Association of St. Louis.
    d. Drug and Alcohol Testing Program of the Carpenters' District Council of Greater St. Louis and Vicinity.
    e. Drug and Alcohol Testing Program of the Sheet Metal Workers Local Union 36.
    f. Eastern Missouri Laborers District Council Substance Abuse Consortium.
3. Submittal to the Owner of written evidence of enrollment in any of the previously listed programs shall satisfy the requirements with regard to pre-engagement and random testing.
4. The Substance Abuse Program will apply to the Contractor and Subcontractors' employees on the Owner's site of construction including workers, new hires, replacements, and supervisory personnel.
5. No employee or prospective employee of a Contractor or Subcontractor will be permitted to work on the Owner's site of construction unless such employee has submitted to testing as required and unless the results of such testing are negative as hereinafter defined.
6. The Contractor and each Subcontractor shall train its employees in methods that will allow them to recognize substance abusers.
7. Supervisory employees of the Contractor or Subcontractor shall be trained to take action, and to confront a substance abuser in a manner consistent with generally accepted training procedures.
8. The Contractor and each Subcontractor shall furnish to the Owner a copy of its Substance Abuse Program for review and acceptance, prior to commencement of the Work on the Owner's site of construction.
9. The costs of implementing the respective Substance Abuse Programs shall be borne by each respective Contractor or Subcontractor.
10. Suppliers, vendors, and visitors shall sign an acknowledgement indicating their abstinence from substance abuse, and their continued avoidance of violations of this paragraph 3.10 at the Owner's site of construction.
    a. The acknowledgement form is in Section - 006000.
11. In the event that an incident/accident occurs and causes the Owner, Contractor, or Subcontractor to believe that substance abuse testing should occur, suppliers, vendors, and visitors agree to submit to a substance abuse screen pursuant to the terms of this Substance Abuse Testing paragraph.
    a. Refusal to submit to substance abuse testing when requested will be grounds for the Owner, Contractor, or Subcontractor to have the supplier, vendor, or visitor permanently barred from the site of construction.

C. Definitions:
1. Positive Tests: Test results indicating the presence of legal or illegal substances at or above the Confirming Limits as set forth in this Substance Abuse Testing paragraph sub-paragraph E.1 below.
2. Negative Tests: Test results indicating that legal or illegal substances are at levels below the Confirming Limits as set forth in this Substance Abuse Testing paragraph sub-paragraph E.1 below.
3. Pre-Engagement Testing: Testing for all substances other than alcohol as set forth in this Substance Abuse Testing paragraph sub-paragraph E.1 below conducted by the Contractor or Subcontractors for their employees or prospective employees within 120 days prior to their appearance on the Owner's site of Construction.
    a. This requirement will be waived if the employee is an active member of an Owner approved pool.

4. Mandatory Follow-up Testing: Testing for all substances other than alcohol set forth in this Substance Abuse Testing paragraph sub-paragraph E.1 below, conducted by the respective Contractor or Subcontractor for their employees at a rate to insure that 100 percent of all workers are tested within a 2 year period.
    a. Employees tested under the Random Testing requirements shall have the 2 year period begin with the Random Testing date.
5. Random Testing: Testing for all substances set forth in this Substance Abuse Testing paragraph sub-paragraph E.1 below, conducted by the respective Contractor or Subcontractors for their employees at random times and with a random selection rate of at least 50 percent of Contractors' or Subcontractors' employees annually.
    a. The frequency of Random Testing for a Contractor or Subcontractors' job of less than 1 year will be adjusted proportionately to the duration of the job, but in any event at least one employee per month shall be tested.
    b. Employees selected for random testing shall report to the drug testing laboratory or collection site and provide a specimen the same day that they are notified that they have been selected.
6. For Cause Testing: Testing for all substances set forth in this Substance Abuse Testing paragraph sub-paragraph E.1 below, conducted by the Contractor or Subcontractors for their employees whose behavior on the Owner's site of construction causes either the Owner's or the respective Contractor's or Subcontractors' supervisory personnel to reasonably conclude that such behavior may result from substance abuse.
7. Post-Accident/Incident Testing: Testing for all substances set forth in this Substance Abuse Testing paragraph sub-paragraph E.1 below, conducted by the Contractor or Subcontractors for their employees involved in any accident involving off-site medical treatment or any property damage.
    a. In addition, first aid cases, or “near misses” in which injury or property damage is narrowly avoided may require testing as determined by the Owner, Contractor or Subcontractor.

D. Testing Requirements:
1. The Contractor or Subcontractor shall perform pre-engagement, mandatory follow-up, random, for cause, and post-accident/incident testing as follows:
    a. Drug Testing:
        1) A screening test (“quickie test”) may be performed on-site or at an approved testing facility, using a Food and Drug Administration (FDA) approved device for instant testing.
            (a) Persons with negative tests will be allowed to start work immediately.
            (b) Persons testing non-negative will not be allowed to begin work pending confirmation via the standard test.
            (c) If a screening test is used, specimens shall be collected and submitted for testing per this Substance Abuse Testing paragraph, sub-paragraph D.1.a.2) below.
            (d) Upon approval, a device from the approved listing provided by the Department of Transportation (DOT) may also be used.
        2) Standard drug testing must be conducted by a SAMHSA (Substance Abuse Mental Health Services Administration) certified laboratory with test results interpreted by a licensed medical review officer (MRO).
    b. Alcohol Testing:
        1) The initial screen tests for alcohol shall be performed by using either a saliva test or a breathalyzer test comparable to the type used by law enforcement officials.
        2) Alcohol confirmatory tests shall be performed by using either a blood alcohol test or a breathalyzer test comparable to the type used by law enforcement officials.
2. Evidence of Testing:

a. Evidence of the negative test results of individual employees (the identity of employees testing positive shall be kept confidential) shall be furnished to the Owner, prior to commencement of work by the employer or individual employee and promptly after performance of any subsequent testing required by this this Substance Abuse Testing paragraph, in the form of:
   1) Electronic databases, all negative test results shall be included in an electronic database that will be accessible to employers and Owners. The database will include the employee's name, craft, identification number, and the date of the test.
   2) A certificate not older than 120 calendar days prior to the Notification To Proceed for pre-employment testing, signed by the testing laboratory, setting forth the nature and results of tests performed, including the employee's name, identification number, craft, and the date of the test.
   3) An identification card, signed by the respective Contractor or Subcontractor and issued to the individual employee, setting forth employee's name, and the date, nature and results of testing as reported on a certificate issued by the testing laboratory, the name of which shall also appear on the identification card; provided the affected employee authorized the issuance of such identification card.
   4) Documentation not older than 120 calendar days that the Contractor or Subcontractor is enrolled in an approved program identified in this Substance Abuse Testing paragraph, sub-paragraph B.2.
   5) Documentation not older than 120 calendar days of Contractor or Subcontractor company program that specifically identifies compliance with the requirements of this Substance Abuse Testing paragraph and encompasses 100 percent mandatory participation by Contractor or Subcontractor employees.

E. Threshold Limits:
   1. Under the five-panel test, the minimum substance abuse testing requirements for the following substances are:

SUBSTANCE	THRESHOLD LIMIT	GC/MS CONFIRMING LIMIT
Alcohol	0.04%	0.04%
Amphetamines	1,000 ng/ml	500 ng/ml
Cocaine Metabolites	300 ng/ml	150 ng/ml
Marijuana Metabolites	50 ng/ml	15 ng/ml
Opiate Metabolites	2,000 ng/ml	300 ng/ml
Phencyclidine	25 ng/ml	25 ng/ml

   2. The Owner will accept, although not required, ten-panel tests in lieu of five-panel tests. Under the ten-panel test, the minimum substance abuse testing requirements for the following substances are:

SUBSTANCE	THRESHOLD LIMIT	GC/MS CONFIRMING LIMIT
Alcohol	0.04%	0.04%
Amphetamines	1,000 ng/ml	500 ng/ml
Cocaine Matabolites	300 ng/ml	150 ng/ml
Marijuana Metabolites	50 ng/ml	15 ng/ml
Opiate Metabolites	2,000 ng/ml	300 ng/ml
Phencyclidine	25 ng/ml	25 ng/ml
Barbiturates	300 ng/ml	200 ng/ml
Benzodiazepines	300 ng/ml	200 ng/ml
Methadone	300 ng/ml	200 ng/ml
Methaqualone	300 ng/ml	200 ng/ml

Propoxyphene	300 ng/ml	200 ng/ml

3. Additionally, minimum-testing requirements for “Drugs of Choice” may be established on an individual job site basis. “Drugs of Choice” are defined as substances, in addition to the basic list set forth above, that may be found to be in significant use. If implemented, the Owner will pay for the additional testing.

F. Compliance Procedure:
   1. The Owner reserves the right to audit any Substance Abuse Program to verify compliance results within twenty-four (24) hours of the Owner's notification of intent to audit, and the Owner shall have free right of access to all relevant records of the Contractor and its Subcontractors and suppliers for this purpose, provided such record disclosures are within the scope of the Department of Health and Human Services (DHHS) guidelines pertaining to confidentiality of employee records.
   2. The Contractors' or Subcontractors' employees who receive a positive test result shall immediately leave the Owner's site of construction.
   3. The Contractors' or Subcontractors' employees who receive a confirmatory positive test result shall be prohibited from returning to any of the Owner's sites of construction until such time that said employee has successfully completed an assessment/substance abuse treatment program as submitted by the employer that is acceptable to the Owner, but no sooner than 60 days, tests negative, and if said employee agrees to submit to substance abuse testing, without prior notice, at least 1 time per quarter (with dated certificates), for at least 3 years from the date of return or the duration of the Contract, whichever is less.

G. Cooperation and Review:
   1. The Contractor's Substance Abuse Program (and the Substance Abuse Programs of its Subcontractors) shall be furnished to the Owner for review prior to starting the Work on site. The Owner reserves the right to review and have the Contractor's or Subcontractors' Substance Abuse Program amended prior to acceptance.
   2. The Contractor or Subcontractors shall provide the Owner with a monthly summary report of Program compliance.
   3. The requirements of this program related to post accident/incident testing after an injury or accident and for cause testing may be met through implementation of the Contractor's program. However, the Owner reserves the right in any circumstance to require that Contractor or Subcontractor employees be tested for cause or after an injury or accident.

H. Submittals:
   1. Submit to Owner as a single Submittal.
   2. Submittal will be stored in the Owner's electronic document management system in the Contractor's Contracts Page in the Contract Submittals table for this Project.
   3. Substance abuse company policies for Contractor and all Subcontractors as one submittal package.
   4. Substance abuse evidence of testing as required by this Substance Abuse Testing paragraph sub-paragraph D.2 for Contractor and all Subcontractors as one submittal package.
   5. Submit no later than 28 days from Notice to Proceed date but prior to beginning the Work on site.
   6. For Contractor and Subcontractor employees that are added to workforce after initial submittal and are not in an approved program identified in this Substance Abuse Testing paragraph, sub-paragraph B.2 or an approved Contractor or Subcontractor program, submit evidence of testing as an electronic document attached to an e-mail prior to employee beginning the Work on site.

END OF SECTION 013000

SECTION 013216
CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preliminary schedule.

B. Construction progress schedule, with network analysis diagrams and reports.

1.02 RELATED SECTIONS

A. Section 011000 - Summary: Work sequence and occupancy.

B. Section 013000 - Administrative Requirements: Submittals and distribution of schedule.

1.03 REFERENCE STANDARDS

A. AGC (CPSM) - Construction Planning and Scheduling Manual.

B. M-H (CPM) - CPM in Construction Management - Project Management with CPM.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements.

B. Within 10 days after date of Agreement, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.

C. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

D. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.

1. Include written certification that major contractors have reviewed and accepted proposed schedule.

E. Within 10 days after joint review, submit complete schedule.

F. Submit updated schedule with each Application for Payment.

1.05 QUALITY ASSURANCE

A. Scheduler: Contractor's personnel or specialist Consultant specializing in CPM scheduling with three years minimum experience in scheduling construction work of a complexity comparable to this Project, and having use of computer facilities capable of delivering a detailed graphic printout within 48 hours of request.

B. Contractor's Administrative Personnel: three years minimum experience in using and monitoring CPM schedules on comparable projects.

1.06 SCHEDULE FORMAT

A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.

B. Diagram Sheet Size: Maximum 24 x 36 inches.

C. Sheet Size: Multiples of 8-1/2 x 11 inches.

D. Scale and Spacing: To allow for notations and revisions.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

A. Prepare preliminary schedule in the form of a preliminary network diagram.

3.02 CONTENT

A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

B. Identify each item by specification section number.

C. Identify work of separate phases and stages and other logically grouped activities.

D. Provide sub-schedules for each stage of Work identified in Section 011000 - Summary.

E. Provide sub-schedules to define critical portions of the entire schedule.
   1. Identify start-up and testing activity for major equipment or systems.
   2. Identify building automation systems activity after installation of major equipment or systems.
   3. Identify testing and balancing activity associated with generation or preliminary report and separately for generation of final report if testing and balancing reports are required as part of project scope of work.

F. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the report data day of each report.

G. Identify submittal dates for shop drawings, product data, and samples, owner-furnished products, and dates reviewed submittals will be required from Architect. Indicate decision dates for selection of finishes.

H. Indicate delivery dates for owner-furnished products.

I. Coordinate content with schedule of values specified in Section 012000 - Price and Payment Procedures.

J. Provide legend for symbols and abbreviations used.

K. Include weather days allowance as identified in the General Conditions as part of critical path.

3.03 NETWORK ANALYSIS

A. Prepare network analysis diagrams and supporting mathematical analyses using the Critical Path Method.

B. Illustrate order and interdependence of activities and sequence of work; how start of a given activity depends on completion of preceding activities, and how completion of the activity may restrain start of subsequent activities.

C. Mathematical Analysis: Tabulate each activity of detailed network diagrams, using calendar dates, and identify for each activity:
   1. Preceding and following event numbers.
   2. Activity description.
   3. Estimated duration of activity, in maximum 14 day intervals.
   4. Earliest start date.
   5. Earliest finish date.
   6. Actual start date.
   7. Actual finish date.
   8. Latest start date.
   9. Latest finish date.
   10. Total and free float; float time shall accrue to Owner and to Owner's benefit.
      a. Changes to the Work which can be performed during float time shall not be considered a delay and therefore shall not cause a change to the Substantial Completion Date.
   11. Percentage of activity completed.
   12. Responsibility.

D. Analysis Program: Capable of accepting revised completion dates, and recomputation of all dates and float.

E. Required Reports: List activities in sorts or groups if network diagram is incapable of graphically identifying the relationships between activities and the critical path:
   1. By preceding work item or event number from lowest to highest.
   2. By amount of float, then in order of early start.

3. Listing of activities on the critical path.

3.04 REVIEW AND EVALUATION OF SCHEDULE

A. Participate in joint review and evaluation of schedule with Owner and Architect at each submittal.

B. Evaluate project status to determine work behind schedule and work ahead of schedule.

C. After review, revise as necessary as result of review, and resubmit within 10 days.

3.05 UPDATING SCHEDULE

A. Maintain schedules to record actual start and finish dates of completed activities.

B. Indicate progress of each activity to date of revision, with projected completion date of each activity.

C. Update diagrams to graphically depict current status of Work.

D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.

E. Indicate changes required to maintain Date of Substantial Completion.

F. Submit reports required to support recommended changes.

G. Provide narrative report to define problem areas, anticipated delays, and impact on the schedule. Report corrective action taken or proposed and its effect including the effects of changes on schedules of separate contractors.

3.06 DISTRIBUTION OF SCHEDULE

A. Distribute copies of updated schedules to Contractor's project site file, to Subcontractors, suppliers, Architect, Owner, and other concerned parties as required in Section 013000.

B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

END OF SECTION 013216

SECTION 013553
SECURITY PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Security measures including formal security program, entry control, personnel identification, and miscellaneous restrictions.

1.02 RELATED REQUIREMENTS

A. Section 011000 - Summary: use of premises and occupancy.

B. Section 015000 - Temporary Facilities and Controls

1.03 SECURITY PROGRAM

A. Protect Work , existing premises and Owner's operations from theft, vandalism, and unauthorized entry.

B. Initiate program in coordination with Owner's existing security system at project mobilization.

C. Maintain program throughout construction period until Owner occupancy.

1.04 ENTRY CONTROL

A. Restrict entrance of persons and vehicles into Project site and existing facilities.

B. Allow entrance only to authorized persons with proper identification.

C. Maintain log of workers and visitors, make available to Owner on request.

D. Owner will control entrance of persons and vehicles related to Owner's operations.

1.05 SECURITY IDENTIFICATION

A. Provide identification badge to each person authorized to enter premises.

B. All Contractor or Subcontractor employees working on the Project site will be required to obtain security identification badges before coming to the Project site.

C. **Failure of the Contractor or Subcontractor to enforce these security identification procedures may lead to a ban on future work with the Owner in addition to notices of non-performance.**

D. Badges may be obtained Monday through Friday after contacting the Parkway School District Security/Badging Office (Logan Gnade) at 314-415-8262, and making an appointment. The Parkway School District Security/Badging office is located at the Parkway School District Welcome Center at South Middle School, 760 Woods Mill Road, Manchester, Missouri 63011.

E. To obtain a security identification badge, the Contractor or Subcontractor employee shall be required to give their full name, present personal identification verifying their name (e.g., driver's license), give their employer's company name, and present documentation verifying their employment with the company (e.g., business card, identification letter on company letterhead, etc.).

1. During normal working hours, employment confirmation may be made by a confirming telephone call to the company.

F. Security identification badge must be kept with the Contractor or Subcontractor employee and prominently displayed while they are on the Project site.

1. The Contractor or Subcontractor employee shall prior to or immediately upon arriving at the project site to begin their work, report to the Contractor's Superintendent to present the their security identification badge and shall record the badge number on the Security Badges & OSHA 10 Hour Training Log form provided by the Contractor.
2. The security identification badge may be temporarily removed from prominent display if the security identification badge will pose a safety threat to the Contractor or Subcontractor employee as the employee carries out the Work.

3. If the Contractor or Subcontractor employee temporarily removes the security identification badge from prominent display for safety purposes, the Contractor or Subcontractor employee shall promptly present the security identification badge to any employee of the Owner that requests to see the security identification badge.

G. Failure to promptly present the security identification badge shall be grounds for instant removal of the Contractor or Subcontractor employee from the Project site until the security identification badge can be presented.

H. If the Contractor or Subcontractor employee fails to present the security identification badge a second time, the Owner will request the Contractor or Subcontractor employee to be removed from the Project site permanently.

I. Require return of badges at expiration of their employment on the Work.

1.06 SUBMITTALS

A. Owner's Standard Security Badges & OSHA 10 Hour Training Log Form is in Section 006000 - Project Forms.

B. Submit a copy of the Owner's Standard Security Badges & OSHA 10 Hour Training Log required under paragraph 1.05.F.1 of this Section prior to submitting Final Application for Payment or no later than 42 days from Substantial Completion, whichever comes first.

1.07 RESTRICTIONS

A. Do not allow cameras on site or photographs taken except by written approval of Owner.

B. Do not work prior to 6:00 a.m. or after 11:00 p.m. Monday through Friday within enclosed facility without prior approval of Owner.

C. Do not work on site or on exterior of facility outside of times allowed by local municipality or county ordinance.

D. Do not work on Saturdays, Sundays, or holidays without prior approval of Owner.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 013553

SECTION 014000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittals.

B. References and standards.

C. Inspection agencies and services.

D. Control of installation.

E. Mock-ups.

F. Tolerances.

G. Owner's required inspections.

H. Manufacturers' field services.

I. Defect Assessment.

1.02 RELATED REQUIREMENTS

A. Document 007200 - General Conditions: Inspections and approvals required by public authorities.

B. Section 013000 - Administrative Requirements: Submittal procedures.

C. Section 014216 - Definitions.

D. Section 016000 - Product Requirements: Requirements for material and product quality.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Design Data: Submit for Owner's and Architect's knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Owner's and Architect's information.

C. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of inspector.
      d. Date and time of sampling or inspection.
      e. Identification of product and specifications section.
      f. Location in the Project.
      g. Type of test/inspection.
      h. Date of test/inspection.
      i. Results of test/inspection.
      j. Compliance with Contract Documents.
      k. When requested by Owner or Architect, provide interpretation of results.
   2. Test report submittals are for Owner's and Architect's knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Owner's and Architect's information.

D. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Owner's electronic document management system.
   1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

2. Certificates may be recent or previous test results on material or product, but must be acceptable to Owner and Architect.

E. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

F. Manufacturer's Field Reports: Submit reports for Owner's and Architect's benefit as contract administrator or for Owner's and Architect's information.
1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.

G. Erection Drawings: Submit drawings for Owner's and Architect's benefit as contract administrator or for Owner's and Architect's information.
1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.
2. Data indicating inappropriate or unacceptable Work may be subject to action by Architect or Owner.

1.04 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from Contract Documents by mention or inference otherwise in any reference document.

1.05 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Owner will employ and pay for services of an independent testing agency to perform specified testing and inspection unless specifically indicated in individual specification sections to be the responsibility of the Contractor.

B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 MOCK-UPS

A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.

B. Accepted mock-ups establish the standard of quality the Architect will use to judge the Work.

C. Integrated Exterior Mock-ups: Construct integrated exterior mock-up as indicated on drawings. Coordinate installation of exterior envelope materials and products as required in individual Specification Sections. Provide adequate supporting structure for mock-up materials as necessary.

D. Room Mock-ups: Construct room mock-ups as indicated on drawings. Coordinate installation of materials, products, and assemblies as required in specification sections; finish according to requirements. Provide required lighting and any supplemental lighting where required to enable Architect to evaluate quality of the mock-up.

E. Notify Architect and Owner seven (7) working days in advance of dates and times when mockups will be constructed.

F. Provide supervisory personnel who will oversee mock-up construction. Provide workers that will be employed during the construction at Project.

G. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.

H. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

I. Obtain Architect's approval of mock-ups before starting work, fabrication, or construction.
   1. Architect will issue written comments within two (2) working days of initial review and each subsequent follow up review of each mockup.
   2. Make corrections as necessary until Architect's approval is issued.

J. Architect will use accepted mock-ups as a comparison standard for the remaining Work.

K. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.

L. Where possible salvage and recycle the demolished mock-up materials.

3.03 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.04 TESTING AND INSPECTION

A. See individual specification sections for testing and inspection required.

B. Testing Agency Duties:
   1. Test samples of mixes submitted by Contractor.

2. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
3. Perform specified sampling and testing of products in accordance with specified standards.
4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
5. Promptly notify Owner, Architect, and Contractor of observed irregularities or non-conformance of Work or products.
6. Perform additional tests and inspections required by Owner or Architect.
7. Attend preconstruction meetings and if request by Owner attend progress meetings.
8. Submit reports of all tests/inspections specified.

C. Limits on Testing/Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not approve or accept any portion of the Work.
3. Agency may not assume any duties of Contractor.
4. Agency has no authority to stop the Work.

D. Contractor Responsibilities:
1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
3. Provide incidental labor and facilities:
   a. To provide access to Work to be tested/inspected.
   b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
   c. To facilitate tests/inspections.
   d. To provide storage and curing of test samples.
4. Notify Owner and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

E. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Owner.

F. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.05 OWNER REQUIRED INSPECTIONS

A. Owner requires inspections by Construction Manager's personnel prior to execution of parts of the Work that will close off the Work from future inspection.

B. Contractor shall notify the Owner telephonically and directly (voice mail not allowed) at least 24 hours in advance of performing the Work requiring inspections by Owner.

C. If Contractor begins the Work requiring inspections by the Owner prior to the expiration of the 24 hour notification period, Owner will require Contractor to uncover the Work at Contractor's cost.

D. Contractor may proceed with the Work requiring inspections by the Owner upon expiration of the 24 hour notification period whether the Owner has representatives on site or not.

E. The following Work requires inspections by the Owner:
1. All underground utilities prior to backfilling.
2. All underground utility trenches prior to backfilling over tracer warning tape.

3. All aggregate base courses prior to placement of asphalt or concrete surfaces.
4. All final graded areas prior to installation of sod or seeding.
5. All segmental block retaining walls prior to backfilling courses below grade.
6. All segmental block retaining walls prior to backfilling first level of geo-grid reinforcement.
7. Spaces above ceilings before hanging support grids.
8. Walls containing sanitary sewer, storm sewer, water, fire sprinkler, heating water supply or return, and any other piping conveying liquid under gravity flow or pressure flow prior to enclosing the wall on both sides.
9. Walls containing sanitary vent, natural gas, compressed air, pneumatic control and any other piping or tubing conveying gaseous material prior to enclosing the wall on both sides.
10. Prior to conducting any pressure tests on systems.
11. All roof curbs prior to installing mechanical equipment on the curbs.
12. All mechanical equipment to be installed on roof curbs prior to installing on the curbs.
13. All electrical cable splices prior to installing equipment or covers over the electrical cable splices

3.06 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance equipment, and training as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to Owner's electronic document management system 30 days in advance of required observations.
   1. Observer subject to approval of Architect.
   2. Observer subject to approval of Owner.

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.07 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not conforming to specified requirements at Contractor's cost.

B. If, in the opinion of Architect, it is not practical to remove and replace the work, Architect will direct an appropriate remedy or adjust payment.

END OF SECTION 014000

SECTION 014100
REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Owner regulatory requirements.

B. County, Municipality, and Fire District regulatory requirements.

C. State regulatory requirements.

D. Federal regulatory requirements.

1.02 OWNER

A. No Tobacco Use Policy:
   1. Owner has adopted a tobacco free site policy.
   2. No tobacco products may be used in the Owner's facilities or on the Owner's grounds.
   3. Any Contractor or Subcontractor employee discovered violating this policy may be required to leave the Project site and may not be allowed to return to the Project.

B. No Firearms Policy:
   1. Owner has adopted a firearms free site policy.
   2. No firearms may be brought in the Owner's facilities or on the Owner's grounds.
   3. Any Contractor or Subcontractor employee discovered violating this policy may be required to leave the Project site and may not be allowed to return to the Project.

C. Alcohol and Controlled Substances Policy:
   1. Owner has adopted a alcohol and controlled substance free site policy.
   2. No alcohol or controlled substances may be brought in the Owner's facilities or on the Owner's grounds.
      a. Exception: Controlled substances prescribed by a doctor specifically for the use of the Contractor or Subcontractor employee in the original prescription container will be allowed.
   3. Any Contractor or Subcontractor employee discovered violating this policy may be required to leave the Project site and may not be allowed to return to the Project.

1.03 COUNTY, MUNICIPALITY, AND FIRE DISTRICT

A. Regulatory requirements applicable to this project are the following:

B. 29 CFR 1910 - Occupational Safety and Health Standards.

C. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines.

D. ADA Standards - 2010 ADA Standards for Accessible Design.

E. County of St. Louis amendments to some or all of the following.

F. Municipality where the Project is located amendments to some or all of the following.

G. Zoning Code: St. Louis County or Municipality where the project is located.

H. ICC (IBC) - International Building Code.

I. ICC A117.1 - Accessible and Usable Buildings and Facilities.

J. ICC (IBC) - ICC International Existing Building Code, 2009.

K. IAPMO (UPC) - Uniform Plumbing Code.

L. ICC (IFGC) - International Fuel Gas Code.

M. ICC (IMC) - International Mechanical Code.

N. NFPA 70 - National Electrical Code.

O. Elevator Code: State of Missouri and County of St. Louis.

P. ICC (IECC) - International Energy Conservation Code.

Q. Erosion and Sedimentation Control Regulations:Most recent edition adopted by Authority Having Jurisdiction, including all applicable amendments and supplements.

1.04 STATE

A. Prevailing Wage Law:
   1. Contractor and Subcontractors shall comply with the requirements of this paragraph 1.04 and Section 290.220 RSMo which provides that "a wage of no less than the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed, shall be paid to all workers employed by or on behalf of any public body engaged in public works exclusive of maintenance work."
   2. Contractor shall forfeit to the Owner the sum of One Hundred Dollars ($100.00) for each worker employed, for each calendar day, or portion thereof such worker is paid less than the said stipulated rates for any work done under this Contract, by the Contractor or by any Subcontractor to the Contractor.
   3. Contractor shall include provisions in all bonds to guarantee the faithful performance of the prevailing wage requirements specified herein.
   4. Contractor shall post in a prominent and easily accessible place at the Project Site during the full time that any worker shall be employed on the Project a clearly legible statement of all prevailing hourly wage rates to be paid to all workers employed in order to execute the Contract and perform the Work.
   5. Owner may request from time to time certified copies of Contractor's payroll to ascertain if Contractor is in compliance.
   6. Contractor shall execute an affidavit stating compliance with the prevailing wage law upon completion of the Project and before final payment request.
      a. The affidavit form is in Section 006000 - Project Forms.
   7. The Contractor and each Subcontractor shall maintain accurate records pertaining to wages paid all workers employed on the Project within the State of Missouri for a period of not less than 1 year following Final Acceptance by Owner.
   8. Wage Rate Determination for this Project is attached following this section.
   9. Submittals:
      a. Contractor will execute an affidavit stating compliance with the prevailing wage law upon completion of the project and before final payment request.
      b. The affidavit form is in Section 006000 - Project Forms.
      c. Submit affidavit form prior to submitting Final Application for Payment or no later than 42 days from Substantial Completion, whichever comes first.

B. Construction Safety Training Law:
   1. Contractor and Subcontractors shall comply with the requirements of 1.04 and Section 290.220 RSMo which provides that "any Contractor for any public body for purposes of construction of public works and any Subcontractor to such Contractor shall provide a ten-hour Occupational Safety and Health Administration (OSHA) construction safety program [the program] for their on-site employees which includes a course in construction safety and health approved by OSHA or a similar program approved by the department [of labor] which is at least as stringent as an approved OSHA program, unless such employees have previously completed the required program".
   2. Contractor and Subcontractors shall require all on-site workers to complete the ten-hour training program or such employees must hold documentation of prior completion of the program.
      a. Contractor shall require every on-site worker to report to the Contractor's Project Superintendent and produce documentation of successful completion of the program upon the on-site worker's first day working on the Project Site.

b. Contractor shall maintain a log of on-site workers that includes the worker's name, worker's signature, date worker began work on Project Site, company name employing worker, and training certification number on Owner's Standard OSHA 10 Hour Construction Safety & Health Training Log Form .
c. Contractor and Subcontractors shall require all on-site workers to carry documentation of successful completion of the program at all times while working on Project Site and present the documentation to the Owner's Representative when requested.

3. Contractor and Subcontractors shall require all on-site workers who have not previously completed the program to complete the program within sixty calendar days of beginning work on the Project.
   a. Any on-site worker who cannot produce documentation of successful completion of the program as required by paragraph 1.04.B.2 of this Section shall produce documentation of successful completion of the program within twenty calendar days of the initial request to present documentation.
   b. Any on-site worker who fails to present the documentation of successful completion of the program within twenty calendar days shall be removed from the Project until such time as the on-site worker can present the documentation of successful completion of the program.
4. Contractor shall forfeit as a penalty to the Owner two thousand five hundred dollars ($2,500.00) plus one hundred dollars ($100.00) for each employee employed by the Contractor or Subcontractor for each calendar day, or portion thereof, such employee is employed without the required training.
   a. The penalty will not begin to accrue until the time period in paragraphs 1.04.3 and 1.04.3.a of this Section have elapsed.
   b. Owner will withhold and retain therefrom all sums and amounts due and owing as a result of any violation of Section 292.675 RSMo when making payments to the Contractor under the Contract.
   c. Contractor may withhold from any Subcontractor sufficient sums to cover any penalties the Owner has withheld from the Contractor resulting from the Subcontractor's failure to comply with the terms of this Section.
      1) If the Contractor has made payment to the Subcontractor without withholding, the Contractor may recover from the Subcontractor the amount of the penalty resulting from the fault of the Subcontractor in an action maintained in the circuit court in the county in which the Project is located.
5. Submittals:
   a. Owner's Standard OSHA 10 Hour Construction Safety & Health Training Log Form is in Section 006000 - Project Forms.
   b. Submit a copy of the Owner's Standard OSHA 10 Hour Construction Safety & Health Training Log required under paragraph 1.04.B.2.b of this Section prior to submitting Final Application for Payment or no later than 42 days from Substantial Completion, whichever comes first.

1.05 FEDERAL

A. Immigration Documentation:
   1. The Immigration Reform and Control Act of 1986 (“IRCA”) requires all U.S. employers to verify the employment eligibility and identity of all employees as of November 6, 1986.
      a. This includes the verification of the individual's identity and work eligibility.
      b. The IRCA makes it unlawful for United States employers to knowingly hire or continue to employ unauthorized workers.
      c. Whether the illegal employment is intentional or merely due to an oversight or lack of knowledge, the employer may still be subject to fines as defined by the Department of Homeland Security.
   2. Employer Responsibility:

a. It is the employer's responsibility to ensure that the appropriate documentation is provided to every new employee hired after November 6th, 1986.
b. There are stiff penalties for not being able to provide Form I-9 for all employees upon request.
c. The employer has the right to refuse the employee their job if they are unable to furnish the required documents.
d. There are certain exceptions as to who Form I-9 is applicable for, such as independent contractors, employees hired from employment agencies, and employees hired before November 7, 1986.

3. Penalties for non compliance with Form I-9:
   a. Employers who fail to properly complete, retain, or make I-9 Forms available for inspection, face fines ranging from one hundred dollars ($100.00) to one thousand one hundred dollars ($1,100.00) per individual I-9.
   b. For employers who knowingly hire or knowingly continue to employ unauthorized workers, civil penalties range from two hundred fifty dollars ($250.00) to eleven thousand dollars ($11,000.00) per violation.
   c. For employers engaging in a pattern or practice of knowingly hiring or continuing to employ unauthorized workers, criminal penalties can be as much as three thousand dollars ($3,000.00) per unauthorized employee and/or 6 months of imprisonment.
4. Employee Responsibility:
   a. Even though the employer is responsible for providing a newly hired employee with Form I-9, the new employee must still complete Section 1 of Form I-9 by the end of the first day of work to be in compliance with the IRCA.
   b. In the event that the company is not aware of this legal requirement, it is strongly recommended that any new employee provide the employer with Form I-9 to ensure that his or her new workplace is in compliance with federal regulations.
5. Genuineness of work eligibility and identity documents:
   a. The employer must review the genuineness of the documents provided the employee. Employers may encounter the following two scenarios:
      1) A document accepted is not genuine
      2) The document accepted is genuine but does not belong to the person that provided it
   b. The employer can refuse to accept a document that does not appear to be genuine.
   c. If the prospective new employee cannot provide an acceptable document, he or she should not be allowed to continue to work.
6. Submittals:
   a. Contractor and Subcontractors shall submit a letter on their respective company letterhead, signed by authorized representative of the Contractor or Subcontractor is in compliance with the IRCA and that I-9 forms and supporting documentation are on file as required.
   b. Submit certification within 28 days from Notice to Proceed date but prior to beginning the Work on Project Site.

B. Refrigerant Management:
   1. Under Section 608 of the CAA, EPA has established regulations (40 CFR Part 82, Subpart F) that:
      a. Require service practices that maximize recovery and recycling of ozone-depleting substances (both chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) and their blends) during the servicing and disposal of air-conditioning and refrigeration equipment.
      b. Set certification requirements for refrigerant recycling and recovery equipment, technicians, and refrigerant reclaimers.
      c. Restrict the sale of refrigerant to certified technicians.

d. Require persons servicing or disposing of air-conditioning and refrigeration equipment to certify to EPA that they have acquired refrigerant recovery and/or recycling equipment and are complying with the requirements of the rule.
e. Require the repair of substantial leaks in air-conditioning and refrigeration equipment with a refrigerant charge greater than 50 pounds.
f. Establish safe disposal requirements to ensure removal of refrigerants from goods that enter the waste stream with the charge intact (e.g., motor vehicle air conditioners, home refrigerators, and room air conditioners).

2. Contractor shall complete an Owner's Standard Contractor Information and Licensing Input Form and identify all technicians that will work on equipment that uses a refrigerant.
   a. All technicians must carry a “Universal” class refrigerant technician license.
   b. Photocopies of each technician's license shall be attached to the Owner's Standard Contractor Information and Licensing Input Form.
3. Contractor shall complete an Owner's Standard Equipment Removal/Installation Input Form for each piece of equipment that uses a refrigerant removed as part of the Work.
4. Contractor shall complete an Owner's Standard Equipment Removal/Installation Input Form for each piece of equipment that uses a refrigerant installed as part of the Work.
5. Contractor shall complete an Owner's Standard Service Order Form for each removal or addition of refrigerant for each piece of equipment.
6. Disposition of Refrigerant:
   a. Contractor shall turn over all removed refrigerant to the Owner in containers conforming to DOT and EPA requirements and in good condition.
   b. Refrigerant containers shall be tagged with the name of the Contractor, the Owner's Project number, the Owner's equipment number, and the type of refrigerant in the container.
   c. Refrigerant will remain the property of the Owner.
   d. The Owner will contact the Contractor after refrigerant is transferred to Owner's storage containers to arrange time for Contractor to retrieve Contractor's refrigerant containers.
   e. Deliver refrigerant containers to the Owner at the District Operations Building, 363 North Woods Mill Road, Chesterfield, Missouri 63017, between the hours of 8:00 a.m. and 3:00 p.m. Monday through Friday.
   f. Notify Owner forty-eight hours in advance of delivery; obtain receipt from Owner at time of delivery.
7. Submittals:
   a. Contractor's transmittal form documenting delivery date, type of refrigerant, and quantity of refrigerant delivered to Owner.
   b. The following forms to be used are in Section 006000 - Project Forms:
      1) Owner's Standard Contractor Information and Licensing Input Form: submit within 28 days from Notice to Proceed date but prior to beginning the Work on Project Site.
      2) Owner's Standard Equipment Installation/Removal Input Form: submit all equipment forms as one submittal package prior to Substantial Completion date.
      3) Owner's Standard Service Order Form: submit all service order forms for removing, addiing, or accidental venting of refrigerant as one submittal package prior to Substantial Completion date.

1.06 RELATED REQUIREMENTS

A. Section 014000 - Quality Requirements.

1.07 QUALITY ASSURANCE

A. Contractor's Designer Qualifications: Refer to Section - 014000 - Quality Requirements.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 014100

Missouri
Division of Labor Standards
WAGE AND HOUR SECTION

MIKE KEHOE, Governor

Annual Wage Order No. 33

Section 100
ST. LOUIS COUNTY

In accordance with Section 290.262 RSMo 2000, within thirty (30) days after a certified copy of this Annual Wage Order has been filed with the Secretary of State as indicated below, any person who may be affected by this Annual Wage Order may object by filing an objection in triplicate with the Labor and Industrial Relations Commission, P.O. Box 599, Jefferson City, MO 65102-0599. Such objections must set forth in writing the specific grounds of objection. Each objection shall certify that a copy has been furnished to the Division of Labor Standards, P.O. Box 449, Jefferson City, MO 65102-0449 pursuant to 8 CSR 20-5.010(1). A certified copy of the Annual Wage Order has been filed with the Secretary of State of Missouri.

Original Signed by
Logan Hobbs, Director
Division of Labor Standards

Filed With Secretary of State: **March 10, 2026**

Last Date Objections May Be Filed: **April 9, 2026**

Prepared by Missouri Department of Labor and Industrial Relations

ST. LOUIS COUNTY

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Asbestos Worker	$72.26
Boilermaker	$44.93*
Bricklayer - Stone Mason	$65.89
Carpenter	$69.38
Lather	
Linoleum Layers & Cutter	
Millwright	
Pile Driver	
Cement Mason	$61.40
Plasterer	
Communication Technician	$67.84
Electrician (Inside Wireman)	$79.41
Electrician (Outside Lineman)	$44.93*
Outside - Groundman	
Outside - Groundman Tree Trimmer	
Outside - Lineman Operator	
Outside - Lineman Tree Trimmer	
Elevator Constructor	$106.30
Glazier	$71.63
Iron Worker	$75.80
Laborer	$58.92
Laborer - First Semi-Skilled	
Laborer - General	
Laborer - Second Semi-Skilled	
Laborer - Skilled	
Mason	$57.31
Marble Finisher	
Marble Mason	
Terrazzo Finisher	
Terrazzo Worker	
Tile Finisher	
Tile Setter	
Operating Engineer	$76.62
Operating Engineer - Group I	
Operating Engineer - Group II	
Operating Engineer - Group III	
Operating Engineer - Group III - A	
Operating Engineer - Group IV	
Operating Engineer - Group V	
Painter	$57.67
Plumber	$83.99
Pipe Fitter	
Roofer/WaterProofer	$62.13
Sheet Metal Worker	$78.63
Sprinkler Fitter - Fire Protection	$88.12
Truck Driver	$44.93*
Truck Control Service Driver	
Truck Driver, Teamsters Group I	
Truck Driver, Teamsters Group II	
Truck Driver, Teamsters Group III	
Truck Driver, Teamsters Group IV	

*** The Division of Labor Standards received fewer than 1,000 reportable hours for this occupational title. The public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.**

****The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title as defined in RSMo Section 290.210.**

ST. LOUIS COUNTY

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Carpenter	$70.28
Millwright	
Pile Driver	
Electrician (Outside Lineman)	$77.51
Outside - Groundman	
Outside - Groundman Tree Trimmer	
Outside - Lineman Operator	
Outside - Lineman Tree Trimmer	
Laborer	$59.45
Laborer - General	
Laborer - Skilled	
Operating Engineer	$76.52
Operating Engineer - Group I	
Operating Engineer - Group II	
Operating Engineer - Group III	
Operating Engineer - Group IV	
Truck Driver	$40.45
Truck Control Service Driver	
Truck Driver, Teamsters Group I	
Truck Driver, Teamsters Group II	
Truck Driver, Teamsters Group III	
Truck Driver, Teamsters Group IV	

Use Heavy Construction Rates on Highway and Heavy construction in accordance iwth the classifications of construction work established in 8 CSR 30-3.040(3).

Use Building Construction Rates on Building construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(2).

If a worker is performing work on a heavy construction project within an occupational title that is not listed on the Heavy Construction Rate Sheet, use the rate for that occupational title shown on the Building Construction Rate Sheet.

***The Division of Labor Standards received fewer than 1,000 reportable hours for this occupational title. Public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.**

****The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title.**

OVERTIME
and
HOLIDAYS

OVERTIME

For all work performed on a Sunday or a holiday, not less than twice (2x) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work.

For all overtime work performed, not less than one and one-half (1½) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work or contractual obligation. For purposes of this subdivision, **"overtime work"** shall include work that exceeds ten hours in one day and work in excess of forty hours in one calendar week; and

A thirty-minute lunch period on each calendar day shall be allowed for each worker on a public works project, provided that such time shall not be considered as time worked.

HOLIDAYS

January first;
The last Monday in May;
July fourth;
The first Monday in September;
November eleventh;
The fourth Thursday in November; and
December twenty-fifth;

If any holiday falls on a Sunday, the following Monday shall be considered a holiday.

SECTION 014113
ASBESTOS ABATEMENT CODES, REGULATIONS AND STANDARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Summary.

B. Codes and regulations.

C. Standards.

D. EPA guidance documents.

E. Notices.

F. Posting and filing of regulations.

G. Submittals related to regulatory requirements.

1.02 SUMMARY

A. This section sets forth governmental regulations and industry standards which are included and incorporated herein by reference and made a part of the specification. This section also sets forth those notices and permits which are known to the Owner and which either must be applied for and received, or which must be given to governmental agencies before start of work.

B. Requirements include adherence to work practices and procedures set forth in applicable codes, regulations and standards.

C. Requirements include obtaining permits, licenses, inspections, releases and similar documentation, as well as payments, statements and similar requirements associated with codes, regulations, and standards.

1.03 CODES AND REGULATIONS

A. General Applicability of Codes and Regulations, and Standards: Except to the extent that more explicit or more stringent requirements are written directly into the contract documents, all applicable codes, regulations, and standards have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the contract documents, or as if published copies are bound herewith.

B. Contractor Responsibility: The Contractor shall assume full responsibility and liability for the compliance with all applicable Federal, State, and local regulations pertaining to work practices, hauling, disposal, and protection of workers, visitors to the site, and persons occupying areas adjacent to the site. The Contractor is responsible for providing medical examinations and maintaining medical records of personnel as required by the applicable Federal, State, and local regulations. The Contractor shall hold the Owner and Owner's Representative harmless for failure to comply with any applicable work, hauling, disposal, safety, health or other regulation on the part of himself, his employees, or his subcontractors.

C. Federal Requirements: Which govern asbestos abatement work or hauling and disposal of asbestos waste materials include but are not limited to the following:
   1. OSHA: U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA), including but not limited to:
      a. Asbestos 29 CFR 1910.1001 and 29 CFR 1926.1101
      b. Respiratory Protection 29 CFR 134
      c. Access to Employee Exposure and Medical Records 29 CFR 20
      d. Hazard Communication 29 CFR 1910.1200
      e. Specifications for Accident Prevention Signs and Tags 29 CFR 1910.145
   2. DOT: U. S. Department of Transportation, including but not limited to:
      a. Hazardous Substances 49 CFR 171 and 172

3. EPA: U. S. Environmental Protection Agency (EPA), including but not limited to:
    a. Asbestos Abatement Projects; Worker Protection Rule 40 CFR 763, Sub-part G
    b. Asbestos Hazard Emergency Response Act (AHERA) Regulation Asbestos Containing Materials in Schools Final Rule & Notice 40 CFR 763, Sub-part E
    c. Training Requirements of (AHERA) Regulation Asbestos Containing Materials in Schools Final Rule & Notice 40 CFR 763, Sub-part E, Appendix C
    d. National Emission Standard for Hazardous Air Pollutants (NESHAP) National Emission Standard for Asbestos 40 CFR 61, Sub-part A and M

D. State Requirements: Which govern asbestos abatement work or hauling and disposal of asbestos waste materials include but are not limited to the following:
1. Missouri Department of Natural Resources
    a. Air pollution Control Program Asbestos Abatement Projects Registration, Notification, and Performance Requirements10 CSR 10-6

E. Local Requirements: Abide by all local requirements which govern asbestos abatement work or hauling and disposal of asbestos waste materials.
1. Saint Louis County
    a. Air Pollution Control Code Section 612.530.

1.04 STANDARDS

A. General Applicability of Standards: Except to the extent that more explicit or more stringent requirements are written directly into the Contract Documents, all applicable standards have the same force and effect (and are made a part of the Contract Documents by reference) as if copied directly into the Contract Documents, or as if published copies are bound herewith.

B. Contractor Responsibility: The Contractor shall assume full responsibility and liability for the compliance with all standards pertaining to work practices, hauling, disposal, and protection of workers, visitors to the site, and persons occupying areas adjacent to the site. The Contractor shall hold the Owner and Owner's Representative harmless for failure to comply with any applicable standard on the part of himself, his employees, or his subcontractors.

C. Standards: Which apply to asbestos abatement work or hauling and disposal of asbestos waste materials include but are not limited to the following:
1. American National Standards Institute (ANSI), 1180 6th Ave, 10th floor, New York, NY 10036; Telephone (212) 642-4980
    a. Fundamentals Governing the Design and Operation of Local Exhaust Systems Publication Z9.2-79
    b. Practices for Respiratory Protection Publication Z88.2-80
2. American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, West Conshohocken, PA 19428; Telephone: (610) 832-9500
    a. Safety and Health Requirements Relating to Occupational Exposure to Asbestos E 849-82
    b. Standard Practice for Visual Inspection of Asbestos Abatement Projects E 1368-90
    c. Specification for Encapsulants for Friable Asbestos Containing Building Materials Proposal P-189

1.05 EPA GUIDANCE DOCUMENTS

A. EPA Guidance Documents: Discuss asbestos abatement work or hauling and disposal of asbestos waste materials listed below for the Contractor's information only. These documents do not describe the work and are not a part of the work of this contract.

B. Guidance for Controlling Asbestos-Containing Materials in Buildings (Purple Book) EPA 560/5-85-024

C. Evaluation of the EPA Asbestos-in-Schools Identification and Notification Rule. EPA 560/5-84-005.

D. Asbestos in Buildings: Guidance for Service and Maintenance Personnel. EPA 560/5-85-018.

E. Asbestos Waste Management Guidance. EPA 530-SW-85-007.

F. Managing Asbestos in Place. A Building Owner's Guide to Operations and Maintenance Programs for Asbestos-Containing Materials. EPA 20T-2003

G. A Guide to Respiratory Protection for the Asbestos Abatement Industry. EPA-560-OPTS-86-001

1.06 NOTICES

A. U.S. Environmental Protection Agency:
   1. Send Written Notification as required by USEPA National Emission Standards for Hazardous Air Pollutants (NESHAP) Asbestos Regulations (40 CFR 61, Subpart M) to the regional Asbestos NESHAP Contact at least 10 days prior to beginning any work on asbestos-containing materials. Send notification to the following address:
      a. REGION 7:
         Asbestos NESHAP Contact
         Air & Waste Management Division
         USEPA
         11201 Renner Blvd.
         Lenexa KS, 66219
         (913) 551-7003
   2. Notification: Complete the notification form provided in 40 CFR 61 and send to the NESHAP contact.

B. State and Local Agencies:
   1. Notification: Send written notification as required by state and local regulations prior to beginning any work on asbestos-containing materials.
   2. Missouri Department of Natural Resources:
      a. Air Pollution Control Program
         P.O. Box 176
         Jefferson City, Missouri 65102
         (573) 751-4817
   3. Saint Louis County:
      a. Department of Health
         6121 North Hanley Road
         Berkeley, Missouri 63134
         (314) 615-8924
   4. Permits and licenses: Obtain and maintain current permits and licenses as required by applicable state or local jurisdictions for the removal, transporting, disposal or other regulated activity relative to the work of this contract.

1.07 POSTING AND FILING OF REGULATIONS

A. Posting and Filing of Regulations: Post all notices required by applicable federal, state and local regulations. Maintain at least one (1) copy of applicable federal, state and local regulations and standard.

1.08 SUBMITTALS RELATED TO REGULATORY REQUIREMENTS

A. Before the Start of Work: Submit the following to the Owner for review. No work shall begin until these submittals are provided.

B. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receiptsfor fee payments, judgments, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work including:

1. Notices: Submit notices required by federal, state and local regulations together with proof of timely transmittal to agency requiring the notice.
2. Permits: Submit copies of current valid permits required by state and local regulations.
3. Licenses: Submit copies of all State and local licenses and permits necessary to carry out the work of this contract.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 014113

SECTION 014216
DEFINITIONS

PART 1 GENERAL

1.01 SUMMARY

A. This section supplements the definitions contained in the General Conditions.

B. Other definitions are included in individual specification sections.

1.02 DEFINITIONS

A. Contract: Same as Agreement.

B. Furnish: To supply, deliver, unload, and inspect for damage.

C. Install: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.

D. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never before used, or re-used materials or equipment.

E. Project Manual: The book-sized volume that includes the procurement requirements (if any), the contracting requirements, and the specifications.

F. Provide: To furnish and install.

G. Supply: Same as Furnish.

H. Other Secification Sections

1. Approve: The term "approved," where used in conjunction with the Owner's Representative's action on the Contractor's submittals, applications, and requests, is limited to the responsibilities and duties of the Architect stated in General and Supplementary Conditions. Such approval shall not release the Contractor from responsibility to fulfill Contract Document requirements, unless otherwise provided in the Contract Documents.
2. Directed: Terms such as "directed", "requested", "authorized", "selected", "approved", "required", and "permitted" mean "directed by the Owner's Representative", "requested by the "Owner's Representative", and similar phrases. However, no implied meaning shall be interpreted to extend the Owner's Representative's responsibility into the Contractor's area of construction supervision.
3. Furnish: The term "furnish" is used to mean, "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations."
4. Foreman: This is the Contractor's Representative at the work site. This person will generally be the Competent Person required by OSHA in 29 CFR 1926.
5. General Superintendent: This is the Contractor's Representative supervising multiple project sites or on large scale project. This person may be the Competent Person required by OSHA in 29 CFR 1926.
6. Indicated: This term refers to graphic representations, notes or schedules on the Drawings, or other Paragraphs or Schedules in Specifications, and similar requirements in Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used, it is to help locate the reference; no limitation on location is intended except as specifically noted.
7. Install: The term "install" is used to describe operations at project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations."
8. Installer: An "installer" is an entity engaged by the Contractor, either as an employee, subcontractor or sub subcontractor for performance of a particular construction activity, including installation, erection, application and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

9. Owner's Representative: This is the entity described as the "Architect" in AIA Document A201 "General Conditions of the Contract for Construction." All references to Architect or Engineer in the Contract Documents in all cases refer to the Owner's Representative. The Owner's Representative will represent the Owner during construction and until final payment is due. The Owner's Representative will advise and consult with the Owner. The Owner's instructions to the Contractor will be forwarded through the Owner's Representative.
10. Project Administrator: This is the entity described as the "Project Representative" in AIA Document A201 "General Conditions of the Contract for Construction," or is the entity described as "Engineer" in Engineers Joint Contract Document Committee (EJCDC) Document 1910-8 "Standard General Conditions of the Construction Contract." The Project Administrator is a full time representative of the Owner at the job site with authority to stop the work upon verbal order if requirements of the Contract Documents are not met, or if in the sole judgment of the Project Administrator, Owner's Representative, Owner, the interests of the Owner, safety of any person or the Owner's property are jeopardized by the work. The Project Administrator is different from the position of Owner's Representative as used in these documents, the latter having more limited authority in general and specifically not having authority to stop the work.
11. Project Site is the space available to the Contractor for performance of the work, either exclusively or in conjunction with others performing other construction as part of the project.
12. Provide: The term "provide" means "to furnish and install, complete and ready for the intended use."
13. Regulation: The term "Regulations" includes laws, statutes, ordinances, patents, royalties and lawful orders issued by authorities having jurisdiction, as well as rules, conventions and agreements within the construction industry that control performance of the Work, whether they are lawfully imposed by authorities having jurisdiction or not.
14. Testing Laboratories: A "testing laboratory" is an independent entity engaged to perform specific inspections or tests, either at the project site or elsewhere, and to report on, and, if required, to interpret, results of those inspections or tests.+

I. Definitions Relative to Asbestos Abatement
1. Accredited or Accreditation (when referring to a person or laboratory): A person or laboratory accredited in accordance with section 206 of Title II of the Toxic Substances Control Act (TSCA).
2. Aerosol: A system consisting of particles, solid or liquid, suspended in air.
3. Air Cell: Insulation normally used on pipes and duct work that is comprised of corrugated cardboard which is frequently comprised of asbestos combined with cellulose or refractory binders.
4. Air Monitoring: The process of measuring the fiber content of a specific volume of air.
5. Amended Water: Water to which a surfactant has been added to increase the ability of the liquid to penetrate ACM.
6. Asbestos: The asbestiform varieties of serpentinite (chrysotile), riebeckite (crocidolite), cummingtonite grunerite, anthophyllite, and actinolite tremolite.
7. Asbestos Containing Material (ACM): Any material containing asbestos more than one percent asbestos of any type or mixture of types.
8. Asbestos-Containing Building Material (ACBM): Surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on interior structural members or other parts of a building.
9. Asbestos Containing Waste Material: Any material which is or is suspected of being or any material contaminated with an asbestos containing material which is to be removed from a work area for disposal.
10. Asbestos Debris: Pieces of ACBM that can be identified by color, texture, or composition, or means dust, if the dust is determined by an accredited inspector to be ACM.

11. Authorized Visitor: The Owner, the Owner's Representative, testing lab personnel, the Architect/Engineer, emergency personnel or a representative of any federal, state and local regulatory or other agency having authority over the project.
12. Barrier: Any surface that seals off the work area to inhibit the movement of fibers.
13. Breathing Zone: A hemisphere forward of the shoulders with a radius of approximately 6 to 9 inches.
14. Ceiling Concentration: The concentration of an airborne substance that shall not be exceeded.
15. Certified Industrial Hygienist (C.I.H.): An industrial hygienist certified in Comprehensive Practice by the American Board of Industrial Hygiene.
16. Class I Asbestos Work: Activities involving the removal of TSI and surfacing ACM or PACM.
17. Class II Asbestos Work: Activities involving the removal of ACM which is not TSI or surfacing material. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastics.
18. Competent Person: One who meets the definition in 29 CFR 1926.32(f) and is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them, and is specially trained in a training course which meets the criteria of EPA's Model Accreditation Plan for project designer or supervisor.
19. Critical Barriers: One or more layers of plastic sealed over all openings into a work area or any other similarly placed physical barrier sufficient to prevent airborne asbestos in a work area from migrating to an adjacent area.
20. Decontamination Area: An enclosed area adjacent and connected to the regulated area and consisting of an equipment room, shower area, and clean room, which is used for decontamination of workers, materials and equipment that are contaminated with asbestos.
21. Demolition: The wrecking or taking out of any building component, system, finish or assembly of a facility together with any related handling operations.
22. Disposal Bag: A 6 mil thick leak tight plastic bag, properly marked with the OSHA Asbestos DANGER legend, used for transporting asbestos waste from work and to disposal site.
23. Encapsulant: A material that surrounds or embeds asbestos fibers in an adhesive matrix, to prevent release of fibers.
24. Bridging encapsulant: an encapsulant that forms a discrete layer on the surface of an in situ asbestos matrix.
25. Penetrating encapsulant: an encapsulant that is absorbed by the in situ asbestos matrix without leaving a discrete surface layer.
26. Removal encapsulant: a penetrating encapsulant specifically designed to minimize fiber release during removal of asbestos containing materials rather than for in situ encapsulation.
27. Encapsulation: Treatment of asbestos containing materials, with an encapsulant.
28. Enclosure: The construction of an air tight, impermeable, permanent barrier around asbestos containing material to control the release of asbestos fibers into the air.
29. Filter: A media component used in respirators to remove solid or liquid particles from the inspired air.
30. Friable Asbestos Material: Material that contains asbestos and that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.
31. Glovebag: An impervious plastic bag-like enclosure affixed around ACM with glove-like appendages through which materials and tools may be handled.
32. HEPA Filter: A High Efficiency Particulate Air (HEPA) filter capable of trapping and retaining 99.97% of asbestos fibers greater than 0.3 microns in diameter.

33. HEPA Filter Vacuum Collection Equipment (or vacuum cleaner): High Efficiency Particulate Air filtered vacuum collection equipment with a filter system capable of collecting and retaining asbestos fibers. Filters should be of 99.97% efficiency for retaining fibers of 0.3 microns or larger.
34. High Efficiency Particulate Air filter: (HEPA) refers to a filtering system capable of trapping and retaining 99.97 percent of all monodispersed particles 0.3 microns in diameter or larger.
35. Negative Pressure Respirator: A respirator in which the air pressure inside the respiratory inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.
36. Negative Initial Exposure Assessment: A demonstration by the contractor which complies with the criteria specified in 29 CFR 1926.1101 that employee exposure during an operation is expected to be consistently below the PELs.
37. Negative Pressure System: A pressure differential and ventilation system, consisting of a local exhaust system, utilizing HEPA filtration capable of maintaining a pressure differential with the inside of the Work Area at a lower pressure than any adjacent area, and which cleans recirculated air or generates a constant air flow from adjacent areas into the Work Area.
38. Personal Monitoring: Sampling of the asbestos fiber concentrations within the breathing zone of an employee.
39. Permissible Exposure Limits (PELs): Not in excess of 0.1 f/cc airborne asbestos fiber concentration as a 8-hour time weighted average (TWA) or 1.0 f/cc over a sampling period of 30 minutes as measured by NIOSH method 7400.
40. Presumed Asbestos-Containing Material (PACM): Thermal system insulation and surfacing material found in buildings constructed no later than 1980.
41. Protection Factor: The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.
42. Repair: Returning damaged ACBM to an undamaged condition or to an intact state so as to prevent fiber release.
43. Regulated Area: An area established to demarcate areas where Class I, II, and III asbestos work is conducted, and any adjoining area where debris and waste from such asbestos work accumulate. A work area within which airborne concentrations of asbestos exceed or there is a reasonable possibility they may exceed the permissible exposure limit.
44. Respirator: A device designed to protect the wearer from the inhalation of harmful atmospheres.
45. Surfacing Material: Material that is sprayed, troweled-on or otherwise applied to surfaces.
46. Surfactant: A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.
47. Thermal System Insulation (TSI): ACM applied to pipes, fitting, boilers, breeching, tanks, ducts or other structural components to prevent heat loss or gain.
48. Time Weighted Average (TWA): The average concentration of a contaminant in air during a specific time period.
49. Visible Emissions: Any emissions containing particulate asbestos material that are visually detectable without the aid of instruments. This does not include condensed uncombined water vapor.
50. Wet Cleaning: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning utensils that have been dampened with amended water or diluted removal encapsulant and afterwards thoroughly decontaminated or disposed of as asbestos-contaminated waste.

51. Work Area: The area where asbestos-related work or removal operations are performed which is defined and/or isolated to prevent the spread of asbestos dust, fibers or debris, and entry by unauthorized personnel. Work area is a Regulated Area as defined by 29 CFR 1926.

1.03 ASSIGNMENT OF SPECIALISTS

A. This Specification requires that certain specific construction activities shall be performed by specialists who are recognized experts in the operations to be performed. The specialists must be engaged for those activities, and the assignments are requirements over which the Contractor has no choice or option. Nevertheless, the ultimate responsibility for fulfilling Contract requirements remains with the Contractor.

B. This requirement should not be interpreted to conflict with enforcement of building codes or regulations governing the work. It is also not intended to interfere with local trade union jurisdictional settlements and similar conventions.

C. Trades: Use of titles such as "carpentry" is not intended to imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.

1.04 INDUSTRY STANDARDS

A. Applicability of Standards: Except where Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into Contract Documents. Such standards are made a part of the Contract Documents by reference. Individual Sections indicate which codes and standards the Contractor must keep available at the Project Site for reference.

B. Referenced industry standards take precedence over standards that are not referenced but recognized in the construction industry as applicable.

C. Unreferenced industry standards are not directly applicable to the work, except as a general requirement of whether the work complies with recognized construction industry standards.

D. Publication Dates: Where compliance with an industry standard is required, comply with standard in effect as of date of execution of the work.

E. Updated Standards: At the request of the Owner, Contractor may submit a Change Order proposal where applicable code or standard has been revised and reissued after the date of the Contract Documents and before performance of Work affected. The Owner will decide whether to issue a Change Order to proceed with the updated standard.

F. Conflicting Requirements: Where compliance with two or more standards is specified, and they establish different or conflicting requirements for minimum quantities or quality levels, the most stringent requirement will be enforced, unless the Contract Documents indicate otherwise. Refer requirements that are different, but apparently equal, and uncertainties as to which quality level is more stringent to the Owner for a decision before proceeding.

G. Minimum Quantities or Quality Levels: In every instance the quantity or quality level shown or specified shall be the minimum to be provided or performed. The actual installation may comply exactly, within specified tolerances, with the minimum quantity or quality specified, or it may exceed that minimum within reasonable limits. In complying with these requirements, indicated numeric values are minimum or maximum values, as noted, as appropriate for the context of the requirements. Refer instances of uncertainty to the Owner for decision before proceeding.

H. Copies of Standards: Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to that entities' construction activity. Copies of applicable standards are not bound with the Contract Documents.

I. Where copies of standards are needed for performance of a required construction activity, the Contractor shall obtain copies directly from the publication source.

J. Although copies of standards needed for enforcement of requirements may be part of required submittals, the Owner reserves the right to require the Contractor to submit additional copies as necessary for enforcement of requirements.

K. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Where acronyms or abbreviations are used in the Specifications or other Contract Documents they mean the recognized name of the trade association, standards generating organization, authority having jurisdiction or other entity applicable to the context of the text provision. Refer to the "Encyclopedia of Associations," published by Gale Research Co., available in most libraries.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 014216

SECTION 014529
AIR MONITORING TEST LABORATORY SERVICES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Air Monitoring: during work area clearance is described in 017433 - Work Area Clearance.

1.02 DESCRIPTION OF THE WORK

A. This section describes air monitoring carried out by the Owner to verify that the building beyond the work area and the outside environment remains uncontaminated. This section also sets forth airborne fiber levels both inside and outside the work area as action levels, and describes the action required by the Contractor if an action level is met or exceeded.

B. Air monitoring required by OSHA is work of the Contractor and is not covered in this section.

1.03 AIR MONITORING

A. Work Area Isolation: The purpose of the Owner's air monitoring is to detect faults in the work area isolation such as:
   1. Contamination of the building outside of the work area with airborne asbestos fibers.
   2. Failure of filtration or rupture in the negative pressure system.
   3. Contamination of air outside the building envelop by airborne asbestos fibers.

B. Should any of the above occur, immediately cease asbestos abatement activities until the fault is corrected. Do not recommence work until authorized by the Owner's Representative.

C. Work Area Airborne Fiber Count: The Owner will monitor airborne fiber counts in the Work Area. The purpose of this air monitoring will be to detect airborne asbestos concentrations which may challenge the ability of the Work Area isolation procedures to protect the balance of the building or outside of the building from contamination by airborne fibers.

D. Work area clearance: To determine if the elevated airborne fiber counts encountered during abatement operations have been reduced to an acceptable level, the Owner will sample and analyze air per 017433 - Work Area Clearance.

E. The Owner will be conducting air monitoring throughout the course of the project.

1.04 STOP ACTION LEVELS

A. Inside Work Area: Maintain an airborne count in the work area of less than the Stop Action Level given below for the type of respiratory protection in use. If the fiber counts rise above this figure for any sample taken, revise work procedures to lower fiber counts. If a fiber count for any work shift or 8-hour period exceeds the Stop Action Level, stop all work except corrective action, leave negative pressure and air circulation system in operation and notify Owner's Representative. After correcting cause of high fiber levels, do not recommence work for 24 hours unless otherwise authorized, in writing, by Owner's Representative.

STOP ACTION LEVEL (f/cc)	RESPIRATOR REQUIRED	PROTECTION FACTOR
0.1	Half-face/Full-face APR	10
1.0	PAPR or Type C, continuous flow	100
5.0	Type C, pressure demand	1000

B. Outside Work Area: If any air sample taken outside of the Work Area exceeds the base line established prior to start of work, immediately and automatically stop all work except corrective action. The Owner's Representative will determine the source of the high reading and so notify the Contractor in writing.

C. If the high reading was the result of a failure of Work Area isolation measures initiate the following actions:

1. Immediately erect new critical barriers as set forth in Section 015643 Temporary Enclosures to isolate the affected area from the balance of the building. Erect Critical Barriers at the next existing structural isolation of the involved space (e.g. wall, ceiling, and floor).
2. Decontaminate the affected area in accordance with Section 017333 Project Decontamination.
3. Require that respiratory protection as set forth in Section 015736 Respiratory Protection be worn in affected area until area is cleared for reoccupancy in accordance with Section 017433 Work Area Clearance.
4. Leave Critical Barriers in place until completion of work and insure that the operation of the negative pressure system in the Work Area results in a flow of air from the balance of the building into the affected area.
5. If the exit from the clean room of the personnel decontamination unit enters the affected area, establish a decontamination facility consisting of a Shower Room and Changing Room as set forth in Section 015726 Decontamination Units at entry point to affected area.
6. After Certification of Visual Inspection in the Work Area, remove critical barriers separating the work area from the affected area. Final air samples will be taken within the entire area as set forth in Section 017433 Work Area Clearance.

D. If the high reading was the result of other causes, initiate corrective action as determined by the Owner's Representative.

E. Effect on Guaranteed Maximum Price
1. Complete corrective work with no change in the Guaranteed Maximum Price if high airborne fiber counts were caused by Contractor's activities.
2. The Guaranteed Maximum Price will be adjusted for additional work caused by high airborne fiber counts beyond the Contractor's control.

1.05

A. The following methods will be used by the Owner in analyzing filters used to collect air samples. The filters used shall be in accordance with the referenced methods.

B. Samples collected for PCM analysis shall be analyzed by NIOSH 7400 method, most recent method.

C. Samples collected for TEM analysis shall be analyzed by the method set forth in the AHERA Regulations, 40 CFR 763, Appendix A.

1.06 SAMPLE VOLUMES

A. General: The number and volume of air samples taken by the Owner will be in accordance with the following schedule. Sample volumes given may vary depending upon the analytical method used.

1.07 SCHEDULE OF AIR SAMPLES

A. Sample cassettes: Samples will be collected on 25 mm. cassettes with 50 mm. extension cowl as follows:
1. PCM: 0.8 micrometer mixed cellulose ester.
2. TEM: 0.45 micrometer mixed cellulose ester

B. Baseline:
1. Before Start of Work: The Owner will secure the following Air Samples to establish a base line before start of work.

LOCATION SAMPLED	NUMBER OF SAMPLES MINIMUM	MINIMUMVOLUME (LITERS)	RATE LPM
Each Work Area	5 for up to 5000 sq. ft.; one extra per each additional5000 sq. ft.	1,200	1-12

C. Daily:

1. From start of work of Section 015643 Temporary Enclosures through the work of Section 017333 Project Decontamination, the Owner may be taking the following samples on a daily basis.

LOCATION SAMPLED	NUMBER OF SAMPLES	MINIMUM VOLUME (LITERS)*	RATE (LPM)
Each Work Area	2/shift	400	1-12
Outside Each Work Area adjacent to occupied space or space which will be occupied later	1	1,200	1-12
Clean Room	1	1,200	1-12
Equipment Decontamination	1	1,200	1-12
Output, Negative Pressure System	1	1,200	1-12

*or as required by conditions. Lower volumes required by time constraints or filter loading will raise the detection limit, reducing sampling sensitivity.

D. Additional samples may be taken at Owner's discretion. If airborne fiber counts exceed allowed limits, additional samples will be taken as necessary to monitor fiber levels.

1.08 LABORATORY TESTING

A. The services of a testing laboratory will be employed by the Owner to obtain air samples as indicated and to perform laboratory analyses of the air samples. A technician will obtain samples daily. Samples will either be analyzed on site at a suitable location as provided by the Owner or will be sent overnight on a daily basis so that verbal reports on air samples can be obtained within 24 hours of receipt by the laboratory.

B. If requested by the Contractor, the Owner's Representative may request results of clearance sampling within 24 hours of obtaining samples; any additional costs for such requests shall be incurred by the Contractor. The Contractor will have access to all air monitoring tests and results.

C. A complete record of all air monitoring and results will be furnished to the Owner.

D. Written Reports: Of all air monitoring tests will be posted at the job site on a daily basis.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PERSONAL EXPOSURE MONITORING:

A. Owner will not be performing air monitoring to meet Contractor's OSHA requirements for personnel sampling or any other purpose.

END OF SECTION 014529

SECTION 015000
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Dewatering
B. Temporary utilities.
C. Temporary telecommunications services.
D. Temporary sanitary facilities.
E. Temporary Controls: Barriers, enclosures, and fencing.
F. Security requirements.
G. Vehicular access and parking.
H. Waste removal facilities and services.
I. Project identification sign.
J. Field offices.

1.02 RELATED REQUIREMENTS

A. Section 013553 - Security Procedures
B. Section 015100 - Temporary Utilities.
C. Section 015213 - Field Offices and Sheds.
D. Section 015500 - Vehicular Access and Parking.
E. Section 015813 - Temporary Project Signage.

1.03 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
B. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

1.04 DEWATERING

A. Provide temporary means and methods for dewatering all temporary facilities and controls.
B. Maintain temporary facilities in operable condition.

1.05 TEMPORARY UTILITIES - SEE SECTION 015100

1.06 TELECOMMUNICATIONS SERVICES

A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.
B. Telecommunications services shall include:
    1. Windows-based personal computer dedicated to project telecommunications, with necessary software and printer.
    2. Telephone Land Lines: One line, minimum; one handset per line.
        a. Land line requirement will be waived if Contractor's Superintendent has dedicated cellular telephone.
    3. Internet Connections: Minimum of one; DSL modem or faster.
        a. If Contractor is allowed to use Owner's existing facility for a field office, then Contractor may access Owner's internet connection at no cost to Contractor.

1.07 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
B. Maintain daily in clean and sanitary condition.

1.08 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.

C. Provide protection for plants designated to remain. Replace damaged plants.

D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.09 FENCING

A. Provide 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks.

B. Maintain fence in upright, supported, and fastened condition daily.

1.10 EXTERIOR ENCLOSURES

A. Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.11 INTERIOR ENCLOSURES

A. Provide temporary partitions and ceilings as indicated to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.

B. Construction: Framing and plywood or gypsum board sheet materials with closed joints and sealed edges at intersections with existing surfaces as indicated on drawings.
   1. Maximum flame spread rating of 75 in accordance with ASTM E84.

1.12 SECURITY - SEE SECTION 013553

1.13 VEHICULAR ACCESS AND PARKING - SEE SECTION 015500

1.14 WASTE REMOVAL

A. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.

B. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

C. Provide containers with lids. Remove trash from site periodically as containers are filled.

D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.15 PROJECT IDENTIFICATION

A. Provide project identification sign of design and construction indicated on drawings.

B. Erect on site at location indicated.

C. No signs are allowed without Owner permission except those required by law.

1.16 FIELD OFFICES - SEE SECTION 015213

1.17 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.

B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore existing facilities used during construction to original condition.

E. Restore new permanent facilities used during construction to specified condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 015000

SECTION 015100
TEMPORARY UTILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary Utilities: Electricity, lighting, heat, ventilation, and water.

1.02 RELATED REQUIREMENTS

A. Section 015000 - Temporary Facilities and Controls:
   1. Temporary telecommunications services for administrative purposes.
   2. Temporary sanitary facilities required by law.

1.03 REFERENCE STANDARDS

A. 29 CFR 1926 - Safety and Health Regulations for Construction.

1.04 TEMPORARY ELECTRICITY

A. Cost: By Owner.

B. Connect to Owner's existing power service.
   1. Do not disrupt Owner's need for continuous service.
   2. Exercise measures to conserve energy.

C. Provide temporary electric feeder from existing building electrical service at location as directed.

D. Power Service Characteristics: TBD volt, TBD ampere, three phase, four wire.

E. Complement existing power service capacity and characteristics as required.

F. Provide power outlets for construction operations, with branch wiring and distribution boxes located at each floor. Provide flexible power cords as required.

G. Provide main service disconnect and over-current protection at convenient location .

H. Permanent convenience receptacles may be utilized during construction.

I. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.

1.05 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

A. Provide and maintain LED, compact fluorescent, or high-intensity discharge lighting as suitable for the application for construction operations in accordance with requirements of 29 CFR 1926 and authorities having jurisdiction.

B. Provide and maintain 1 watt/sq ft lighting to exterior staging and storage areas after dark for security purposes.

C. Provide and maintain 0.25 watt/sq ft H.I.D. lighting to interior work areas after dark for security purposes.

D. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.

E. Maintain lighting and provide routine repairs.

F. Permanent building lighting may be utilized during construction.

1.06 TEMPORARY HEATING

A. Cost of Energy: By Owner.

B. Provide heating devices and heat as needed to maintain specified conditions for construction operations.

C. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

D. Owner's existing heat plant may be used.
   1. Exercise measures to conserve energy.
   2. Enclose building prior to activating temporary heat.

E. Prior to operation of permanent equipment for temporary heating purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

1.07 TEMPORARY COOLING

A. Cost of Energy: By Owner.

B. Provide cooling devices and cooling as needed to maintain specified conditions for construction operations.

C. Maintain maximum ambient temperature of 80 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

D. Owner's existing cooling plant may be used.
   1. Exercise measures to conserve energy.
   2. Enclose building prior to activating temporary cooling.
   3. Provide separate metering and reimburse Owner for cost of energy used.

E. Prior to operation of permanent equipment for temporary cooling purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

1.08 TEMPORARY VENTILATION

A. Utilize existing ventilation equipment. Extend and supplement equipment with temporary fan units as required to maintain clean air for construction operations.

1.09 TEMPORARY WATER SERVICE

A. Cost of Water Used: By Owner.

B. Provide and maintain suitable quality water service for construction operations at time of project mobilization.

C. Connect to existing water source.
   1. Exercise measures to conserve water.
   2. Provide separate metering and reimburse Owner for cost of water used.

D. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 015100

SECTION 015139
TEMPORARY NEGATIVE PRESSURE AIR CIRCULATION SYSTEM

PART 1 GENERAL

1.01 PATENT RIGHTS

A. Negative pressure machines and the process of setting up a negative pressure space may be subject to patent rights (e.g. Patent No. 4,604,111).

B. Contractor shall pay all license fees and royalties and assume all costs incidental to the use, in the performance of the work or the incorporation into the work of any invention, design, process, product or device which is the subject of any rights, including but not limited to patents or copyrights, held by others.

C. Contractor shall defend, indemnify and hold harmless Owner and Owner's Environmental Consultant and anyone directly or indirectly employed by either of them from and against any and all claims, damages, losses and expenses (including attorney's fees and court and arbitration expenses) arising out of any alleged infringement of such rights of others.

1.02 MONITORING

A. Continuously monitor and record the pressure differential between the work area and the outside of the work area with a monitoring device incorporating a continuous recorder.

B. For containments greater than 20,000 square feet, two monitoring devices, with recorder, shall be required.

C. Meters shall be equipped with a warning buzzer which will sound if pressure differential drops below -0.02 inches of water.

D. The monitoring device(s) shall produce a continuous printout of the pressure differential between the work area and the outside of the work area.

E. The Contractor shall date, initial and indicate the beginning and the end of each shift on the printout.

F. Maintain records of pressure differential in the project data binder.

1.03 SUBMITTALS

A. Before the Start of Work: Submit the following to the Owner for review. No work shall begin until these submittals provided.
   1. Number of HEPA filtered fan units required and the calculations necessary to determine the number of machines.
   2. Location of the machines in the Work Area.
   3. Manufacturer's product data on the HEPA filtered fan units to be used.
   4. Description of work practices to insure that airborne fibers travel away from workers.
   5. Manufacturer's product data on equipment used to monitor pressure differential between inside and outside of Work Area.

1.04 QUALITY ASSURANCE

A. Monitor pressure differential at Personnel and Equipment Decontamination Units with a differential pressure meter equipped with a continuous recorder.

B. Meter shall be equipped with a warning buzzer which will sound if pressure differential drops below -0.01" of water.

PART 2 PRODUCTS

2.01 HEPA FILTERED FAN UNITS

A. General: Supply the required number of HEPA filtered fan units to the site in accordance with these specifications.

B. Cabinet: Constructed of durable materials able to withstand damage from rough handling and transportation. The width of the cabinet should be less than 30 inches to fit through standard-size doorways. Provide units whose cabinets are:
   1. Factory-sealed to prevent asbestos-containing dust from being released during use, transport, or maintenance.
   2. Arranged to provide access to and replacement of all air filters from intake end.
   3. Mounted on casters or wheels.

C. Fans: Rate capacity of fan according to usable air-moving capacity under actual operating conditions.

D. HEPA Filters: Provide units whose final filter is the HEPA type with the filter media (folded into closely pleated panels) completely sealed on all edges with a structurally rigid frame.
   1. Provide units with a continuous rubber gasket located between the filter and the filter housing to form a tight seal.
   2. Provide HEPA filters that are individually tested and certified by the manufacturer to have an efficiency of not less than 99.97 percent when challenged with 0.3 um dioctylphthalate (DOP) particles when tested in accordance with Military Standard Number 282 and Army Instruction Manual 136-300-175A.
   3. Provide filters that bear a UL 586 label to indicate ability to perform under specified conditions.
   4. Provide filters that are marked with: the name of the manufacturer, serial number, air flow rating, efficiency and resistance, and the direction of test air flow.

E. Prefilters, which protect the final filter by removing the larger particles, are required to prolong the operating life of the HEPA filter. Two stages of prefiltration are required. Provide units with the following prefilters:
   1. First-stage prefilter: low-efficiency type (e.g., for particles 100 um and larger).
   2. Second-stage (or intermediate) filter: medium efficiency (e.g., effective for particles down to 5 um).

F. Provide units with prefilters and intermediate filters installed either on or in the intake grid of the unit and held in place with special housings or clamps.

G. Provide units equipped with:
   1. Magnehelic gauge or manometer to measure the pressure drop across filters and indicate when filters have become loaded and need to be changed.
   2. A table indicating the usable air-handling capacity for various static pressure readings on the Magnehelic gauge affixed near the gauge for reference, or the Magnehelic reading indicating at what point the filters should be changed, noting Cubic Feet per Minute (CFM) air delivery at that point.
   3. Elapsed time meter to show the total accumulated hours of operation.
      a. Safety and Warning Devices: Provide units with the following safety and warning devices:
      b. Electrical (or mechanical) lockout to prevent fan from operating without a HEPA filter.
   4. Automatic shutdown system to stop fan in the event of a rupture in the HEPA filter or blocked air discharge.
   5. Warning lights to indicate normal operation (green), too high a pressure drop across the filters (i.e., filter overloading) (yellow), and too low of a pressure drop (i.e., rupture in HEPA filter or obstructed discharge) (red).
   6. Audible alarm if unit shuts down due to operation of safety systems.

H. Electrical components: Provide units with electrical components approved by the National Electrical Manufacturers Association (NEMA) and Underwriter's Laboratories (UL).
   1. Each unit is to be equipped with overload protection sized for the equipment.
   2. The motor, fan, fan housing, and cabinet are to be grounded.

PART 3 EXECUTION

3.01 NEGATIVE PRESSURE SYSTEM ISOLATION

A. Isolate the Work Area from all adjacent areas or systems of the building with a pressure differential that will cause a movement of air from outside to inside at any breach in the physical isolation of the Work Area ("Negative Air").

B. Relative Pressure in Work Area: Continuously maintain the Work Area at an air pressure that is lower than that in any surrounding space in the building, or at any location in the immediate proximity outside of the building envelope. This pressure differential when measured across any physical or critical barrier must equal or exceed a static pressure of 0.02 inches of water.

C. Accomplish the pressure differential by exhausting a sufficient number of HEPA filtered fan units from the Work Area. The number of units required will depend on machine characteristics, the seal at barriers, and required air circulation. The number of units will increase with increased make-up air or leaks into the Work Area. Determine the number of units required for pressure isolation by the following procedure:
   1. Establish required air circulation in work area, personnel and equipment decontamination units. Exhaust a sufficient number of units from the work area to develop the required pressure differential.
   2. The required number of units is the number determined above plus one additional unit.

D. Vent HEPA filtered fan units to outside of building unless authorized in writing by Owner.
   1. Mount units to exhaust directly or through disposable ductwork.
   2. Use only new ductwork except for sheet metal connections and elbows.
   3. Use inflatable, disposable plastic ductwork in lengths not greater than 100 feet.
   4. Use spiral wire-reinforced flex duct in lengths not greater than 50 feet.
   5. Arrange exhaust as required to inflate duct to a rigidity sufficient to prevent flapping.

E. Isolation of elevators, stair towers, and return air intakes: Erect seals with an air space at doors to elevators and stair towers.
   1. Fabricate seal by first sealing door with duct tape and 6 mil polyethylene. Construct a barrier from ½" CDX plywood or ½" gypsum board supported by wood studs at 16" on centers.
   2. Space face of barrier a minimum of 3" from face of door.
   3. Seal barrier with 6 mil sheet plastic and duct tape.
   4. Use plywood and framing lumber that is treated to be fire resistant.

F. Isolation of return air ductwork: Return air duct work which must be kept operating is to be isolated from the Work Area.
   1. Wrap the duct with two (2) layers of 6 mil polyethylene.
   2. Seal all polyethylene seams with spray glue and duct tape.

3.02 AIR CIRCULATION IN THE WORK AREA

A. Air Circulation: For purposes of this section air circulation refers to either the introduction of outside air to the Work Area or the circulation and cleaning of air within the Work Area.

B. Determining the Air Circulation Requirements: Provide a fully operational air circulation system supplying a minimum of four (4) air changes per hour.

C. Determine Number of Units needed to achieve required air circulation according to the following procedure:
   1. Determine the volume in cubic feet of the work area by multiplying floor area by ceiling height.
   2. Determine total air circulation requirement in cubic feet per minute (CFM) for the work area by multiplying this volume by the air change rate and dividing by 60.
      a. X Number of air changes per hour
         1) 60 (minutes per hour)

3. Divide the air circulation requirement (CFM) above by capacity of HEPA filtered fan unit(s) used.
4. Capacity of a unit for purposes of this section is the capacity in cubic feet per minute with fully loaded filters (pressure differential which causes loaded filter warning light to come on) in the machine's labeled operating characteristics.
5. Number of Units Needed = Air Circulation Requirement (CFM) Capacity of Unit with Loaded Filters (CFM)
    a. Add one (1) additional unit as a backup in case of equipment failure or machine shutdown for filter changing.

3.03 EXHAUST SYSTEM

A. Negative pressure isolation and air circulation in the Work Area are to be accomplished by an exhaust system as described below.

B. Exhaust all units from the Work Area to meet air circulation requirement of this section.

C. Locate fan unit(s) so that makeup air enters work area primarily through decontamination facilities and traverses Work Area as much as possible. This may be accomplished by positioning the HEPA filtered fan unit(s) at a maximum distance from the worker access opening or other makeup air sources.

D. Vent to Outside of Building, unless authorized in writing by the Owner.

E. Window Openings: Window panes which have to be removed temporarily shall be reinstalled by a qualified tradesman at the completion of the work.

F. Decontamination Units: Arrange Work Area and decontamination units so that the majority of make up air comes through the Decontamination Units. Use only personnel or equipment Decontamination Unit at any time and seal the other so that make up air passes through unit in use.

G. Supplemental Makeup Air Inlets: Provide where required for proper air flow through the Work Area in location approved by the Owner by making openings in the plastic sheeting that allow air from outside the building into the Work Area.
    1. Locate auxiliary makeup air inlets as far as possible from the fan unit(s) (e.g., on an opposite wall), off the floor (preferably near the ceiling), and away from barriers that separate the Work Area from occupied clean areas.
    2. Cover with flaps to reseal automatically if the negative pressure system should shut down for any reason.
    3. Spray flap and around opening with spray adhesive so that if flap closes meeting surfaces are both covered with adhesive.
    4. Use adhesive that forms contact bond when dry.
    5. If makeup air is coming from an asbestos-fiber-contaminated source or potentially contaminated then it should pass through a HEPA filter before entering work area.
    6. If air is contaminated with other materials it may also require filtering.
    7. If this is done, supply air fans will be necessary to overcome the resistance of the filters.
    8. A HEPA filtered fan unit may be used to accomplish this.
    9. Caution must be used to insure that work area remains under negative pressure.

3.04 AIR CIRCULATION IN DECONTAMINATION UNITS

A. Pressure Differential Isolation: Continuously maintain the pressure differential required for the work area in the:
    1. Personnel Decontamination Unit: across the Shower Room with the Equipment Room at a lower pressure than the Clean room.
    2. Equipment Decontamination Unit: Across the Holding Room with the Wash Room at a lower pressure than the Clean Room.

B. Air Circulation: Continuously maintain air circulation in Decontamination Units at same level as required for Work Area.

C. Air Movement: Arrange air circulation through the Personnel Decontamination Unit so that it produces a movement of air from the Clean Room through the Shower Room into the Equipment Room.

3.05 USE OF THE NEGATIVE AIR SYSTEM

A. General:
   1. Each unit shall be serviced by dedicated circuits with overload device.
   2. If an existing building electrical panel is being used it must have sufficient spare capacity to accommodate the load of all negative pressure units connected.
   3. Dedication of existing circuits may be accomplished by shutting down existing loads on the circuits.

B. Testing the System:
   1. Test negative pressure system before any asbestos-containing material is wetted or removed.
   2. After the Work Area has been prepared, the decontamination facility set up, and the fan unit(s) installed, start the unit(s) (one at a time).
   3. Demonstrate operation and testing of negative pressure system to Owner.

C. Demonstrate Operation of the negative pressure system to the Owner to include, but not be limited to, the following:
   1. Plastic barriers and sheeting move lightly in toward Work Area.
   2. Curtain of decontamination units move lightly in toward Work Area.
   3. There is a noticeable movement of air through the Decontamination Unit.
   4. Use smoke tube to demonstrate air movement from Clean Room through Shower Room to Equipment Room.
   5. Use smoke tubes to demonstrate a definite motion of air across all areas in which work is to be performed.

D. Modify the Negative Pressure System as necessary to demonstrate successfully the above.

E. Use of System During Abatement Operations:
   1. Start fan units before beginning work (before any asbestos-containing material is disturbed).
   2. After abatement work has begun, run units continuously to maintain constant negative pressure and air circulation until decontamination of the work area is complete.
   3. Do not turn off units at the end of the work shift or when abatement operations temporarily stop.
   4. Do not shut down negative pressure system during encapsulating procedures, unless authorized by the Owner in writing.
   5. Supply sufficient pre-filters to allow frequent changes.
   6. Start abatement work at a location farthest from the fan units and proceed toward them.
   7. If an electric power failure occurs, immediately stop all abatement work and do not resume until power is restored and fan units are operating again.
   8. At completion of abatement work, allow fan units to run as specified under Section 017333 Project Decontamination, to remove airborne fibers that may have been generated during abatement work and cleanup and to purge the Work Area with clean makeup air. The units may be required to run for a longer time after decontamination, if dry or only partially wetted asbestos material was encountered during any abatement work.

F. Dismantling the System:

1. When a final inspection and the results of final air tests indicate that the area has been decontaminated, fan units may be removed from the Work Area. Before removal from the Work Area, remove and properly dispose of pre-filter, decontaminate exterior of machine and seal intake to the machine with 6 mil polyethylene to prevent environmental contamination from the filters.

END OF SECTION 015139

SECTION 015213
FIELD OFFICES AND SHEDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Maintenance and removal.

1.02 RELATED REQUIREMENTS

A. Section 011000 - Summary: use of premises.

B. Section 015000 - Temporary Facilities and Controls:
   1. Temporary telecommunications services for administrative purposes.
   2. Temporary sanitary facilities required by law.

C. Section 015500: Parking and access to field offices.

1.03 USE OF EXISTING FACILITIES

A. Existing facilities shall not be used for field offices.

1.04 USE OF PERMANENT FACILITIES

A. Permanent facilities shall not be used for field offices.

PART 2 PRODUCTS

2.01 MATERIALS, EQUIPMENT, FURNISHINGS

A. Materials, Equipment, Furnishings: Serviceable, new or used, adequate for required purpose.

2.02 CONSTRUCTION

2.03 ENVIRONMENTAL CONTROL

A. Heating, Cooling, and Ventilating: Automatic equipment to maintain comfort conditions.

PART 3 EXECUTION

3.01 PREPARATION

A. Fill and grade sites for temporary structures to provide drainage away from buildings.

3.02 INSTALLATION

A. Coordinate with Owner to confirm location for office and date of installation.

B. Employee Residential Occupancy: Not allowed on Owner's property.

3.03 MAINTENANCE AND CLEANING

A. Maintain approach walks free of mud, water, and snow.

3.04 REMOVAL

A. At completion of Work remove buildings, foundations, utility services, and debris. Restore areas.

END OF SECTION 015213

SECTION 015500
VEHICULAR ACCESS AND PARKING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Access roads.

B. Parking.

C. Existing pavements and parking areas.

D. Permanent pavements and parking facilities.

E. Construction parking controls.

F. Flag persons.

G. Flares and lights.

H. Haul routes.

I. Traffic signs and signals.

J. Maintenance.

K. Removal, repair.

L. Mud from site vehicles.

1.02 RELATED REQUIREMENTS

PART 2 PRODUCTS

2.01 MATERIALS

A. Temporary Construction: Contractor's option.

B. Materials for Permanent Construction: As specified in product specification sections, including earthwork, paving base, and topping.

2.02 SIGNS, SIGNALS, AND DEVICES

A. Stock Post Mounted and Wall Mounted Traffic Control and Informational Signs:

B. Traffic Control Signals: As approved by local jurisdictions.

C. Traffic Cones and Drums, Flares and Lights: As approved by local jurisdictions.

D. Flag Person Equipment: As required by local jurisdictions.

PART 3 EXECUTION

3.01 PREPARATION

A. Clear areas, provide surface and storm drainage of road, parking, area premises, and adjacent areas.

3.02 ACCESS ROADS

A. Use of existing on-site streets and driveways for construction traffic is permitted.

B. Tracked vehicles not allowed on paved areas.

C. Construct new temporary all-weather access roads from public thoroughfares to serve construction area, of a width and load bearing capacity to provide unimpeded traffic for construction purposes.

D. Construct temporary bridges and culverts to span low areas and allow unimpeded drainage.

E. Extend and relocate as work progress requires, provide detours as necessary for unimpeded traffic flow.

F. Location as approved by Architect.

G. Provide unimpeded access for emergency vehicles. Maintain 20 foot width driveways with turning space between and around combustible materials.

H. Provide and maintain access to fire hydrants and control valves free of obstructions.

3.03 PARKING

A. Use of designated areas of existing parking facilities by construction personnel is permitted.

B. Use of designated areas of new parking facilities by construction personnel is permitted.

C. Arrange for temporary parking areas to accommodate use of construction personnel.

D. When site space is not adequate, provide additional off-site parking.

E. Locate as approved by Architect.

3.04 PERMANENT PAVEMENTS AND PARKING FACILITIES

A. The base for permanent roads and parking areas may be used for construction traffic.

B. Avoid traffic loading beyond paving design capacity. Tracked vehicles not allowed.

3.05 CONSTRUCTION PARKING CONTROL

A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and Owner's operations.

B. Monitor parking of construction personnel's vehicles. Maintain vehicular access to and through parking areas.

C. Prevent parking on or adjacent to access roads or in non-designated areas.

3.06 FLAG PERSONS

A. Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.

3.07 FLARES AND LIGHTS

A. Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

3.08 HAUL ROUTES

A. Consult with authority having jurisdiction, establish public thoroughfares to be used for haul routes and site access.

B. Confine construction traffic to designated haul routes.

C. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.

3.09 TRAFFIC SIGNS AND SIGNALS

A. At approaches to site and on site, install at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.

B. Relocate as work progresses, to maintain effective traffic control.

3.10 MAINTENANCE

A. Maintain traffic and parking areas in a sound condition free of excavated material, construction equipment, products, mud, snow, and ice.

B. Maintain existing and new permanent paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

3.11 REMOVAL, REPAIR

A. Remove temporary roads when permanent paving is usable.

B. Remove underground work and compacted materials to a depth of 2 feet; fill and grade site as specified.

C. Repair existing facilities damaged by use, to original condition.

D. Remove equipment and devices when no longer required.

E. Repair damage caused by installation.

F. Remove post settings to a depth of 2 feet.

3.12 MUD FROM SITE VEHICLES

A. Provide means of removing mud from vehicle wheels before entering streets.

END OF SECTION 015500

SECTION 015643
TEMPORARY ENCLOSURES

PART 1 GENERAL

1.01 SUBMITTALS

A. Before the Start of Work: Submit the following to the Owner for review. No work shall begin until these submittals provided.

B. Spray Cement: Submit following:
   1. Material Safety Data Sheet: Submit the Material Safety Data Sheet, or equivalent, in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200) for spray cement material proposed for use on the work.
   2. Include a separate attachment for each sheet indicating the specific worker protective equipment proposed for use with the material indicated.

C. Signs: Submit samples of signs to be used.

PART 2 PRODUCTS

2.01 SHEET PLASTIC

A. Polyethylene Sheet: A single polyethylene film in the largest sheet size possible to minimize seams, 4 or 6 mils thick as indicated, clear, frosted, or black as indicated.

2.02 MISCELLANEOUS MATERIALS

A. Duct Tape: Provide duct tape in 2" or 3" widths as indicated, with an adhesive which is formulated to stick aggressively to sheet polyethylene.

B. Spray Cement: Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.

PART 3 EXECUTION

3.01 SEQUENCE OF WORK

A. Carry out work of this section sequentially.

B. Complete each activity before proceeding to the next.

3.02 GENERAL

A. Work Area: One contiguous work location that is considered contaminated during the work, which must be isolated from the balance of the building and decontaminated at the completion of the asbestos-control work.

B. Completely isolate the Work Area from other parts of the building so as to prevent asbestos-containing dust or debris from passing beyond the isolated area.

C. Should the area beyond the Work Area(s) become contaminated with asbestos-containing dust or debris as a consequence of the work, clean those areas in accordance with the procedures indicated in 017333 - Project Decontamination. Perform all such required cleaning or decontamination at no additional cost to Owner.

D. Place all tools, scaffolding, staging, etc. necessary for the Work in the area to be isolated prior to completion of Work Area isolation.

E. Disable ventilating systems or any other system bringing air into or out of the Work Area. Disable system by disconnecting wires, removing circuit breakers, by lockable switch or other positive means that will prevent accidental premature restarting of equipment.

F. Lockout power to Work Area by switching off all breakers serving power or lighting circuits in work area.
   1. Label breakers with tape over breaker with notation "DANGER circuit being worked on". Lock panel and have all keys under control of Contractor's Superintendent or Owner.

G. Lockout power to circuits running through work area wherever possible by switching off all breakers or removing fuses serving these circuits.
   1. Label breakers with tape over breaker with notation "DANGER circuit being worked on". Lock panel and have all keys under control of Contractor's Superintendent or Owner.
   2. If circuits cannot be shut down for any reason, label at intervals 4' on center with tags reading, "DANGER live electric circuit. Electrocution hazard."
   3. Label circuits in hidden locations but which may be affected by the work in a similar manner.

H. Inspection Windows: Install inspection windows in locations shown on the plans or as directed by the Owner. Each inspection window is to have a 24" X 24" viewing area fabricated from 1/4" acrylic or polycarbonate sheet.
   1. Install window with top at 6'-6" above floor height in a manner that provides unobstructed vision from outside to inside of the Work Area.
   2. Protect window from damage from scratching, dirt or any coatings used during the work.
   3. A sufficient number of windows are to be installed to provide observation of all portions of the Work Area that can be made visible from adjacent areas.
   4. Inspection windows that open into uncontrolled area are to be covered with a removable plywood hatch secured by lock and key.
   5. Provide keys to Owner for all such locks.

3.03 EMERGENCY EXITS

A. Emergency Exits: At each existing exit door from the Work Area provide the following means for emergency exiting:
   1. Arrange exit door so that it is secure from outside the Work Area but permits exiting from the Work Area.
   2. Mark outline of door on Primary and Critical Barriers with luminescent paint at least 1" wide.
   3. Hang a razor knife on a string beside outline.
   4. Arrange Critical and Primary barriers so that they can be easily cut with one pass of razor knife.
   5. Paint words "EMERGENCY EXIT" inside outline with luminescent paint in letters at least one foot high and 2" thick.
   6. Mark arrows on poly barriers to indicate direction to exit.

3.04 CONTROL ACCESS

A. Isolate the Work Area to prevent entry by building occupants into Work Area or surrounding controlled areas.

B. Locked Access: Arrange Work Area so that the only access into Work Area is through lockable doors to personnel and equipment decontamination units.

C. Visual Barrier: Where the Work Area is immediately adjacent to or within view of occupied areas, provide a visual barrier of opaque polyethylene sheeting at least 6 mil in thickness so that the work procedures are not visible to building occupants. Where this visual barrier would block natural light, substitute frosted or woven rip-stop sheet plastic in locations approved by the Owner.

D. Provide Warning Signs at each locked door leading to Work Area reading as follows:
   1. Immediately inside door and outside critical barriers post an approximately 20“ by 14” manufactured caution sign displaying the following legend with letter sizes and styles of a visibility required by 29 CFR 1926.1101:

+
DANGER
ASBESTOS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS

AUTHORIZED PERSONNEL ONLY

2. Provide spacing between respective lines at least equal to the height of the respective upper line.

3.05 ALTERNATE METHODS OF ENCLOSURE

A. Before proceeding beyond this point in providing Temporary Enclosures, comply with:
   1. Section 015733 Worker Protection
   2. Section 015736 Respiratory Protection
   3. Section 015726 Decontamination Units

3.06 RESPIRATORY AND WORKER PROTECTION

A. Alternate methods of containing the Work Area may be submitted to the Owner for approval in accordance with procedures set forth in 016000 - Product Requirements.

B. Before Class I work which involves the removal of more than 25 linear or 10 square feet of TSI or surfacing material is begun using an alternate method to those specified in 29 CFR 1926.1101, a copy of the required evaluation and certification must be submitted to the national office of OSHA.

C. Do not proceed with any such method(s) without prior written approval of the Owner.

3.07 CRITICAL BARRIERS

A. Completely Separate the Work Area from other portions of the building and the outside by closing all openings with two layers of polyethylene sheeting at least 6 mil in thickness, or by sealing cracks leading out of Work Area with duct tape.

B. Individually seal all ventilation openings (supply and exhaust), clocks, doorways, windows, convectors and speakers, and other openings into the Work Area with duct tape alone or with polyethylene sheeting at least 6 mil in thickness, taped securely in place with duct tape.

C. Maintain seal until all work including Project Decontamination is completed.

D. Provide Sheet Plastic barriers at least 6 mil in thickness as required to seal openings completely from the Work Area into adjacent areas.

E. Seal the perimeter of all sheet plastic barriers with duct tape or spray cement.

F. Provide Negative Pressure System per 015139 - Temporary Negative Pressure Air Circulation System.

3.08 PREPARE AREA

A. Scaffolding: If fixed scaffolding is to be used to provide access, HEPA vacuum and wet clean area prior to scaffolding installation.

B. Remove all electrical and mechanical items, such as lighting fixtures, clocks, diffusers, registers, escutcheon plates, etc. which cover any part of the surface to be worked on with the work.

C. Remove all general construction items such as cabinets, and doors, which cover the surface of the work as required to prevent interference with the work.

D. Clean, decontaminate and reinstall all such materials, upon completion of all removal work with materials, finishes, and workmanship to match existing installations before start of work.

E. Remove all general construction items such as casework, door trim, moldings, ceilings, trim, etc., which cover the surface of the work as required to prevent interference with the work.

3.09 PRIMARY BARRIER

A. Protect building and other surfaces in the Work Area from damage from water and high humidity or from contamination from asbestos-containing debris, slurry or high airborne fiber levels by covering with a primary barrier as described below.

B. Sheet Plastic: Protect surfaces in the Work Area with two (2) layers of plastic sheeting on floor and walls, or as otherwise directed on the Contract Drawings or in writing by the Owner. Perform work in the following sequence:
   1. Cover Floor of Work Area with 2 individual layers of clear polyethylene sheeting, each at least 6 mil in thickness, turned up walls at least 12 inches. Form a sharp right angle bend at junction of floor and wall so that there is no radius which could be stepped on causing the wall attachment to be pulled loose. Both spray-glue and duct tape all seams in floor covering. Locate seams in top layer six feet from, or at right angles to, seams in bottom layer. Install sheeting so that top layer can be removed independently of bottom layer.
   2. Cover all walls in Work Area including "Critical Barrier" sheet plastic barriers with one layer of polyethylene sheeting, at least 6 mil in thickness, mechanically supported and sealed with duct tape or spray-glue in the same manner as "Critical Barrier" sheet plastic barriers. Tape all joints including the joining with the floor covering with duct tape or as otherwise indicated on the Contract Documents or in writing by the Owner. Install sheeting so that inner layer can be removed independently of bottom layer.
   3. Stairs and Ramps: Do not cover stairs or ramps with unsecured sheet plastic. Where stairs or ramps are covered with plastic, provide 3/4" exterior grade plywood treads securely held in place, over plastic.
   4. Cover Carpeting with three (3) layers of polyethylene sheeting at least 6 mil in thickness. Place corrugated cardboard sheets between the top and middle layers of polyethylene.
   5. Repair of Damaged Polyethylene Sheeting: Remove and replace plastic sheeting which has been damaged by removal operations or where seal has failed allowing water to seep between layers. Remove affected sheeting and wipe down entire area. Install new sheet plastic only when area is completely dry.

3.10 STOP WORK

A. If the Critical or Primary barrier falls or is breached in any manner stop the Work immediately.

B. Do not start the Work until authorized in writing by the Owner.

3.11 EXTENSION OF WORK AREA

A. Extension of Work Area: If the Critical Barrier is breached in any manner that could allow the passage of asbestos debris or airborne fibers, then add affected area to the Work Area, enclose it as required by this Section of the specification and decontaminate the affected area as described in 017333 - Project Decontamination.

3.12 EXTERIOR ENCLOSURES

A. Construct exterior enclosures as a Critical Barrier as necessary to completely enclose the work.

B. Fabricate from reinforced polyethylene sheeting and wood framing with appropriate sized lumber.

C. Attach to existing building components or brace as necessary for lateral stability.

D. Construct walls to meet all state and local regulations for construction of temporary buildings.

E. Construct to resist a wind of 30 MPH, slope ceiling to permit drainage of rain water.

END OF SECTION 015643

SECTION 015713
TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Prevention of erosion due to construction activities.

B. Prevention of sedimentation of waterways, open drainage ways, and storm and sanitary sewers due to construction activities.

C. Restoration of areas eroded due to insufficient preventive measures.

D. Compensation of Owner for fines levied by authorities having jurisdiction due to non-compliance by Contractor.

1.02 RELATED REQUIREMENTS

A. Section 311000 - Site Clearing: Limits on clearing; disposition of vegetative clearing debris.

B. Section 312200 - Grading: Temporary and permanent grade changes for erosion control.

C. Section 329223 - Sodding: Permanent turf for erosion control.

1.03 REFERENCE STANDARDS

A. EPA (NPDES) - National Pollutant Discharge Elimination System (NPDES), Construction General Permit.

1.04 PERFORMANCE REQUIREMENTS

A. Comply with all requirements of U.S. Environmental Protection Agency for erosion and sedimentation control, as specified for the National Pollutant Discharge Elimination System (NPDES), Phases I and II, under requirements for the 2003 Construction General Permit (CGP).

B. Comply with all requirements of the local municipality and St. Louis County for erosion and sedimentation control.

C. Develop and follow an Erosion and Sedimentation Prevention Plan and submit periodic inspection reports as required by the authority having jurisdiction.

D. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained; furnish all documentation required to obtain applicable permits.
   1. Obtain and pay for permits and provide security required by authority having jurisdiction.
   2. Owner will withhold payment to Contractor equivalent to all fines resulting from non-compliance with applicable regulations.

E. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.

F. Storm Water Runoff: Control increased storm water runoff due to disturbance of surface cover due to construction activities for this project.
   1. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less.

G. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
   1. Control movement of sediment and soil from temporary stockpiles of soil.
   2. Prevent development of ruts due to equipment and vehicular traffic.
   3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.

H. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.

1. Prevent windblown soil from leaving the project site.
2. Prevent tracking of mud onto public roads outside site.
3. Prevent mud and sediment from flowing onto sidewalks and pavements.
4. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.

I. Sedimentation of Waterways On Site: Prevent sedimentation of waterways on the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
   1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
   2. If sediment basins are used as temporary preventive measures, pump dry and remove deposited sediment after each storm.

J. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
   1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.

K. Open Water: Prevent standing water that could become stagnant.

L. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Inspection Reports: Submit report of each inspection; identify each preventive measure, indicate condition, and specify maintenance or repair required and accomplished.

C. Maintenance Instructions: Provide instructions covering inspection and maintenance for temporary measures that must remain after Substantial Completion.

PART 2 PRODUCTS

2.01 MATERIALS

A. Mulch: Use one of the following:
   1. Straw or hay.
   2. Erosion control matting or netting.

B. Grass Seed For Temporary Cover: Select a species appropriate to climate, planting season, and intended purpose. If same area will later be planted with permanent vegetation, do not use species known to be excessively competitive or prone to volunteer in subsequent seasons.

C. Erosion Control Barriers
   1. Provide erosion control barriers such as straw bales, silt fences, and other measures as detailed in the drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible.

3.02 PREPARATION

A. Schedule work so that soil surfaces are left exposed for the minimum amount of time.

3.03 SCOPE OF PREVENTIVE MEASURES

A. In all cases, if permanent erosion resistant measures have been installed temporary preventive measures are not required.

B. Construction Entrances: Traffic-bearing aggregate surface.
   1. Width: As required; 20 feet, minimum.
   2. Length: 50 feet, minimum.
   3. Provide at each construction entrance from public right-of-way.
   4. Where necessary to prevent tracking of mud onto right-of-way, provide wheel washing area out of direct traffic lane, with drain into sediment trap or basin.

C. Linear Sediment Barriers: Made of silt fences.
   1. Provide linear sediment barriers:
      a. Along downhill perimeter edge of disturbed areas, including soil stockpiles.
   2. Space sediment barriers with the following maximum slope length upslope from barrier:
      a. Slope of Less Than 2 Percent: 100 feet..
      b. Slope Between 2 and 5 Percent: 75 feet.
      c. Slope Between 5 and 10 Percent: 50 feet.
      d. Slope Between 10 and 20 Percent: 25 feet.
      e. Slope Over 20 Percent: 15 feet.

D. Storm Drain Curb Inlet Sediment Trap: Protect each curb inlet using one of the following measures:
   1. Filter fabric wrapped around hollow concrete blocks blocking entire inlet face area; use one piece of fabric wrapped at least 1-1/2 times around concrete blocks and secured to prevent dislodging; orient cores of blocks so runoff passes into inlet.
   2. Straw bale row blocking entire inlet face area; anchor into pavement.

E. Storm Drain Drop Inlet Sediment Traps: As detailed on drawings.

F. Temporary Splash Pads: Stone aggregate over filter fabric; size to suit application; provide at downspout outlets and storm water outlets.

G. Soil Stockpiles: Protect using one of the following measures:
   1. Cover with polyethylene film, secured by placing soil on outer edges.
   2. Cover with mulch at least 4 inches thickness of pine needles, sawdust, bark, wood chips, or shredded leaves, or 6 inches of straw or hay.

H. Mulching: Use only for areas that may be subjected to erosion for less than 6 months.

I. Temporary Seeding: Use where temporary vegetated cover is required.

3.04 INSTALLATION

A. Silt Fences:
   1. Store and handle fabric in accordance with ASTM D4873/D4873M.
   2. Where slope gradient is less than 3:1 or barriers will be in place less than 6 months, use nominal 16 inch high barriers with minimum 36 inch long posts spaced at 6 feet maximum, with fabric embedded at least 4 inches in ground.
   3. Where slope gradient is steeper than 3:1 or barriers will be in place over 6 months, use nominal 28 inch high barriers, minimum 48 inch long posts spaced at 6 feet maximum, with fabric embedded at least 6 inches in ground.
   4. Where slope gradient is steeper than 3:1 and vertical height of slope between barriers is more than 20 feet, use nominal 32 inch high barriers with woven wire reinforcement and steel posts spaced at 4 feet maximum, with fabric embedded at least 6 inches in ground.
   5. Install with top of fabric at nominal height and embedment as specified.
   6. Do not splice fabric width; minimize splices in fabric length; splice at post only, overlapping at least 18 inches, with extra post.
   7. Fasten fabric to wood posts using one of the following:

a. Four nails per post with 3/4 inch diameter flat or button head, 1 inch long, and 14 gauge, 0.083 inch shank diameter.
b. Five staples per post with at least 17 gauge, 0.0453 inch wire, 3/4 inch crown width and 1/2 inch long legs.

8. Fasten fabric to steel posts using wire, nylon cord, or integral pockets.
9. Wherever runoff will flow around end of barrier or over the top, provide temporary splash pad or other outlet protection; at such outlets in the run of the barrier, make barrier not more than 12 inches high with post spacing not more than 4 feet.

B. Straw Bale Rows:
1. Install bales in continuous rows with ends butting tightly, with one bale at each end of row turned uphill.
2. Install bales so that bindings are not in contact with the ground.
3. Embed bales at least 4 inches in the ground.
4. Anchor bales with at least two stakes per bale, driven at least 18 inches into the ground; drive first stake in each bale toward the previously placed bale to force bales together.
5. Fill gaps between ends of bales with loose straw wedged tightly.
6. Place soil excavated for trench against bales on the upslope side of the row, compacted.

C. Temporary Seeding:
1. When hydraulic seeder is used, seedbed preparation is not required.
2. When surface soil has been sealed by rainfall or consists of smooth undisturbed cut slopes, and conventional or manual seeding is to be used, prepare seedbed by scarifying sufficiently to allow seed to lodge and germinate.
3. On soils of very low fertility, apply 10-10-10 fertilizer at rate of 12 to 16 pounds per 1000 sq ft.
4. Incorporate fertilizer into soil before seeding.
5. Apply seed uniformly; if using drill or cultipacker seeders place seed 1/2 to 1 inch deep.
6. Irrigate as required to thoroughly wet soil to depth that will ensure germination, without causing runoff or erosion.
7. Repeat irrigation as required until grass is established.

3.05 MAINTENANCE

A. Inspect preventive measures weekly, within 24 hours after the end of any storm that produces 0.5 inches or more rainfall at the project site, and daily during prolonged rainfall.

B. Repair deficiencies immediately.

C. Silt Fences:
1. Promptly replace fabric that deteriorates unless need for fence has passed.
2. Remove silt deposits that exceed one-third of the height of the fence.
3. Repair fences that are undercut by runoff or otherwise damaged, whether by runoff or other causes.

D. Straw Bale Rows:
1. Promptly replace bales that fall apart or otherwise deteriorate unless need has passed.
2. Remove silt deposits that exceed one-half of the height of the bales.
3. Repair bale rows that are undercut by runoff or otherwise damaged, whether by runoff or other causes.

E. Clean out temporary sediment control structures weekly and relocate soil on site.

F. Place sediment in appropriate locations on site; do not remove from site.

3.06 CLEAN UP

A. Remove temporary measures after permanent measures have been installed, unless permitted to remain by Architect.

B. Clean out temporary sediment control structures that are to remain as permanent measures.

C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.

END OF SECTION 015713

SECTION 015719
TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Construction procedures to promote adequate indoor air quality after construction.

1.02 PROJECT GOALS

A. Dust and Airborne Particulates: Prevent deposition of dust and other particulates in HVAC ducts and equipment.
   1. Cleaning of ductwork is not contemplated under this Contract.
   2. Contractor shall bear the cost of cleaning required due to failure to protect ducts and equipment from construction dust.

B. Airborne Contaminants: Procedures and products have been specified to minimize indoor air pollutants.
   1. Furnish products meeting the specifications.
   2. Avoid construction practices that could result in contamination of installed products leading to indoor air pollution.

1.03 RELATED REQUIREMENTS

A. Section 014000 - Quality Requirements: Testing and inspection services.

B. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions.

C. Section 230593 - Testing, Adjusting, and Balancing for HVAC: Testing HVAC systems for proper air flow rates, adjustment of dampers and registers, and settings for equipment.

1.04 REFERENCE STANDARDS

A. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.

B. SMACNA (OCC) - IAQ Guidelines for Occupied Buildings Under Construction.

1.05 DEFINITIONS

A. Adsorptive Materials: Gypsum board, acoustical ceiling tile and panels, carpet and carpet tile, fabrics, fibrous insulation, and other similar products.

B. Contaminants: Gases, vapors, regulated pollutants, airborne mold and mildew, and the like, as specified.

C. Particulates: Dust, dirt, and other airborne solid matter.

D. Wet Work: Concrete, plaster, coatings, and other products that emit water vapor or volatile organic compounds during installation, drying, or curing.

PART 2 PRODUCTS

2.01 MATERIALS

A. Low VOC Materials: See Section 016116.

B. Low VOC Materials: See other sections for specific requirements for materials with low VOC content.

C. Auxiliary Air Filters: MERV of 8, minimum, when tested in accordance with ASHRAE Std 52.2.

PART 3 EXECUTION

3.01 CONSTRUCTION PROCEDURES

A. Prevent the absorption of moisture and humidity by adsorptive materials by:
   1. Sequencing the delivery of such materials so that they are not present in the building until wet work is completed and dry.
   2. Delivery and storage of such materials in fully sealed moisture-impermeable packaging.

3. Provide sufficient ventilation for drying within reasonable time frame.

B. Begin construction ventilation when building is substantially enclosed.

C. If extremely dusty or dirty work must be conducted inside the building, shut down HVAC systems for the duration or temporarily isolate the HVAC system supply and return in the work area from the remainder of the HVAC system; remove dust and dirt completely before restarting systems.

D. HVAC equipment and supply air ductwork may be used for ventilation during construction:
   1. Ensure that air filters are correctly installed prior to starting use; replace filters when they lose efficiency.
   2. Seal return air inlets or otherwise positively isolate return air system to prevent recirculation of air; provide alternate return air pathways.
   3. Where return air ducts must be used for ventilation, install auxiliary filters at return inlets, sealed to ducts; use filters with at least the equivalent efficiency as those required at supply air side; inspect and replace filters when they lose efficiency.

E. Do not store construction materials or waste in mechanical or electrical rooms.

F. Prior to use of return air ductwork without intake filters clean up and remove dust and debris generated by construction activities.
   1. Inspect duct intakes, return air grilles, and terminal units for dust.
   2. Clean plenum spaces, including top sides of lay-in ceilings, outsides of ducts, tops of pipes and conduit.
   3. Clean tops of doors and frames.
   4. Clean mechanical and electrical rooms, including tops of pipes, ducts, and conduit, equipment, and supports.
   5. Clean return plenums of air handling units.
   6. Remove intake filters last, after cleaning is complete.

G. Do not perform dusty or dirty work after starting use of return air ducts without intake filters.

H. Use other relevant recommendations of SMACNA (OCC) for avoiding unnecessary contamination due to construction procedures.

END OF SECTION 015719

SECTION 015726
DECONTAMINATION UNITS

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Provide separate Personnel and Equipment Decontamination facilities. Require that the Personnel Decontamination Unit be the only means of ingress and egress for the Work Area. Require that all materials exit the Work Area through the Equipment Decontamination Unit.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 015000 Temporary Facilities and Controls: Electrical requirements and requirements relative to connection of decontamination facilities to building systems such as water, sewer, and electrical.

B. Section 015643 Temporary Enclosures: Isolation of the Work Area.

C. Section 014113 Asbestos Abatement Codes, Regulations, and Standards: Warning Signs.

D. Section 013000 - Administrative Requirements: Submittals.

1.03 SUBMITTALS

A. Before the Start of Work: Submit the following to the Owner for review. No work shall begin until these submittals provided.

B. Personnel Decontamination Unit: Provide sketch showing location.

C. Equipment Decontamination Unit: Provide sketch showing location.

D. Filters: Provide product data.

PART 2 PRODUCTS

2.01 POLYETHYLENE SHEET

A. Provide a single polyethylene film in the largest sheet size possible to minimize seams, 4 or 6 mil thick as indicated, clear, frosted or black as indicated.

2.02 DUCT TAPE

A. Provide duct tape in 2" or 3" widths as indicated, with an adhesive which is formulated to stick aggressively to sheet polyethylene.

2.03 SPRAY ADHESIVE

A. Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.

2.04 SHOWER PAN

A. Provide one piece waterproof shower pan of appropriate size.

B. Fabricate from seamless fiberglass minimum 1/16" thick reinforced with wood, 18 ga. stainless or galvanized steel with welded seems, copper or lead with soldered seams, or a seamless liner of minimum 60 mil thick elastomeric membrane.

2.05 SHOWER WALLS

A. Provide 8' long by approximately 7' high walls fabricated from rigid, impervious, waterproof material, either corrugated fiberglass roofing or equivalent.

B. Structurally support as necessary for stability.

2.06 SHOWER HEAD AND CONTROLS

A. Provide a factory-made shower head producing a spray of water which can be adjusted for spray size and intensity.

B. Feed shower with water mixed from hot and cold supply lines.

C. Arrange so that control of water temperature, flow rate, and shut off is from inside shower without outside aid.

2.07 FILTERS

A. Provide cascaded filter units on drain lines from showers or any other water source carrying asbestos-contaminated water from the work area.

B. Provide units with disposable filter elements as indicated below.

C. Connect so that discharged water passes primary filter and output of primary filter passes through secondary filter.

D. Primary Filter - Passes particles 20 microns and smaller

E. Secondary Filter - Passes particles 5 microns and smaller

F. Provide spare filters for both personnel and equipment decontamination unit water filters.

2.08 HOSE BIB

A. Provide heavy bronze angle type with wheel handle, vacuum breaker, and 3/4" National Standard male hose outlet.

2.09 SHOWER STALL

A. For wash down station provide leak tight shower enclosure with integrated drain pan fabricated from fiberglass or other durable waterproof material, approximately 3' x 3' square with minimum 6' high sides and back.

B. Structurally support as necessary for stability.

C. Equip with hose bib, as specified in this section, mounted at approximately 4'" above drain pan.

D. Connect drain to a reservoir, pump water from reservoir through filters to a drain.

E. Mount filters inside shower stall on back wall beneath hose bib.

2.10 ELASTOMERIC MEMBRANE

A. Provide uniform flat sheets of flexible sheet roofing material fabricated from EPDM (ethylene propylene diene monomers) or Neoprene (polychloroprene), in a nominal 45 mil thickness.

2.11 LUMBER

A. Provide kiln dried lumber of any grade or species.

2.12 SUMP PUMP

A. Provide totally submersible waterproof sump pump with integral float switch.

B. Provide unit sized to pump two times the flow capacity of all showers or hoses supplying water to the sump, through the filters specified herein when they are loaded to the extent that replacement is required.

C. Provide unit capable of pumping debris, sand, plaster or other materials washed off during decontamination procedures without damage to mechanism of pump.

D. Adjust float switch so that a minimum of 3" remains between top of liquid and top of sump pan.

2.13 HOLDING TANK

A. Provide holding tank for waste water to prevent water from backing up in shower or wash room.

2.14 GROUND FAULT CIRCUIT INTERRUPTER

A. To be installed on all electrical equipment, including cords, used in the decontamination units.

PART 3 EXECUTION

3.01 PERSONNEL DECONTAMINATION UNIT

A. Provide a Personnel Decontamination Unit outside the work area consisting of a serial arrangement of connected rooms or spaces, Clean Room, Shower Room, and Equipment Room.

B. Require all persons without exception to pass through this Personnel Decontamination Unit for entry into and exiting from the Work Area for any purpose.

C. Do not allow parallel routes for entry or exit.

D. Do not remove equipment or materials through Personnel Decontamination Unit.

E. Provide adequate temporary lighting and heat within Personnel Decontamination Units.

F. Clean Room (changing room): Provide a room that is physically and visually separated from the rest of the building for the purpose of changing into protective clothing. Clean Room shall meet the following requirements:
   1. Construct using polyethylene sheeting, at least 6 mil in thickness, to provide an airtight seal between the clean room and the rest of the building.
   2. Locate so that access to work area from clean room is through shower room.
   3. Separate clean room from the building by a sheet plastic flapped doorway.
   4. Require workers to remove all street clothes in this room, dress in protective coveralls, and don respiratory protection equipment.
   5. Do not allow asbestos-contaminated items to enter this room.
   6. Require workers to enter this room either from outside the structure dressed in street clothes, or naked from the showers.
   7. An existing room may be utilized as the changing room if it is suitably located and of a configuration whereby workers may enter the changing room directly from the shower room.
      a. Protect all surfaces of room with sheet plastic as set forth in Section 015643 Temporary Enclosures.
      b. Authorization for this must be obtained from the Owner's Representative in writing prior to start of construction.
      c. Submit written request in accordance with Section 016000 Product Requirements detailing layout and protective measures proposed.
   8. Maintain floor of changing room dry and clean at all times.
   9. Do not allow overflow water from shower to wet floor in changing room.
   10. Damp wipe all surfaces twice after each shift change with a disinfectant solution.
   11. Provide posted information for all emergency phone numbers and procedures.
   12. Provide a continuously adequate supply of disposable bath towels.
   13. Provide one (1) storage locker per employee.
   14. Equip room with benches and shelves and clean protective clothing, replacement filters for respirators, towels and other required protective equipment.
   15. Provide a lockable door which may be secured during non-work hours.

G. Shower Room: Provide a completely watertight operational shower to be used for transit by cleanly dressed workers heading for the work area from the changing room, or for showering by workers headed out of the work area after undressing in the equipment room. Shower Room shall meet the following requirements:
   1. Construct room by providing a shower pan and two shower walls in a configuration that will cause water running down walls to drip into pan.
   2. Install a freely draining wooden floor in shower pan at elevation of top of pan.
   3. Separate this room from the rest of the building with airtight walls fabricated of 6 mil polyethylene.
   4. Separate this room from the clean room and equipment room with airtight walls fabricated of 6 mil polyethylene.
   5. Provide splash proof entrances.
   6. Provide shower head and controls.
   7. Provide temporary extensions of existing hot and cold water and drainage, as necessary for a complete and operable shower.
   8. Provide a soap dish and a continuously adequate supply of soap and maintain in sanitary condition.

9. Provide liquid shampoo.
10. Arrange so that water from showering does not splash into the clean or equipment rooms.
11. Arrange water shut off and drain pump operation controls so that a single individual can shower without assistance from either inside or outside of the work area.
12. Pump waste water to drain.
13. Provide 20 micron and 5 micron waste water filters in line to drain or waste water storage.
14. Change filters daily or more often if necessary.
15. Locate filters inside shower unit so that water lost during filter changes is caught by shower pan.
16. Provide hose bib.

H. Equipment Room (contaminated area): Require work equipment, footwear and additional contaminated work clothing to be left here. This is a change and transit area for workers. Equipment Room shall meet the following requirements:
1. Separate this room from the work area by a 6 mil polyethylene flapped doorway.
2. Separate this room from the rest of the building with airtight walls fabricated of 6 mil polyethylene.
3. Separate this room from the shower room and work area with airtight walls fabricated of 6 mil polyethylene.
4. Provide a container for collection of used protective clothing.

I. Work Area: Separate work area from the equipment room by polyethylene barriers. Damp wipe clean all surfaces after each shift change.

J. Decontamination Sequence: Require that all workers adhere to the following sequence when entering or leaving the work area:
1. Entering Work Area:
a. Worker enters clean room and removes street clothing, puts on protective overalls and respirator, and passes through the shower room into the equipment room.
b. Any additional clothing and equipment left in equipment room needed by the worker are put on in the equipment room.
c. Worker proceeds to work area.
2. Exiting Work Area:
a. Before leaving the work area, require the worker to remove all gross contamination and debris from overalls and feet.
b. The worker then proceeds to the equipment room and removes all clothing except respiratory protection equipment.
c. Extra work clothing such as boots, hard hats, goggles, and gloves are to be stored in contaminated end of the equipment room.
d. Disposable coveralls are placed in a bag for disposal with other material.
e. Require that decontamination procedures found in Section 015733 Worker Protection be followed by all individuals leaving the work area.
f. After showering, the worker moves to the clean room and dresses in either new coveralls for another entry or street clothes if leaving.

3.02 EQUIPMENT DECONTAMINATION UNIT

A. Provide an Equipment Decontamination Unit consisting of a serial arrangement of rooms, clean room, holding room, wash room for removal of equipment and material from work area.

B. The Personnel Decontamination Unit may be used as the Equipment Decontamination Unit if it is not feasible to erect both decontamination units due to the size of the work area.

C. Wash Room: Provide an enclosed shower unit located in wash room for cleaning of bagged or containerized asbestos-containing waste materials passed from the work area. Wash Room shall meet the following requirements:

1. Construct wash room of wood framing of appropriate sized lumber and polyethylene sheeting, at least 6 mil in thickness and located so that package materials, after being wiped clean, can be passed to the holding room.
2. Separate this room from the work area by a single flapped door of 6 mil polyethylene sheeting.
3. Provide a drop cloth layer of plastic on floor in the wash room for every load-out operation.
4. Roll this drop cloth layer of plastic from wash room into work area after each load-out.
5. Provide a minimum of two (2) layers of plastic at all times. Use only clear plastic to cover floors.
6. Pump waste water to drain.
7. Provide 20 micron and 5 micron waste water filters in line to drain or waste water storage.
8. Change filters daily or more often if necessary.
9. Locate filters inside shower unit so that water lost during filter changes is caught by shower pan.

D. Holding Room: Provide holding room as a drop location for bagged asbestos-containing materials passed from the wash room. Holding Room shall meet the following requirements:
1. Separate this room from the adjacent rooms by flapped doors fabricated from 1/16” +/- thick single ply elastomeric membrane material either EPDM or Neoprene or by 6 mil sheet plastic.

E. Clean Room: Provide clean room to isolate the holding room from the rest of the building. Clean Room shall meet the following requirements:
1. Erect critical and primary barriers as described in Section 015643 Temporary Enclosures in an existing space.
2. If no space exists construct clean room of wood framing of appropriate size and polyethylene sheeting, at least 6 mil in thickness.
3. Separate this room from the building by a single flap door of 6 mil polyethylene sheeting.
4. Provide a lockable door to secure the work area during non-work hours.

F. Decontamination Sequence: Take all equipment or material from the work area through the decontamination unit according to the following procedure:
1. When passing equipment or containers into the wash room, close all doorways of the equipment decontamination unit, other than the doorway between the Work area and the Wash Room.
2. Keep all outside personnel clear of the Equipment Decontamination Unit.
3. Once inside the washroom, wet clean the bags and/or equipment.
4. When cleaning is complete pass items into Holding Room. Close all doorways except the doorway between the Holding Room and the Clean Room.
5. Pass bags and/or equipment into clean room.
6. Workers from the outside enter Clean Room and remove decontaminated equipment and/or containers for disposal.
7. Require these workers to wear full protective clothing and appropriate respiratory protection.
8. At no time is a worker from an uncontaminated area to enter the enclosure when a removal worker is inside.

3.03 CONSTRUCTION OF THE DECONTAMINATION UNITS

A. Walls and Ceiling:
1. Construct airtight walls and ceiling using two layers of polyethylene sheeting, at least 6 mil in thickness.
2. Attach to existing building components or a temporary framework.

B. Floors:
1. Use 2 layers (minimum) of 6 mil polyethylene sheeting to cover floors in all areas of the Decontamination Units.
2. Use only clear plastic to cover floors.

C. Flap Doors:
   1. Fabricated from three (3) overlapping sheets with openings a minimum of three feet (3') wide.
   2. Configure so that sheeting overlaps adjacent surfaces.
   3. Weigh sheets at bottoms as required so that they quickly close after being released.
   4. Put arrows on sheets to indicate direction of overlap and/or travel.
   5. Provide a minimum of six feet (6') between entrance and exit of any room.
   6. Provide a minimum of three feet (3') between doors to airlocks, if applicable.

D. If the Decontamination area is located within an area containing friable asbestos on overhead ceiling, ducts, piping, etc., provide the area with a minimum 1/4” hardboard or 1/2” plywood “ceiling” with polyethylene sheeting, at least 6 mil in thickness covering the top of the “ceiling”.

E. Visual Barrier:
   1. Where the Decontamination area is immediately adjacent to and within view of occupied areas, provide a visual barrier of opaque polyethylene sheeting at least 6 mil in thickness so that worker privacy is maintained and work procedures are not visible to building occupants.
   2. Where the area adjacent to the Decontamination area is accessible to the public, construct a solid barrier on the public side of the sheeting to protect the sheeting.
   3. Construct barrier with wood or metal studs covered with minimum 1/4 inch thick hardboard or 1/2 inch plywood.
   4. Where the solid barrier is provided, sheeting need not be opaque.

F. Alternate methods of providing Decontamination facilities may be submitted to the Owner for approval. Do not proceed with any such method(s) without written authorization of the Owner.

G. Electrical: Provide subpanel at Clean Room to accommodate all removal equipment. Connect all electrical branch circuits in Decontamination unit and particularly any pumps in shower room to a ground-fault circuit protection device.

3.04 CLEANING OF DECONTAMINATION UNITS

A. Clean debris and residue from inside of Decontamination Units on a daily basis or as otherwise indicated on Contract Drawings.

B. Damp wipe or hose down all surfaces after each shift change.

C. Clean debris from shower pans on a daily basis.

D. If the Clean Room of the Personnel Decontamination Unit becomes contaminated with asbestos-containing debris, abandon the entire Decontamination Unit and erect a new Decontamination Unit.

E. Use the former Clean Room as an inner section of the new Equipment Room.

3.05 MAINTENANCE OF DECONTAMINATION UNITS

A. Inspect all seals and doorways prior to each work shift and as indicated by conditions throughout removal.

B. Repair immediately if necessary.

C. Clean and dry decontamination units at the end of each work shift.

3.06 SIGNS

A. Post an approximately 20” x 14” manufactured caution sign at each entrance to the Work Area displaying the following with letter sizes and styles of a visibility required by 29 CFR 1926:

DANGER
ASBESTOS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
AUTHORIZED PERSONNEL ONLY

B. Provide spacing between respective lines at least equal to the height of the respective upper line.

C. Post an approximately 10” x 14” manufactured sign at each entrance to each Work Area displaying the following with letter sizes and styles of a visibility at least equal to the following:

LEGEND	NOTATION
NO FOOD, BEVERAGES OR TOBACCO PERMITTED	3/4” Block
ALL PERSONS SHALL DON PROTECTIVE CLOTHING (COVERINGS) BEFORE ENTERING THE WORK AREA	3/4” Block
ALL PERSONS SHALL SHOWER IMMEDIATELY AFTER LEAVING WORK AREA AND BEFORE ENTERING THE CHANGING AREA	3/4” Block

D. Post Work Area emergency procedures.

END OF SECTION 015726

SECTION 015733
WORKER PROTECTION

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. This section describes the equipment and procedures required for protecting workers against asbestos contamination and other workplace hazards except for respiratory protection.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Respiratory Protection: is specified in Section 015736.

1.03 WORKER TRAINING

A. AHERA Accreditation: All workers are to be accredited as Abatement Workers as required by the Asbestos Model Accreditation Plan, 40 CFR 763 Appendix C to Subpart E.

B. State and Local License: All workers are to be trained, certified and accredited as required by state or local code or regulation.

C. Training: In accordance with 29 CFR 1926.1101 and any applicable state and local regulations, train all workers shall be trained in the dangers inherent in handling asbestos and breathing asbestos dust and in proper work procedures and personal and area protective measures.

1.04 MEDICAL EXAMINATIONS

A. Provide medical examinations for all workers who may encounter an airborne fiber level of 0.1 f/cc or greater for an 8-hour Time Weighted Average.

B. In the absence of specific airborne fiber data provide medical examinations for all workers who will enter the Work Area for any reason.

C. Examination shall as a minimum meet OSHA requirements as set forth in 29 CFR 1926.1101.

D. Provide an evaluation of the individual's ability to work in environments capable of producing heat stress in the worker.

1.05 SUBMITTALS

A. Before the Start of Work: Submit the following to the Owner for review. No work shall begin until these submittals provided.

B. Asbestos Worker Accreditation: Submit copies of certificates from an EPA-approved Asbestos Abatement Workers course for each worker as evidence that each asbestos abatement worker is accredited as required by 40 CFR 763 Appendix C to Subpart E.

C. State and Local License: Submit evidence that all workers have been trained, certified and accredited as required by state or local code or regulation.

D. Certificate Worker Acknowledgment: Submit an original signed copy of the Certificate of Worker's Acknowledgment found at the end of this section, for each worker who is to be at the job site or enter the Work Area.

E. Report from Medical Examination: conducted within last 12 months as part of compliance with OSHA medical surveillance requirements for each worker who is to enter the Work Area. Submit, at a minimum, for each worker the following:
   1. Name and Social Security Number.
   2. Physician's Written Opinion from examining physician including at a minimum the following:
      a. Whether worker has any detected medical conditions that would place the worker at an increased risk of material health impairment from exposure to asbestos.
      b. Any recommended limitations on the worker or on the use of personal protective equipment such as respirators.

c. Statement that the worker has been informed by the physician of the results of the medical examination and of any medical conditions that may result from asbestos exposure.
d. Statement that worker is able to wear and use the type of respiratory protection proposed for the project, and is able to work safely in an environment capable of producing heat stress in the worker.

F. Notarized Certifications: Submit certification signed by an officer of the abatement contracting firm and notarized that exposure measurements, medical surveillance, and worker training records are being kept in conformance with 29 CFR 1926.1101.

PART 2 PRODUCTS

2.01 PROTECTIVE CLOTHING

A. Coveralls:
1. Provide disposable full-body coveralls and head gear and require that they be worn by all workers in the Work Area.
2. Provide a sufficient number for all required changes, for all workers in the work area.

B. Cold Weather Gear:
1. Provide each worker with an insulated jacket, pants, gloves, and hat.
2. Require that cold weather gear be removed in Equipment Room of Personnel Decontamination Unit.
3. Dispose of cold weather gear as asbestos waste at completion of all work.

C. Boots:
1. Provide work boots with non-skid soles, and where required by OSHA, foot protection, for all workers. Provide boots at no cost to workers.
2. Do not allow boots to be removed from the Work Area for any reason, after being contaminated with asbestos-containing material.
3. Dispose of boots which have not been decontaminated as asbestos-contaminated waste at the end of the work.

D. Hard Hats:
1. Provide head protection (hard hats) as required by OSHA for all workers, and provide four
a. (4) spares for use by Owner's Representative, Project Administrator, and Owner.
2. Label hats with same warning labels as used on disposal bags.
3. Require hard hats to be worn at all times that work is in progress that may potentially cause head injury.
4. Provide hard hats of type with plastic strap type suspension.
5. Require hats to remain in the Work Area throughout the work.
6. Thoroughly clean, decontaminate and bag hats before removing them from Work Area at the end of the work.

E. Goggles:
1. Provide eye protection (goggles) as required by OSHA for all workers involved in scraping, spraying, or any other activity which may potentially cause eye injury.
2. Thoroughly clean, decontaminate and bag goggles before removing them from Work Area at the end of the work.

F. Gloves:
1. Provide work gloves to all workers and require that they be worn at all times in the Work Area.
2. Do not remove gloves from Work Area and dispose of as asbestos-contaminated waste at the end of the work.

PART 3 EXECUTION

3.01 GENERAL

A. Provide worker protection as required by the most stringent OSHA and/or EPA standards applicable to the work.

B. The following procedures are minimums to be adhered to regardless of fiber count in the Work Area:
   1. Each time Work Area is entered remove all street clothes in the Changing Room of the Personnel Decontamination Unit and put on new disposable coverall, or reusable coverall (to be donned in Equipment Room), new head cover, and a clean respirator.
   2. Proceed through shower room to equipment room and put on work boots.

3.02 DECONTAMINATION PROCEDURES

A. Require all workers to adhere to the following personal decontamination procedures whenever they leave the Work Area:
   1. When using Type C Supplied Air or Powered Air-Purifying Respirators: Require that all workers use the following decontamination procedure as a minimum requirement whenever leaving the Work Area:
      a. When exiting area, remove coveralls, disposable head covers, and disposable footwear covers or boots in the Equipment Room.
      b. Still wearing respirators, proceed to showers.
      c. Showering is mandatory.
      d. Care must be taken to follow reasonable procedures in removing the respirator to avoid asbestos fibers while showering.
      e. The following procedure is required as a minimum:
         1) Thoroughly wet body including hair and face. If using a Powered Air-Purifying Respirator (PAPR) hold blower unit above head to keep canisters dry.
         2) With respirator still in place thoroughly wash body, hair, respirator face piece, and all parts of the respirator except the blower unit and battery pack on a PAPR. Pay particular attention to seal between face and respirator and under straps.
         3) Take a deep breath, hold it and/or exhale slowly, completely wet hair, face, and respirator. While still holding breath, remove respirator and hold it away from face before starting to breath.
         4) If using PAPR, shut down in the following sequence: first cap inlets to filter cartridges, then turn off blower unit (this sequence will help keep debris which has collected on the inlet side of filter from dislodging and contaminating the outside of the unit). Thoroughly wash blower unit and hoses. Carefully wash battery pack with wet rag. Be extremely cautious of getting water in battery pack as this will short out and destroy battery.
         5) Shower completely with soap and water.
         6) Rinse thoroughly.
         7) Rinse shower room walls and floor prior to exit.
         8) Proceed from shower to Clean Room and change into street clothes or into new disposable work items.
   2. When using Air Purifying-Negative Pressure Respirators: Require that all workers use the following decontamination procedure as a minimum requirement whenever leaving the Work Area with a half or full face cartridge type respirator:
      a. When exiting area, remove coveralls, disposable headcovers, and disposable footwear covers or boots in the Equipment Room.
      b. Still wearing respirators, proceed to showers.
      c. Showering is mandatory.
      d. Care must be taken to follow reasonable procedures in removing the respirator and filters to avoid asbestos fibers while showering.

e. The following procedure is required as a minimum:
    1) Thoroughly wet body from neck down.
    2) Wet hair as thoroughly as possible without wetting the respirator filter if using an air purifying type respirator.
    3) Take a deep breath, hold it and/or exhale slowly, complete wetting of hair, thoroughly wetting face, respirator and filter (air purifying respirator). While still holding breath, remove respirator and hold it away from face before starting to breath.
    4) Dispose of wet filters from air purifying respirator.
    5) Carefully wash face piece of respirator inside and out.
    6) Shower completely with soap and water.
    7) Rinse thoroughly.
    8) Rinse shower room walls and floor prior to exit.
    9) Proceed from shower to Clean Room and change into street clothes or into new disposable work items.

B. Remote Shower:
    1. The procedures above are to be used if the decontamination facility is used as a remote shower.
    2. Workers are to double suit upon exiting the work area and proceed directly to the remote decontamination.
    3. Decontamination procedure is then completed as required above.

C. Within Work Area:
    1. Require that workers NOT eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the Work Area.
    2. To eat, chew, drink or smoke, workers shall follow the procedure described above, then dress in street clothes before entering the non-Work Areas of the building.

END OF SECTION 015733

SECTION 015736
RESPIRATORY PROTECTION

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Instruct and train each worker involved in asbestos abatement or maintenance and repair of friable asbestos-containing materials in proper respiratory use and require that each worker always wear a respirator, properly fitted on the face, in the Work Area from the start of any operation which may cause airborne asbestos fibers until the Work Area is completely decontaminated. Use respiratory protection appropriate for the fiber level encountered in the work place or as required for other toxic or oxygen-deficient situations encountered.

1.02 STANDARDS

A. Except to the extent that more stringent requirements are written directly into the Contract Documents, the following regulations and standards have the same force and effect (and are made a part of the Contract Documents by reference) as if copied directly into the Contract Documents, or as if published copies were bound herewith. Where there is a conflict in requirements set forth in these regulations and standards, meet the more stringent requirement.

B. OSHA - U.S. Department of Labor Occupational Safety and Health Administration, Safety and Health Standards 29 CFR 1910.1001, 1910.134, and 1926.1101.

C. ANSI - American National Standard Practices for Respiratory Protection, ANSI Z88.2-1980.

D. NIOSH - National Institute for Occupational Safety and Health.

E. MSHA - Mine Safety and Health Administration.

F. Other Federal, state and/or local regulations as required.

1.03 SUBMITTALS

A. Before the Start of Work: Submit the following to the Owner for review. No work shall begin until these submittals provided.

B. Product Data: Submit manufacturer's product information for each component used, including NIOSH and MSHA Certifications for each component in an assembly and/or for entire assembly.

C. Respiratory Protection Program: Submit Contractor's written respiratory protection program manual as required by OSHA 1926.1101.

PART 2 PRODUCTS

2.01 AIR PURIFYING RESPIRATORS

A. Respirator Bodies:
   1. Provide half-face or full-face type respirators.
   2. Equip full- face respirators with a nose cup or other anti-fogging device as would be appropriate for use in air temperatures less than 32 degrees Fahrenheit.
   3. Filter Cartridges:
      a. Provide, at a minimum, HEPA type filters labeled with NIOSH and MSHA Certification for "Radionuclides, Radon Daughters, Dust, Fumes, Mists including
      b. In addition, a chemical cartridge section may be added, if required, for solvents, etc., in use.
      c. If a chemical cartridge section is added, provide cartridges that have each section of the combination canister labeled with the appropriate color code and NIOSH/MSHA Certification.
   4. Non-permitted respirators: Do not use single use, disposable or quarter- face respirators.

PART 3 EXECUTION

3.01 GENERAL

A. Respiratory Protection Program: Comply with ANSI Z88.2 - 1980 "Practices for Respiratory Protection" and OSHA 29 CFR 1910 and 1926.

B. Require that respiratory protection be used at all times that there is any possibility of disturbance of asbestos-containing materials whether intentional or accidental.

C. Require that a respirator be worn by anyone in a Work Area at all times, regardless of activity, during a period that starts with any operation which could cause airborne fibers until the area has been cleared for re-occupancy in accordance with Section 017433 Work Area Clearance.

D. Regardless of Airborne Fiber Levels: Require that the minimum level of respiratory protection used be half-face air-purifying respirators with high efficiency filters.

E. Do not allow the use of single-use, disposable, or quarter-face respirators for any purpose.

3.02 FIT TESTING

A. Initial Fitting:
   1. Provide initial fitting of respiratory protection during a respiratory protection course of training.
   2. Fit types of respirator to be actually worn by each individual.
   3. Allow an individual to use only those respirators for which training and fit testing have been provided.

B. Upon Each Wearing: Require that each time an air-purifying respirator is put on it be checked for fit with a positive and negative pressure fit test in accordance with the manufacturer's instructions or ANSI Z88.2 (1980).

3.03 TYPE OF RESPIRATORY PROTECTION REQUIRED

A. Provide Respiratory Protection as indicated in paragraph below. Higher levels of protection may be provided as desired by Contractor, or as directed by Owner. Where paragraph below does not apply, determine the proper level of protection by dividing the expected or actual airborne fiber count in the Work Area by the "protection factors" following:
   1. The level of respiratory protection which supplies an airborne fiber level inside the respirator, at the breathing zone of the wearer, at or below 0.01 f/cc is the minimum level of protection allowed.

B. Use the following unless air monitoring results indicate greater protection is necessary. Refer to Protection Factors table for choice of respirators.
   1. Loose equipment cleaning prior to removal in uncontaminated area: Half-face dual cartridge-type respirator.
   2. Plastic installation which does not disturb asbestos-containing material: Half-face dual cartridge-type respirator.
   3. Removing or cleaning items or plastic installation when such operation may disturb asbestos-containing material: Half-face dual cartridge-type respirator.
   4. Asbestos-containing material removal: Half-face dual cartridge-type respirator.
   5. Gross cleanup of removal area(s): Half-face dual cartridge-type respirator.
   6. Installation of encapsulant after air sampling results indicate 0.01 or less f/cc and before plastic removal: Half-face dual cartridge-type respirator.
   7. Final wet-cleaning of walls until final air tests show exposure in work areas to be below f/cc: Half-face dual cartridge-type respirator.
   8. Loading and unloading drums on truck (outside work area): Half-face cartridge respirators.
   9. Glove bag removal: Half-face dual cartridge-type respirator.
   10. Vinyl-asbestos floor tile, floor tile mastic, ceiling tile, cement-asbestos board removal: Half-face cartridge respirators
   11. Built-up roofing and roof flashing removal: Half-face dual cartridge respirators.
   12. Disposal at landfill: Half-face dual cartridge respirator.

C. Fibers: For purposes of this section fibers are defined as all fibers regardless of composition as counted in the OSHA Reference Method (ORM), NIOSH Method 7400 procedure, or asbestos fibers of any size as counted using either a scanning or transmission electron microscope.

D. Protections Factors:

RESPIRATOR TYPE	PROTECTION FACTOR
Air purifying: Negative pressure respirator; High efficiency filter; Half-face/Full-face piece	10
Air purifying: Negative pressure respirator; High efficiency filter; Half-face/Full-face piece or Type C supplied air: Positive pressure respirator, continuous flow; Pressure demand; Half-face/Full-face piece	100
Type C supplied air: Positive pressure respirator; Pressure demand; Full-face piece	1,000
Type C supplied air: Positive pressure respirator; Pressure demand; Full-face piece; Equipped with an auxiliary positive pressure Self-Contained Breathing Apparatus (SCBA)	Over 1,000

3.04 AIR PURIFYING RESPIRATORS

A. Negative pressure - half- or full-face mask:
   1. Supply a sufficient quantity of respirator filters approved for asbestos, so that workers can change filters during the work day.
   2. Require that respirators be wet-rinsed, and filters discarded, each time a worker leaves the Work Area.
   3. Require that new filters be installed each time a worker re-enters the Work Area.
   4. Store respirators and filters at the job site in the changing room and protect totally from exposure to asbestos prior to their use.

B. Powered air purifying - half- or full-face mask:
   1. Supply a sufficient quantity of high efficiency respirator filters approved for asbestos so that workers can change filters at any time that flow through the face piece decreases to the level at which the manufacturer recommends filter replacement.
   2. Require that regardless of flow, filter cartridges be replaced after 40 hours of use.
   3. Require that HEPA elements in filter cartridges be protected from wetting during showering.
   4. Require entire exterior housing of respirator, including blower unit, filter cartridges, hoses, battery pack, face mask, belt, and cords, and be washed each time a worker leaves the Work Area.
   5. Caution should be used to avoid shorting battery pack during washing. Provide an extra battery pack for each respirator so that one can be charging while one is in use.

END OF SECTION 015736

SECTION 015813
TEMPORARY PROJECT SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project identification sign.

1.02 RELATED REQUIREMENTS

A. Section 011000 - Summary: Responsibility to provide signs.

1.03 REFERENCE STANDARDS

A. FHWA (SHS) - Standard Highway Signs and Markings.

1.04 QUALITY ASSURANCE

A. Design sign and structure to withstand 50 miles/hr wind velocity.

B. Sign Painter: Experienced as a professional sign painter for minimum three years.

C. Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Shop Drawing: Show content, layout, lettering, color, foundation, structure, sizes and grades of members.

PART 2 PRODUCTS

2.01 SIGN MATERIALS

A. Structure and Framing: New, wood, structurally adequate.

B. Sign Surfaces: Exterior grade plywood with medium density overlay, minimum 3/4 inch thick, standard large sizes to minimize joints.

C. Rough Hardware: Galvanized.

D. Paint and Primers: Exterior quality, two coats; sign background of color as selected.

E. Lettering: Exterior quality paint, contrasting colors.

2.02 PROJECT IDENTIFICATION SIGN

A. One painted sign, 32 sq ft area, bottom 6 feet above ground.

B. Content:
   1. Project number, title, logo and name of Owner as indicated on Contract Documents.
   2. Names and titles of authorities.
   3. Names and titles of Architect and Consultants.
   4. Name ofContractor .

C. Graphic Design, Colors, Style of Lettering: Designated by Architect.

D. Lettering: Standard Alphabet Series C, as specified in FHWA (SHS).
   1. Bond Issue scope of work as provided by the Owner.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install project identification sign within 30 days after date fixed by Notice to Proceed.

B. Erect at designated location.

C. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.

D. Install sign surface plumb and level, with butt joints. Anchor securely.

E. Paint exposed surfaces of sign, supports, and framing.

3.02 MAINTENANCE

A. Maintain signs and supports clean, repair deterioration and damage.

3.03 REMOVAL

A. Remove signs, framing, supports, and foundations at completion of Project and restore the area.

END OF SECTION 015813

SECTION 016000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General product requirements.

B. Re-use of existing products.

C. Transportation, handling, storage and protection.

D. Product option requirements.

E. Substitution limitations.

F. Value engineering proposals

G. Procedures for Owner-supplied products.

H. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

A. Section 011000 - Summary: Lists of products to be removed from existing building.

B. Section 011000 - Summary: Identification of Owner-supplied products.

C. Section 014000 - Quality Requirements: Product quality monitoring.

D. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions: Requirements for VOC-restricted product categories.

E. Section 017419 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

1.03 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code.

1.04 SUBMITTALS

A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.

B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.

C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

D. Specific Products to be Reused: The reuse of certain materials and equipment already existing on the project site is required.

1. See Section 011000 for list of items required to be salvaged for reuse and relocation.

2.02 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by Contract Documents.

B. Use of products having any of the following characteristics is not permitted:
   1. Made of wood from newly cut old growth timber.
   2. Containing lead, cadmium, or asbestos.

C. Where other criteria are met, Contractor shall give preference to products that:
   1. If used on interior, have lower emissions, as defined in Section 016116.
   2. If wet-applied, have lower VOC content, as defined in Section 016116.
   3. Are extracted, harvested, and/or manufactured closer to the location of the project.
   4. Have longer documented life span under normal use.
   5. Result in less construction waste. See Section 017419
   6. Are made of vegetable materials that are rapidly renewable.
   7. Are made of recycled materials.
   8. If made of wood, are made of sustainably harvested wood, wood chips, or wood fiber.
   9. If bio-based, other than wood, are or are made of Sustainable Agriculture Network certified products.
   10. Are Cradle-to-Cradle Certified.
   11. Have a published Environmental Product Declaration (EPD).
   12. Have a published Health Product Declaration (HPD).
   13. Have a published Manufacturer's Inventory of Chemical Content.

D. Provide interchangeable components by the same manufacture for components being replaced.

E. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Size terminal lugs to NFPA 70, include lugs for terminal box.

F. Cord and Plug: Provide minimum 6 foot cord and plug including grounding connector for connection to electric wiring system. Cord of longer length is specified in individual specification sections.

2.03 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.04 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Owner; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION PROCEDURES

A. No substitutions will be considered after award of the Contract except as follows:
   1. The specified product becomes unavailable through no fault of the Contractor.
   2. The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure of the Contractor to pursue the Work promptly or coordinate activities properly.
   3. The specified product or method of construction cannot receive necessary approval by authorities having jurisdiction, and the requested substitution can be approved.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

C. A request for substitution constitutes a representation that the Contractor:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
   2. Agrees to provide the same warranty for the substitution as for the specified product.
   3. Agrees to coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.

D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

E. Substitution Submittal Procedure (after contract award):
   1. Submit to Owner and Architect one electronic copy of request for substitution as a Request For Information in Owner's document management system for consideration.
   2. Limit each submittal to one value engineering proposal.
   3. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
   4. The Architect will notify Contractor in writing of decision to accept or reject request.
   5. If accepted, a Change Order will be issued to document the acceptance of the substitution request.

3.02 VALUE ENGINEERING PROPOSALS

A. Value engineering proposals shall be substitutions which, if accepted, provide a savings to the Project of at least two thousand five hundred dollars ($2,500.00) or more after deducting offsetting costs the Owner may be required to bear. Offsetting costs to the Owner may include increased administrative costs by the Owner, Architect's fees for incorporating proposal into Construction Documents, increased cost of other construction by the Owner, cost of Owner's other contractors, and similar considerations.

B. Value engineering proposals will be considered at any time after award of the Contract.

C. Owner is under no obligation to accept value engineering proposals from Contractor.

D. Owner is under no obligation to reimburse costs of value engineering proposal preparation to Contractor if proposal is rejected.

E. The amount of savings to the Project after deducting offsetting costs to the Owner will be distributed fifty percent to the Owner and fifty percent to the Contractor.

F. Value Engineering Proposal Submittal Procedure:
   1. Submit to Owner and Architect one electronic copy of value engineering proposal as a Request For Information into Owner's document management system for consideration.
   2. Limit each submittal to one value engineering proposal.
   3. Submit narrative describing value engineering proposal, product information, and cost savings analysis.
   4. The Owner will notify Contractor in writing of decision to accept or reject request.
   5. If accepted, a Change Order will be issued to document the acceptance of the value engineering proposal and modify the Contract Sum accordingly.

3.03 OWNER-SUPPLIED PRODUCTS

A. See Section Section 011000 - Summary for identification of Owner-supplied products.

B. Owner's Responsibilities:
   1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
   2. Arrange and pay for product delivery to site.

3. On delivery, inspect products jointly with Contractor.
4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
5. Arrange for manufacturers' warranties, inspections, and service.

C. Contractor's Responsibilities:
1. Review Owner reviewed shop drawings, product data, and samples.
2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
3. Handle, store, install and finish products.
4. Repair or replace items damaged after receipt.

3.04 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.05 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 017419.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Provide off-site storage and protection when site does not permit on-site storage or protection.

G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

H. Comply with manufacturer's warranty conditions, if any.

I. Do not store products directly on the ground.

J. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

K. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

L. Prevent contact with material that may cause corrosion, discoloration, or staining.

M. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

N. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION 016000

SECTION 016116
VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for Indoor-Emissions-Restricted products.

B. Requirements for VOC-Content-Restricted products.

1.02 RELATED REQUIREMENTS

A. Section 013000 - Administrative Requirements: Submittal procedures.

B. Section 014000 - Quality Requirements: Procedures for testing and certifications.

C. Section 016000 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.

1.03 DEFINITIONS

A. Indoor-Emissions-Restricted Products: All products in the following product categories, whether specified or not:
   1. Interior paints and coatings applied on site.
   2. Interior adhesives and sealants applied on site, including flooring adhesives.
   3. Flooring.
   4. Composite wood.
   5. Products making up wall and ceiling assemblies.
   6. Thermal and acoustical insulation.
   7. Other products when specifically stated in the specifications.

B. VOC-Content-Restricted Products: All products in the following product categories, whether specified or not:
   1. Interior paints and coatings.
   2. Interior adhesives and sealants applied on site, including flooring adhesives.
   3. Other products when specifically stated in the specifications.

C. Interior of Building: Anywhere inside the exterior weather barrier.

D. Adhesives: All gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.

E. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including firestopping sealants and duct joint sealers.

F. Inherently Non-Emitting Materials: Products composed wholly of minerals or metals, unless they include organic-based surface coatings, binders, or sealants; and specifically the following:
   1. Concrete.
   2. Clay brick.
   3. Metals that are plated, anodized, or powder-coated.
   4. Glass.
   5. Ceramics.
   6. Solid wood flooring that is unfinished and untreated.

1.04 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency.

B. ASTM D3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings.

C. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.

D. CARB (ATCM) - Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products.

E. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board.

F. CHPS (HPPD) - High Performance Products Database.

G. CRI (GLP) - Green Label Plus Testing Program - Certified Products.

H. GreenSeal GC-03 - Anti-Corrosive Paints; Green Seal, Inc.; 2007

I. GreenSeal GS-11 - Paints; Green Seal, Inc.; 1993.

J. GreenSeal GS-36 - Standard for Adhesives for Commercial Use.

K. SCAQMD 1113 - Architectural Coatings.

L. SCAQMD 1168 - Adhesive and Sealant Applications.

M. SCS (CPD) - SCS Certified Products.

N. UL (GGG) - GREENGUARD Gold Certified Products.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: For each VOC-restricted product used in the project, submit evidence of compliance.

1.06 QUALITY ASSURANCE

A. Indoor Emissions Standard and Test Method: CAL (CDPH SM), using Standard Private Office exposure scenario and the allowable concentrations specified in the method, and range of total VOC's after 14 days.
   1. Wet-Applied Products: State amount applied in mass per surface area.
   2. Paints and Coatings: Test tinted products, not just tinting bases.
   3. Evidence of Compliance: Acceptable types of evidence are the following;
      a. Current UL (GGG) certification.
      b. Current SCS (CPD) Floorscore certification.
      c. Current SCS (CPD) Indoor Advantage Gold certification.
      d. Current listing in CHPS (HPPD) as a low-emitting product.
      e. Current CRI (GLP) certification.
      f. Test report showing compliance and stating exposure scenario used.
   4. Product data submittal showing VOC content is NOT acceptable evidence.
   5. Manufacturer's certification without test report by independent agency is NOT acceptable evidence.

B. VOC Content Test Method: 40 CFR 59, Subpart D (EPA Method 24), or ASTM D3960, unless otherwise indicated.
   1. Evidence of Compliance: Acceptable types of evidence are:
      a. Report of laboratory testing performed in accordance with requirements.
      b. Published product data showing compliance with requirements.
      c. Certification by manufacturer that product complies with requirements.

C. Composite Wood Emissions Standard: CARB (ATCM) for ultra-low emitting formaldehyde (ULEF) resins.
   1. Evidence of Compliance: Acceptable types of evidence are:
      a. Current SCS "No Added Formaldehyde (NAF)" certification; www.scscertified.com.
      b. Report of laboratory testing performed in accordance with requirements.
      c. Published product data showing compliance with requirements.
      d. Certification by manufacturer that product complies with requirements.

D. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

PART 2 PRODUCTS

2.01 MATERIALS

A. All Products: Comply with the most stringent of federal, State, and local requirements, or these specifications.

B. Indoor-Emissions-Restricted Products: Comply with Indoor Emissions Standard and Test Method, except for:
   1. Composite Wood, Wood Fiber, and Wood Chip Products: Comply with Composite Wood Emissions Standard or contain no added formaldehyde resins.
   2. Inherently Non-Emitting Materials.

C. VOC-Content-Restricted Products: VOC content not greater than required by the following:
   1. Adhesives, Including Flooring Adhesives: SCAQMD 1168 Rule.
   2. Aerosol Adhesives: GreenSeal GS-36.
   3. Joint Sealants: SCAQMD 1168 Rule.
   4. Paints and Coatings: Each color; most stringent of the following:
      a. 40 CFR 59, Subpart D.
      b. SCAQMD 1113 Rule.
      c. CARB (SCM).

D. Other Product Categories: Comply with limitations specified elsewhere.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. Owner reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to Owner.

B. Additional costs to restore indoor air quality due to installation of non-compliant products will be borne by Contractor.

END OF SECTION 016116

SECTION 017000
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Requirements for alterations work, including selective demolition.

C. Pre-installation meetings.

D. Cutting and patching.

E. Surveying for laying out the work.

F. Cleaning and protection.

G. Starting of systems and equipment.

H. Demonstration and instruction of Owner personnel.

I. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

1.02 RELATED REQUIREMENTS

A. Section 011000 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.

B. Section 013000 - Administrative Requirements: Submittals procedures, Electronic document submittal service.

C. Section 014000 - Quality Requirements: Testing and inspection procedures.

D. Section : 015643 - Temporary Enclosures Temporary exterior enclosures.

E. Section : 015643 - Temporary Enclosures Temporary interior partitions.

F. Section 015100 - Temporary Utilities: Temporary heating, cooling, and ventilating facilities.

G. Section 017419 - Construction Waste Management and Disposal: Additional procedures for trash/waste removal, recycling, salvage, and reuse.

H. Section 017800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.

I. Section 017900 - Demonstration and Training: Demonstration of products and systems to be commissioned and where indicated in specific specification sections

J. Individual Product Specification Sections:
   1. Advance notification to other sections of openings required in work of those sections.
   2. Limitations on cutting structural members.

1.03 REFERENCE STANDARDS

A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Cutting and Patching: Notify Owner in advance of cutting or alteration that affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   4. Visual qualities of sight exposed elements.
   5. Work of Owner or separate contractor.

C. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.05 QUALIFICATIONS

A. For demolition work, employ a firm specializing in the type of work required.

B. For surveying work, employ a land surveyor registered in the State of Missouri and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

C. For field engineering, employ a professional engineer of the discipline required for specific service on Project, licensed in the State of Missouri. Employ only individual(s) trained and experienced in establishing and maintaining horizontal and vertical control points necessary for laying out construction work on project of similar size, scope and/or complexity.

D. For design of temporary shoring and bracing, employ a Professional Engineer experienced in design of this type of work and licensed in the State of Missouri.

1.06 PROJECT CONDITIONS

A. Use of explosives is not permitted.

B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

C. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

D. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

E. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
   1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.
   2. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.

F. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
   1. Minimize amount of bare soil exposed at one time.
   2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
   3. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
   4. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

G. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
   1. At All Times: Excessively noisy tools and operations will not be tolerated inside the building at any time of day; excessively noisy includes.
   2. Outdoors: Limit conduct of especially noisy exterior work to local municipality or County ordinances.
   3. Indoors: Limit conduct of especially noisy interior work to the hours of 6 pm to 7 am unless approved by Owner prior to performing noisy work.

H. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.

I. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

J. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.07 COORDINATION

A. See Section 011000 - Summary for occupancy-related requirements.

B. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

C. Notify affected utility companies and comply with their requirements.

D. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

E. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

G. Coordinate completion and clean-up of work of separate sections.

H. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 016000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify Architect four days in advance of meeting date.

D. Prepare agenda and preside at meeting:
   1. Review conditions of examination, preparation and installation procedures.
   2. Review coordination with related work.

E. Record minutes and distribute copies within two days after meeting to participants, with one copy to Architect, Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Architect of any discrepancies discovered.

C. Contractor shall locate and protect survey control and reference points.

D. Control datum for survey is _____.

E. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

F. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

G. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.

H. Utilize recognized engineering survey practices.

I. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
   2. Grid or axis for structures.
   3. Building foundation, column locations, ground floor elevations.

J. Periodically verify layouts by same means.

K. Maintain a complete and accurate log of control and survey work as it progresses.

3.05 GENERAL INSTALLATION REQUIREMENTS

A. In addition to compliance with regulatory requirements, conduct construction operations in compliance with NFPA 241, including applicable recommendations in Appendix A.

B. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

C. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

D. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

E. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

F. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.

1. Verify that construction and utility arrangements are as indicated.
2. Report discrepancies to Architect before disturbing existing installation.
3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
   1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 015000 in locations indicated on drawings.
   2. Provide sound retardant partitions of construction indicated on drawings in locations indicated on drawings.

C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
   1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
   2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.

D. Remove existing work as indicated and as required to accomplish new work.
   1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
   2. Remove items indicated on drawings.
   3. Relocate items indicated on drawings.
   4. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
   5. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
   2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
   3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
      a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
      b. See Section 011000 - Summary for other limitations on outages and required notifications.
      c. Provide temporary connections as required to maintain existing systems in service.
   4. Verify that abandoned services serve only abandoned facilities.
   5. Remove abandoned pipe, ducts, conduits, and equipment , including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

F. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.

G. Adapt existing work to fit new work: Make as neat and smooth transition as possible.

1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.
2. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
3. Where a change of plane of 1/4 inch or more occurs in existing work, submit recommendation for providing a smooth transition for Architect review and request instructions.
4. Trim existing wood doors as necessary to clear new floor finish. Refinish trim as required.

H. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

I. Refinish existing surfaces as indicated:
1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.

J. Clean existing systems and equipment.

K. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

L. Do not begin new construction in alterations areas before demolition is complete.

M. Comply with all other applicable requirements of this section.

3.07 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. See Alterations article above for additional requirements.

C. Perform whatever cutting and patching is necessary to:
1. Complete the work.
2. Fit products together to integrate with other work.
3. Provide openings for penetration of mechanical, electrical, and other services.
4. Match work that has been cut to adjacent work.
5. Repair areas adjacent to cuts to required condition.
6. Repair new work damaged by subsequent work.
7. Remove samples of installed work for testing when requested.
8. Remove and replace defective and non-complying work.

D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

G. Restore work with new products in accordance with requirements of Contract Documents.

H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material , to full thickness of the penetrated element.

J. Patching:

1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
2. Match color, texture, and appearance.
3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.08 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect waste materials, debris, and trash/rubbish and place in appropriate trash receptacles or dumpsters daily.

E. Compliance failure:
1. Owner shall give Contractor written notice of failure to comply with progress cleaning and waste removal requirements.
2. Owner shall commence progress cleaning and waste removal requirements with Owner's own forces if Contractor has not complied within 24 hours after receiving notice.
3. Owner shall back charge Contractor at the rate of $80 per man hour required to bring site to a clean and orderly condition.

3.09 PROTECTION OF EXISTING FACILITIES

A. Protect adjacent rooms and spaces that are not a part of the Work.

B. Contractor shall shut doors and keep closed.

C. Contractor shall seal off with plastic and tape inside the Work area any smoke detectors, communicating wall penetrations, return registers, and door undercuts during operations that will generate airborne dust and debris.

D. Contractor shall maintain plastic barriers until the Work generating airborne dust and debris is completed.

E. Contractor shall remove plastic barriers carefully to not damage existing facilities.

F. Contractor shall not use spray adhesives to attach plastic.

G. Contractor shall use tape that will not damage material adhered to upon tape removal.

H. Protect existing flooring:
1. Prior to Contractor mobilization on site:
   a. Contractor shall provide contact adhesive plastic on carpeted flooring in any room or space, including stairs and ramps that are part of the Work or are used for storage and as indicated on the drawings.
   b. Contractor shall provide 1/4 inch tempered masonite, 3/8 inch masonite, or 1/4 inch plywood over contact adhesive plastic sheeting on carpeted flooring and 1/4 inch tempered masonite, 3/8 inch masonite, or 1/4 inch plywood over plastic sheeting on vinyl tile, sheet vinyl, wood, ceramic tile, quarry tile, porcelain tile, rubber, or poured resin flooring in corridors or any other heavy traffic area, including stairs and ramps used to move wheeled or skidded equipment or materials and as indicated on the drawings.

c. Contractor shall provide 1/4 inch tempered masonite, 3/8 inch masonite, or 1/4 inch plywood over plastic sheeting on vinyl tile, sheet vinyl, wood, ceramic tile, quarry tile, porcelain tile, rubber, or poured resin flooring in any rooms or spaces that are part of the Work or are used for storage.
d. Contractor shall provide 1/4 inch tempered masonite, 3/8 inch masonite, or 1/4 inch plywood in areas where soldering, metal cutting, pipe threading, welding, or torch work is performed.
e. Contractor shall tape all joints on installed 1/4 inch tempered masonite, 3/8 inch masonite, or 1/4 inch plywood and maintain taped joints throughout progress of the Work to insure joints remained sealed and do not pose a tripping hazard.
f. Contractor shall cooperate with Owner to identify spaces that meet the requirements for flooring protection identified in this Section prior to mobilization on site.

2. During construction:
a. Contractor will maintain flooring protection during progress of the Work and will not remove protection until all the Work in the room or space is substantially complete.
b. If Contractor moves into a new space to perform the Work or to use for storage and does not protect the existing floor, then the Contractor shall be back charged for cleaning flooring at a minimum or replacement of flooring at a maximum, dependent upon damage to flooring and at the sole discretion of the Owner.

I. Protect existing casework:
1. Contractor shall cover with plastic and tape as a minimum.
2. Contractor shall provide 1/4 inch tempered masonite, 3/8 inch masonite, or 1/4 inch plywood over plastic if casework is used as a ladder or scaffold for workers or if soldering, metal cutting, pipe threading, welding, or torch work is performed overhead.
3. Maintain during progress of the Work and do not remove until all the Work in the room or space is substantially complete.

J. Compliance failure:
1. Owner shall give Contractor written notice of failure to comply with protection of existing facilities.
2. Owner shall commence protecting existing facilities with Owner's own forces if Contractor has not complied within 24 hours after receiving notice.
3. Owner shall back charge Contractor at the rate of $80 per man hour plus cost of protection materials required to protect existing facilities.
4. Contractor shall repair to the satisfaction of the Owner or replace casework damaged as a consequence of using casework as a ladder or scaffold for workers or if damaged because soldering, metal cutting, pipe threading, welding, or torch work is performed overhead without specified protection.

3.10 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Prohibit traffic from landscaped areas.

H. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.11 SYSTEM STARTUP

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Architect and Owner seven days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify that wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.12 DEMONSTRATION AND INSTRUCTION

A. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.

B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

C. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.

3.13 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

B. Testing, adjusting, and balancing HVAC systems: See Section 230593 - Testing, Adjusting, and Balancing for HVAC.

3.14 FINAL CLEANING

A. Execute final cleaning prior to Substantial Completion.
   1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.

B. Use cleaning materials that are nonhazardous.

C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

F. Replace filters of operating equipment.

G. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.

H. Clean site; sweep paved areas, rake clean landscaped surfaces.

I. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.15 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.

1. Provide copies to Architect and Owner.

B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.

C. Notify Owner when work is considered ready for Substantial Completion inspection.

D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.

E. Owner will occupy portions of the building as specified in Section 011000.

F. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.

G. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

H. Accompany Owner's Construction Supervisor on Contractor's preliminary final inspection.

I. Notify Owner when work is considered finally complete.

J. Complete items of work determined by Architect's and Owner's final inspection.

END OF SECTION 017000

SECTION 017333
PROJECT CONTAMINATION

PART 1 GENERAL

1.01 DESCRIPTION OF REQUIREMENTS

A. General: Decontamination of the Work Area following asbestos abatement.
   1. One cleaning of the primary barrier plastic prior to its removal and one cleaning of the room surfaces to remove any new or existing contamination will be used. Unless specifically indicated otherwise all materials are considered damaged or friable for purposes of this section. Operation of the negative pressure system is used to remove airborne fibers generated by the abatement work.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Removal of Gross Debris is integral with the performance of abatement work and as such is specified in the appropriate work section(s) of these specifications:
   1. Section 028213 Removal of Asbestos Containing Materials
   2. Section 028236 Removal of Class II Asbestos Containing Materials

B. Work Area Clearance: Air testing and other requirements which must be met before release of Contractor and reoccupancy of the work area are specified in Section 017433 Work Area Clearance.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL

A. Work of This Section includes the decontamination of air in the Work Area which has been, or may have been, contaminated by the elevated airborne asbestos fiber levels generated during abatement activities, or which may previously have had elevated fiber levels due to friable asbestos-containing materials in the space.

B. Work of This Section includes the cleaning, decontamination, and removal of temporary facilities installed prior to abatement work, including:
   1. Primary and Critical Barriers erected by work of Section 015643
   2. Decontamination Unit erected by work of Section 015762
   3. Negative Pressure System installed by work of Section 015139

3.02 START OF WORK

A. Previous Work: During completion of the asbestos abatement work specified in other sections, the Secondary Barrier of polyethylene sheeting will have been removed and disposed of along with any gross debris generated by the asbestos abatement work.

B. Start of Work: Work of this section begins with the cleaning of the Primary Barrier. At start of work the following will be in place:
   1. Primary Barrier: Two layers of polyethylene sheeting on floor and two layers on walls.
   2. Critical Barrier: An airtight barrier between the Work Area and other portions of the building or the outside.
   3. Critical Barrier Sheeting: Over lighting fixtures and clocks, ventilation openings, doorways, convectors, speakers and other openings.
   4. Decontamination Units: For personnel and equipment in operating condition.
   5. Negative Pressure System: In operation.

3.03 WORK SEQUENCE

A. The work shall be carried out in the sequence as listed below.

B. First Cleaning:

1. Carry out a first cleaning of all surfaces of the work area including items of remaining sheeting, tools, scaffolding and/or staging by use of damp-cleaning and mopping, and/or a High Efficiency Particulate Air (HEPA) filtered vacuum. (Note: A HEPA vacuum may fail if used with wet material.) Do not perform dry dusting or dry sweeping. Use each surface of a cleaning cloth one time only and then dispose of as contaminated waste. Continue this cleaning until there is no visible debris from removed materials or residue on plastic sheeting or other surfaces.

C. First Visual Inspection:
   1. Conduct a Visual Inspection of the entire Work Area per ASTM guideline E-1368-05e1 or most current version, including: all surfaces, ceiling, walls, floor, decontamination unit, all plastic sheeting, seals over ventilation openings, doorways, windows, and other openings; look for debris from any sources, residue on surfaces, dust or other matter. If any debris, residue, dust or other matter is found repeat final cleaning and continue decontamination procedure from that point. When the area is visually clean, complete the certification at the end of this section. Visual inspection is not complete until confirmed in writing, on the certification, by Project Administrator.
   2. Temporary lighting: Provide adequate lighting for visual inspection of all surfaces in the areas to be subjected to visual inspection.
   3. Lifts: Provide ladders, scaffolding, and lifts as required to provide access to all surfaces in the area to be subjected to visual inspection. Access is to allow touching of all surfaces.

D. Encapsulation:
   1. Perform encapsulation of substrate at this time.
   2. Maintain negative pressure system in operation during encapsulation work.
   3. Perform work only after meeting the following requirements:
      a. Surfaces to be covered have met the requirements for a visual inspection in this section.
   4. Encapsulation may only be performed, if the Contractor has demonstrated that the encapsulant to be used is compatible with the materials or finishes to be re-applied in the Work Area.

E. Waiting Period:
   1. Wait 12 hours to allow HEPA filtered fan units to clean air of airborne asbestos fibers and encapsulant to dry.
   2. Use oscillating fans as necessary to assure circulation of air in all parts of work areas during this period.
   3. Maintain negative pressure system in operation for the entire waiting period.

F. Removal of Primary Barriers:
   1. At completion of waiting period remove Primary barrier sheeting in the work area.
   2. Leave the critical barrier(s): Which form the sole barrier between the Work Area and other portions of the building or the outside:
   3. Leave the Critical Barrier Sheeting: Over lighting fixtures and clocks, ventilation openings, doorways, convectors, speakers, and other openings.
   4. Leave the Decontamination Unit: For personnel, in operating condition.
   5. Leave the negative pressure system and maintain in continuous operation.
   6. Conduct Final cleaning: Clean all surfaces in the work area in the same manner as the first cleaning immediately after removal of Primary plastic. This cleaning is now being applied to existing room surfaces and critical barriers. Take care to avoid water marks or other damage to surfaces.

G. Air Stream Cleaning:

1. Contractor's Testing: Visually inspect all surfaces and reclean if any dust, debris, etc. is found. At completion of this inspection sweep entire Work Area including walls, ceilings, ledges, floors and other surfaces in the Work Area with exhaust from forced-air equipment (leaf blower with approximately 1 horsepower electric motor or equivalent). Do not direct forced-air equipment at any seal in any Critical Barrier. If any debris or dust is found repeat the cleaning. Continue this process until no debris dust or other material is found while sweeping of all surfaces with forced-air equipment.
2. Maintain negative pressure system in continuous operation for the entire time.

H. Second Visual Inspection:
1. Conduct visual inspection per ASTM guideline E-1368-05e1 or most current version, and reclean as necessary. When visual inspection is passed, clearance air monitoring may be performed after work area is dry.

I. Final Clearance Air Sampling:
1. After the work area is found to be visually clean PCM or TEM air samples will be collected and analyzed in accordance with the procedure for Transmission Electron Microscopy or Phase Contrast Microscopy as set forth in Section 01714 Work Area Clearance.
   a. If Release Criteria are not met, repeat Final Cleaning and continue Decontamination procedure from that point.
   b. If Release Criteria are met, work may proceed with removal of work area isolation barriers.

J. Removal of Work Area Isolation:
1. After all requirements of this section and Section 017433 Work Area Clearance have been met:
   a. Remove the Critical Barriers separating the Work Area from the rest of the building.
   b. HEPA vacuum carpeting designated to remain in work areas using a floor cleaning attachment adjusted so that rubber skirting is in contact with carpet surface. Use a passive (non-power brush type) floor attachment with rubber floor seals and adjustable above-floor height. Completely clean carpeting in one direction with each pass of the floor attachment overlapping the previous pass by one-half the attachment width. At the completion of one such cleaning, vacuum clean in the same manner in a direction at right angles to the initial cleaning.
   c. Shut down and remove the negative pressure system: Seal HEPA filtered fan units, HEPA vacuums and similar equipment with 6 mil polyethylene sheet and duct tape to form a tight seal at intake end before being moved from Work Area.
   d. Remove Personnel Decontamination Unit
   e. Remove any small quantities of residual material found with wet wiping, HEPA filtered vacuum cleaners and local area protection. If significant quantities, as determined by the Owner's Representative, are found then the entire area affected shall be decontaminated as specified in Paragraph 3.3.1 of this section.
   f. Remove all equipment, materials, debris from the work site.
   g. Dispose of all asbestos-containing waste material as specified in Section 028233 Disposal of Asbestos Containing Waste Material.

3.04 CERTIFICATE OF VISUAL INSPECTION

A. A "Certificate of Visual Inspection". shall be completed by the Contractor and certified by the Project Administrator. Submit completed Certificate with Application for Final Payment. Final payment will not be made until this Certificate is executed.

B. Form is included in Section 006000 - Project Forms

3.05 SUBSTANTIAL COMPLETION OF ABATEMENT WORK

A. Asbestos Abatement Work is Substantially Complete upon meeting the requirements of this section and Section 017433 Work Area Clearance, including submission of:
1. Certificate of Visual Inspection

2. Punch list detailing repairs to be made and incomplete items.

END OF SECTION 017333

SECTION 017419
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

A. Owner requires that this project generate the least amount of trash and waste possible.

B. Owner recovers commodity, universal, and hazardous waste materials.

C. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

D. Minimize trash/waste disposal in landfills; salvage or recycle as much waste as economically feasible.

E. Required Recycling: The following must be recycled by the Contractor:
   1. Wood pallets, not painted.
   2. Clean dimensional wood, not painted.
   3. Land clearing debris, including brush, branches, logs, and stumps; see 311000 - Site Clearing for use options.
   4. Concrete.
   5. Concrete masonry units.
   6. Bricks, unless specifically identified in the Contract Documents to be re-used on site.
   7. Pre-cast concrete panels.
   8. Asphalt.
   9. Asphalt roofing shingles.
   10. Plumbing fixtures, porcelain.
   11. Acoustical ceiling tile:
      a. Use acoustical ceiling tile recycling program administered by Armstrong World Industries, Inc.
         1) Additional information can be found at web address ***https://www.armstrongceilings.com/commercial/en-us/performance/sustainable-building-design/ceiling-recycling-program.html***
      b. Materials acceptable for recycling:
         1) All brands of dry, pulpable mineral fiber ceiling panels or tiles.
            (a) All metal splines must be removed from tiles (12”x12”).
         2) All brands of dry fiberglass panels (foil-back case by case).
            (a) Facing must be easily removable.
         3) Any vinyl or scrim-faced mineral fiber panels.
      c. Materials acceptable for recycling case-by-case: (Contact the Armstrong Recycling Center at telephone number 877-276-7876)
         1) Asbestos containing ceiling tiles, Ceiling tiles installed below friable asbestos or contaminated with any other hazardous material.
         2) Red or pink-backed ceiling tiles.
         3) Wet, moldy or weathered ceiling tiles.
         4) Ceiling tiles or pallets/boxes/bales which contain visible debris (garbage, construction waste).
         5) Ceiling tiles not packaged according to Armstrong Specifications.
         6) Any gypsum ceiling or board.
         7) Ceiling tiles with visible wood pulp.
         8) Armstrong Artran (cardboard like face).
         9) Armstrong Ceramaguard.
         10) Glue-up or adhesive ceiling tiles.
         11) Roll-offs which contain debris.
         12) Baled fiberglass, vinyl-faced, fabric, scram faced or foil-backed ceiling tiles.

d. Call the Armstrong Recycling Center at 877-276-7876 to review the building where the ceilings will be removed, verify the material meets our requirements and for assistance to facilitate recycle. We are continually updating the types of ceiling panels we can recycle and methods we can receive them in.
e. Ceiling material being reclaimed may not come into contact with asbestos containing material, hazardous waste materials or special waste.
    1) If the area where ceilings are being removed is or has gone through abatement procedures, verification that ceilings did not come in contact with asbestos containing material is required
f. Ceiling material being reclaimed must be kept dry and free from debris.
g. Contractor shall register the Project: Contact the Armstrong Ceiling Recycling Center at telephone number 877-276-7876.
h. Required Information to have project approved for recycling:
    1) Contact information for the recycle project.
    2) Building information (Year of Building Construction, Contractor or demo subontractor, Building use, copy of an asbestos survey, details on any prior or current abatement where ceiling is removed).
        (a) Owner will provide asbestos survey information upon request from the Contractor.
    3) Ceiling Information – Material type, quantity, timing.
i. Scheduling, packaging, and shipping procedures:
    1) Receive final project approval for recycling by the Armstrong Recycling Center.
    2) Contractor shall remove ceiling tiles to be recycled from grid.
    3) Contractor shall contact the Armstrong Recycling Center (877-276-7876) to schedule a pick up.
    4) Contractor shall use one of the following three options for return.
        (a) When Option B or C is chosed by the Contractor, coordinate with the local recyler/consolidator for the applicable option to be used.
    5) Option A For Return-Full Truckload Palletized Procedure:
        (a) Contractor shall supply pallets, metal bands, stretch wrap.
        (b) Approved ceiling materials will be palletized in a manner allowing both secure shipment by trailer and the ability of Armstrong employees to safely inspect and unload the trailers' contents, therefore all approved ceiling materials sent to Armstrong must be neatly stacked as follows:
            (1) 4’ x 4’ pallets stacked with ceiling materials to 4 feet tall each and then stacked on top of each other in the trailer. This method is preferred but proper loading equipment must be available at the job site.
            (2) 4’ x 4’ pallets stacked with ceiling materials to 6 feet tall each.
            (3) Some combination of 2’x4’ and 4’x4’ pallets that are agreed upon in advance, in writing to accommodate special building circumstances if building elevators do not accommodate larger size pallets.
            (4) When 2’ x 4’ pallets are used place onto 4’ x 4’ pallets to stabilize two 2’ x 4’ pallets and use stretch wrap to secure pallets together..
        (c) Contractor shall neatly stack ceiling panels on 4’ x 4’ wooden pallets and secure them with metal bands or stretch wrap for stable shipment.
            (1) Any variation from pallet size must be pre-approved by Armstrong.
        (d) Pallets must be kept dry.
            (1) Wet material is not acceptable and will be returned.
        (e) Pallets must be labeled per Armstrong requirements.
        (f) Pallets must be secured within trailers to prevent shifting in transit.
            (1) Carriers will provide load stabilizers.
        (g) Armstrong will pay for the return freight of full trailers of approved material, all of which are defined as a minimum of 30,000 square feet as follows:

(1) Forty-four 4’ x 4’ pallets stacked with ceiling material to 4 feet tall each and then stacked on top of each other in the trailer (preferred method, but proper loading equipment must be available at the job site).
(2) Twenty-two 4’ x 4’ pallets with ceiling material stacked to 6 feet tall each.

(h) It is Contractor's responsibility to ensure that only full trailer loads of approved ceiling materials are shipped.

6) Option B For Return-Less Than Full Truckload Palletized Procedure:
(a) Where the amount of approved ceiling materials from a site is insufficient for a full trailer load, the Contractor may elect to utilize the services of a local recycler/conconsolidator to consolidate approved ceiling materials in a secure and dry location, until a full trailer load is ready for shipment.
(1) The local recycler/consolidator will ensure that all such aggregated shipments are and remain clearly labeled as to their origin and date of approval by an Armstrong employee.
(2) Go to web address https://www.armstrongceilings.com/commercial/en/performance/sustainable-building-design/ceiling-recycling-program.html to find a local recyler/consolidator.
(3) Upon aggregating a full truck load of ceiling tiles, follow the Option A procedures.

(b) The local recycler/consolidator may assist in supplying pallets, metal bands, and stretch wrap.
(c) When local consolidation is not available a LTL pick up may be arranged in some areas for five (5) pallets (7,000 sq. ft.) or more of approved ceiling materials.
(1) Armstrong will pay the return freight of these LTL pickups. LTL pickup must be pre-approved by Armstrong when other options are not available.
(2) LTL pickup must be pre-approved by Armstrong when other options are not available.

(d) The recycler/consolidator shall retain ownership of approved ceiling materials until it is received and accepted at the destination, the Armstrong Plant, as defined by the terms of shipment, F.O.B. (Free on board) destination, despite Armstrong’s payment of the freight costs for full trailer loads.
(e) While the Armstrong approved common carrier is not a party to this agreement, the following describes their responsibilities.
(1) The common carrier that Armstrong has selected is responsible for the transport of the approved ceiling materials from the pick up location to Armstrong’s plant.
(2) This common carrier is an independent contractor utilized by Armstrong and required to demonstrate general liability insurance coverage that meets or exceeds industry standards.

7) Option C For Return-On-Site Roll-Off Procedure (Bulk return to local recycler/consolidator):
(a) Where the amount of approved ceiling materials from a site is insufficient for a full trailer load, the Contractor may elect to utilize the services of a local recycler/conconsolidator to consolidate approved ceiling materials in a secure and dry location, until a full trailer load is ready for shipment.
(1) The local recycler/consolidator will ensure that all such aggregated shipments are and remain clearly labeled as to their origin and date of approval by an Armstrong employee.

(2) Go to web address

https://www.armstrongceilings.com/commercial/en/performance/sustainable-building-design/ceiling-recycling-program.html to find a local recyler/consolidator.

(3) Upon aggregating a full truck load of ceiling tiles, follow the Option A procedures.

(b) Material must be clean and dry.

(c) No wood, metal, construction debris, trash or hazardous materials of any kind can be included.

(d) Material shall be placed in a roll-off container with a water impermeable cover such that material inside does not get wet.

(e) Material shall not be loaded above the top of the container.

(f) Container should have visible Armstrong RA label attached.

12. Contractor can find contact information for various material recyclers at the following web addresses, but may use the material recycler of their choosing, whether or not they are listed at the web addresses provided:

a.	***http://www.stlouisco.com/HealthandWellness/RecyclingandWasteManagement/RegulationsAndLicensing/ConstructionAndDemolitionRecycling***

F. Required Recycling: The following must be disposed of in Owner provided containers or stockpiled in areas identified by Owner on project site for Owner pick-up for recycling or disposal:

1. Single Stream Recycling Container:
   a. Aluminum and plastic beverage containers.
   b. All nonhazardous aluminum containers.
   c. All nonhazardous glass containers.
   d. All nonhazardous plastic containers marked with the number 1, 2, 3, 4, 5, or 7.
      1) Plastic containers marked with the number 6, plastic bags, plastic straps, and plastic container lids shall not be recycled but shall be disposed of off site.
   e. All nonhazardous cardboard free of contaminants with the exception of metal staples or tape.
2. Ferrous Scrap Metal Recycling Container:
   a. All nonhazardous ferrous metals, including packaging banding, metal studs, acoustic ceiling tile frames, sheet metal, structural steel, conduit not containing copper or aluminum wire, piping, reinforcing bars, doors without glazing, door frames, door hardware, and other items made of steel, iron, galvanized steel, stainless steel.
3. Non-Ferrous Scrap Metal Recycling Container:
   a. All nonhazardous non-ferrous metals, including acoustic ceiling tile frames, sheet metal, conduit which can contain copper or aluminum wire, piping, plumbing fixture trim components, doors without glazing, door frames, door hardware, and other items made of aluminum, copper, zinc, lead, brass, and bronze.
   b. All electrical cabling and wiring.
4. Stockpile For Owner Recycling Or Hazmat Disposal:
   a. Mechanical and electrical equipment, unless otherwise indicated on the drawings.
      1) Refrigerant shall be removed from mechanical equipment before recycling mechanical equipment.
   b. Fluorescent lamps (light bulbs).
      1) Protect lamps from breakage during demolition, collection, and stockpiling
   c. All lead acid NiCad and lithium batteries.
   d. All lighting ballasts or other electrical equipment suspected of containing PCBs.

G. The Owner's waste minimization and material recovery operation is limited to those commodity, universal, and hazardous waste materials identified above as Owner's responsibility and responsibility for disposal or recycling of all other construction and demolition waste shall be the responsibility of the Contractor.

H. Owner will recycle recyclable materials and legally dispose of hazardous materials collected from the commodity, universal, and hazardous waste materials identified above as Owner's responsibility.

I. Revenue from recycling of materials collected from the commodity, universal, and hazardous waste materials identified above as Owner's responsibility shall accrue to the Owner.

J. Revenue from recycling of materials collected from the commodity, universal, and hazardous waste materials identified above as Contractor's responsibility shall accrue to the Contractor.

K. Develop and follow a Waste Management Plan designed to implement these requirements.

L. Methods of trash/waste disposal that are not acceptable are:
   1. Burning on the project site.
   2. Burying on the project site.
   3. Dumping or burying on other property, public or private.
   4. Other illegal dumping or burying.
   5. Incineration, either on- or off-site.

M. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 RELATED REQUIREMENTS

A. Section 011000 - Summary: List of items to be salvaged from the existing building for relocation in project or for Owner.

B. Section 013000 - Administrative Requirements: Additional requirements for project meetings, reports, submittal procedures, and project documentation.

C. Section 015000 - Temporary Facilities and Controls: Additional requirements related to trash/waste collection and removal facilities and services.

D. Section 016000 - Product Requirements: Waste prevention requirements related to delivery, storage, and handling.

E. Section 017000 - Execution and Closeout Requirements: Trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

F. Section 311000 - Site Clearing: Handling and disposal of land clearing debris.

1.03 DEFINITIONS

A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.

B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.

C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.

D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.

E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

I. Return: To give back reusable items or unused products to vendors for credit.

J. Reuse: To reuse a construction waste material in some manner on the project site.

K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

N. Toxic: Poisonous to humans either immediately or after a long period of exposure.

O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Waste Management Plan:
   1. Submit Report prior to starting the Work on Project Site but no later than 42 days after Notice To Proceed date.
   2. Submit to Owner one electronic copy of waste disposal report as a Submittal into Owner's document management system containing the following information:
      a. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed.
      b. Landfill Alternatives: List all waste materials that will be diverted from landfills by salvage or recycling.
         1) List each material proposed to be salvaged or recycled.

C. Waste Disposal Reports:
   1. Submit Report prior to submitting Final Application for Payment but no later than 28 days after Substantial Completion date.
   2. Submit to Owner one electronic copy of waste disposal report as a Submittal into Owner's document management system containing the following information:
      a. Landfill Disposal: Include the following information:
         1) Identification of material.
         2) Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.
         3) Provide the name, address, telephone number, and contact person's name of the landfills used and provide certification to the Owner that the landfills have been used.
         4) Include manifests, weight tickets, receipts, or invoices as evidence of quantity.
      b. Recycled and Salvaged Materials: Include the following information for each:
         1) Does not apply to Owner recycled materials.
         2) Identification of material, including those retrieved by installer for use on other projects.
         3) Amount, in tons or cubic yards, date removed from the project site, and receiving party.
         4) Include manifests, weight tickets, receipts, and invoices as evidence of quantity.

5) Certification by receiving party that materials will not be disposed of in landfills or by incineration.

c. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 WASTE MANAGEMENT PROCEDURES

A. See Section 011000 for list of items to be salvaged from the existing building for relocation in project or for Owner.

B. See Section 013000 for additional requirements for project meetings, reports, submittal procedures, and project documentation.

C. See Section 015000 for additional requirements related to trash/waste collection and removal facilities and services.

D. See Section 016000 for waste prevention requirements related to delivery, storage, and handling.

E. See Section 017000 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.

B. Communication: Distribute copies of the Waste Management Plan to job site foreman and each Subcontractor.

C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

D. Meetings: Discuss trash/waste management goals and issues at project meetings, particularly at:
1. Prebid meeting.
2. Preconstruction meeting.
3. Regular job-site meetings.

E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
1. Provide containers as required.
2. Provide adequate space for pick-up and delivery and convenience to Subcontractors.
3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.

F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.

G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.

I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION 017419

SECTION 017433
WORK AREA CLEARANCE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Visual Inspection: Required as a prerequisite of air testing, is set forth in Section 017333 Project Decontamination.

B. Air Monitoring: Performed by the Owner during abatement work, is described in Section 014529 Air Monitoring Test Laboratory Services.

1.02 SUMMARY

A. Not in Guaranteed Maximum Price: This section describes work being performed by the Owner. This work is not in the Guaranteed Maximum Price.

B. This section sets forth required post-abatement airborne asbestos concentrations in the Work Area and describes testing procedures the Owner will use to measure these levels.

1.03 CONTRACTOR RELEASE CRITERIA

A. The Asbestos Abatement Work Area is cleared when the Work Area is visually clean and airborne asbestos structure concentrations have been reduced to the level specified below.

1.04 VISUAL INSPECTION

A. Work of this section will not begin until the visual inspection described in Section 017333 Project Decontamination is complete and has been certified by the Project Administrator.

1.05 AIR MONITORING

A. To determine if the elevated airborne asbestos structure concentration encountered during abatement operations has been reduced to the specified level, the Owner will secure samples and analyze them according to the following procedures:
   1. Aggressive sampling procedures as described below will be followed.
   2. PCM or TEM samples will be secured as indicated below. PCM samples will be analyzed and TEM samples will be transmitted to the laboratory. If the area meets the clearance criteria by PCM the TEM analysis will proceed.
   3. Work Area Clearance: Upon meeting the PCM or TEM Clearance requirements the work of Section 017333 Project Decontamination can continue.

1.06 AGGRESSIVE SAMPLING

A. All Air Samples will be taken using aggressive sampling techniques as follows:
   1. Before sampling pumps are started the exhaust from forced-air equipment (leaf blower with an approximately 1 horsepower electric motor) will be swept against all walls, ceilings, floors, ledges and other surfaces in the room. This procedure will be continued for 5 minutes per 10,000 cubic feet of room volume.
   2. One 20 inch diameter fan per 10,000 cubic feet of room volume will be mounted in a central location at approximately 2 meters above floor, directed toward ceiling and operated at low speed for the entire period of sample collection.
   3. Air samples will be collected in areas subject to normal air circulation away from room corners, obstructed locations, and sites near windows, doors of vents.
   4. After air sampling pumps have been shut off, fans will be shut off.

1.07 SCHEDULE OF AIR SAMPLES

A. General: The number and volume of air samples taken and analytical methods used by the Owner will be in accordance with the following schedule. Sample volumes given may vary depending upon the analytical instruments used.

1.08 PHASE CONTRAST MICROSCOPY (PCM)

A. In each homogeneous Work Area, containing less than 1,000 cubic feet, containing less than 160 square feet, or containing less than 260 linear feet, after completion of all cleaning work, a minimum of seven (7) samples will be taken and analyzed as follows:

1. Samples will be collected on 25 mm. cassettes with the following filter media:
   a. PCM: 0.8 mixed cellulose ester in a cassette with a 50 mm. conductive extension cowl.
2. Number of PCM samples will be as follows:

LOCATION SAMPLED	NUMBER OF SAMPLES MINIMUM	MINIMUM VOLUME (LITERS)	RATE LPM
Each work area	5	1,200	1-10*
Field blank	2	N/A	Leave open in a sealed plastic bag or other clean container for duration of sampling

1) *Less than 10 LPM for AHERA Projects

B. Analysis: Fibers on each filter will be measured using the most recent revision of NIOSH Method 7400, most recent version.

C. Fibers: referred to in this section include fibers regardless of composition as counted by the phase contrast microscopy method used.

D. Release Criteria: Decontamination of the work site is complete when every Work Area sample is at or below the Lower Limit of Quantization on the previous page. If any sample is above this limit then the decontamination is incomplete and re-cleaning per Section 017333 Project Decontamination is required.

1.09 TRANSMISSION ELECTRON MICROSCOPY (TEM)

A. In each homogeneous work area after completion of all cleaning work, a minimum of 13 samples will be taken and analyzed as follows:

LOCATION SAMPLED	NUMBER OF SAMPLES	RECOMMENDED VOLUME (LITERS)	RATE LPM
Each work area	5	1,300	1-10*
Outside each work area	5	1,300	1-10*
Work area blank	1	N/A	Open for 30 seconds
Outside blank	1	N/A	Open for 30 seconds
Laboratory blank	1	N/A	Do not open

1. *Less than 10 LPM for AHERA Projects

B. Analysis will be performed using the analysis method set forth in the AHERA Regulation 40 CFR Part 763 Appendix A.

C. Asbestos Structures referred to in this Section include asbestos fibers, bundles, clusters or matrices, as defined by method of analysis.

D. Release Criteria: Decontamination of the work site is complete if either of the following two sets of conditions (1. or 2.) is met:

1. Work Area Samples are below filter background levels

a. All Work Area sample volumes are greater than 1,199 liters for a 25 mm. sampling cassette.
b. The average concentration of asbestos on the five Work Area Samples does not exceed the filter background level of 70 structures per square millimeter of filter area.

2. Work Area Samples are not statistically different from Outside samples
a. All sample volumes except for blanks are greater than 560 liters for a 25 mm. sampling cassette.
b. The average asbestos concentration of the three blanks is below the filter background level of 70 structures per square millimeter of filter area.
c. Average asbestos concentrations in Work Area Samples are not statistically different from Outside samples, as determined by the Z-test calculation found in 40 CFR Part 763, Subpart E, Appendix A (Z is less than or equal to 1.65)

E. If these conditions are not met then the decontamination is incomplete and the cleaning procedures of Section 017333 Project Decontamination shall be repeated.

F. Termination of Analysis: If the arithmetic mean (average) asbestos concentration on the blank filters exceed 70 structures per square millimeter of filter area the analysis will cease and new samples collected.

1.10 LABORATORY TESTING

A. Phase Contrast Microscopy (PCM)
1. The services of a testing laboratory will be employed by the Owner to perform laboratory analysis of the air samples. A microscope and technician will be set up at the job site, or samples will be sent daily by overnight mail, so that verbal reports on air samples can be obtained within 24 hours. A complete record, certified by the testing laboratory, of all air monitoring tests and results will be furnished to the Owner and the Contractor.

B. Transmission Electron Microscopy (TEM)
1. Samples will be sent by overnight courier for analysis by Transmission Electron Microscopy. Samples may not be carried on weekends, so that samples shipped on Friday would arrive on the following Monday. Verbal results will normally be available within 24 hours after receipt of samples by the laboratory. All Transmission Electron Microscopy results will be available to the Contractor.

1.11 RE-SAMPLING

A. If, for any reason, the Final Air Clearance Samples do not meet the minimum clearance requirements, re-cleaning and re-sampling must be accomplished. The additional cost of re-sampling and re-analysis will be taken on by the Abatement Contractor and the method of sampling and analysis will be the same as that used for the first set of samples.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 017433

SECTION 017800
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project record documents.

B. Operation and maintenance data.

C. Extended Warranties.

1.02 RELATED REQUIREMENTS

A. Section 007200 - General Conditions: Performance bond and labor and material payment bonds, warranty, and correction of work.

B. Section 013000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

C. Section 017000 - Execution and Closeout Requirements: Contract closeout procedures.

D. Individual Product Sections: Specific requirements for operation and maintenance data.

E. Individual Product Sections: Extended warranties required for specific products or Work.

1.03 SUBMITTALS

A. Project Record Documents Affidavits:
   1. Owner's Standard Affidavits of Record Document Completion is in Section 006000 - Project Forms.
   2. Submit to Owner and Architect one electronic copy of Owner's Standard Affidavits of Record Document Completion as a Submittal into Owner's document management system prior to submittal of Final Application for Payment but no later than 28 days after Substantial Completion date.

B. Operation and Maintenance Data:
   1. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within 10 ten days after acceptance.
   2. Compile all operation and maintenance data for each Section and submit as one submittal for each Section.
   3. Submit to Owner and Architect one electronic copy of operation and maintenance data for each Section as a Submittal into Owner's document management system as required in paragraph 1.03.B.1 but no later than 42 days after Notice to Proceed.
   4. The submittal will be reviewed and returned with Owner's and Architect's comments or it will be accepted.
   5. Revise content of all returned documents as required by the comments.
   6. Submit one set of revised final documents for each Section in final form within 10 days after receipt of returned submittal.

C. Extended Warranties:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents no later than 14 days after Substantial Completion date.
   2. Compile all extended warranties, which are warranties only exceeding one year in length, and submit as one submittal.
   3. Submit to Owner and Architect one electronic copy of extended warranties as a Submittal into Owner's document management system as required in paragraph 1.03.C.1.
   4. This submittal will be reviewed and returned with Owner's and Architect's comments or it will be accepted.
   5. Revise content of all returned documents as required by the comments.
   6. Submit one set of revised final documents in final form within 10 days after receipt of returned submittal.

a. For items of Work for which acceptance is delayed beyond Substantial Completion date, submit within 14 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

A. Record actual revisions to the Work on Construction Documents in the Record Documents Table in the Owner's document management system including:
   1. Drawings.
   2. Specifications.
   3. Addenda.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications:
   1. Identify the product manufacturer selected for the Project in the acceptable manufacturer's paragraph in each Section.
   2. Identify product substitutions or alternates utilized including manufacturer, manufacturer's website address, and model number.

F. Record Drawingsand Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured depths of foundations in relation to finish first floor datum.
   2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   4. Field changes of dimension and detail.
   5. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:
   1. Product data, with catalog number, size, composition, and color and texture designations.
   2. Information for re-ordering custom manufactured products.

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

D. Additional information as specified in individual product specification sections.

E. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:
   1. Description of unit or system, and component parts.
   2. Identify function, normal operating characteristics, and limiting conditions.
   3. Include performance curves, with engineering data and tests.
   4. Complete nomenclature and model number of replaceable parts.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

D. Include color coded wiring diagrams as installed.

E. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

F. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

G. Provide servicing and lubrication schedule, and list of lubricants required.

H. Include manufacturer's printed operation and maintenance instructions.

I. Include sequence of operation by controls manufacturer.

J. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

K. Provide control diagrams by controls manufacturer as installed.

L. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.

M. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

N. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

O. Include test and balancing reports.

P. Additional Requirements: As specified in individual product specification sections.

3.05 EXTENDED WARRANTIES

A. Obtain extended warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain extended warranties and bonds until time specified for submittal.

END OF SECTION 017800

SECTION 017900
DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 SUMMARY

A. Demonstration of products and systems where indicated in specific specification sections.

B. Training of Owner personnel in operation and maintenance is required for:
   1. All software-operated systems.
   2. HVAC systems and equipment.
   3. Plumbing equipment.
   4. Electrical systems and equipment.
   5. Conveying systems.
   6. Landscape irrigation.
   7. Items specified in individual product Sections.

C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
   1. Items specified in individual product Sections.

1.02 RELATED REQUIREMENTS

A. Section 017800 - Closeout Submittals: Operation and maintenance manuals.

B. Other Specification Sections: Additional requirements for demonstration and training.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Training Plan: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
   1. Coordinate training sessions dates and times with Owner's Construction Supervisor.
   2. Notify Owner's Construction Supervisor not less than two weeks prior to start of training.
   3. Provide the following information for each training session:
      a. Identification, date, time, and duration.
      b. Description of products and/or systems to be covered.
      c. Name of firm and person conducting training; include qualifications.
      d. Intended audience, such as job description.
      e. Objectives of training and suggested methods of ensuring adequate training.
      f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
      g. Media to be used, such a slides, hand-outs, etc.
      h. Training equipment required, such as projector, projection screen, etc., to be provided and determination as to whether equipment will be provided by Owner or Contractor.

C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
   1. Include applicable portion of O&M manuals.
   2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
   3. Provide one extra copy of each training manual to be included with operation and maintenance data.

1.04 QUALITY ASSURANCE

A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
   1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.

2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 DEMONSTRATION - GENERAL

A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.

B. Demonstration may be combined with Owner personnel training if applicable.

C. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
   1. Perform demonstrations not less than one week prior to Substantial Completion.
   2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

D. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
   1. Perform demonstrations not less than one week after Substantial Completion.

3.02 TRAINING - GENERAL

A. Conduct training on-site unless otherwise indicated.

B. Owner will provide classroom and seating at no cost to Contractor.

C. Provide training in minimum two hour segments.

D. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.

E. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
   1. The location of the O&M manuals and procedures for use and preservation; backup copies.
   2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
   3. Typical uses of the O&M manuals.

F. Product- and System-Specific Training:
   1. Review the applicable O&M manuals.
   2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
   3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
   4. Provide hands-on training on all operational modes possible and preventive maintenance.
   5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
   6. Discuss common troubleshooting problems and solutions.
   7. Discuss any peculiarities of equipment installation or operation.
   8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
   9. Review recommended tools and spare parts inventory suggestions of manufacturers.
   10. Review spare parts and tools required to be furnished by Contractor.
   11. Review spare parts suppliers and sources and procurement procedures.

G. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

END OF SECTION 017900

SECTION 024100
DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Selective demolition of built site elements.

B. Selective demolition of building elements for alteration purposes excluding removal of hazardous materials and toxic substances.

1.02 RELATED REQUIREMENTS

A. Section 003100 - Available Project Information: Existing building survey conducted by Owner; information about known hazardous materials.

B. Section 011000 - Summary: Limitations on Contractor's use of site and premises.

C. Section 011000 - Summary: Sequencing and staging requirements.

D. Section 011000 - Summary: Description of items to be removed by Owner.

E. Section 011000 - Summary: Description of items to be salvaged or removed for re-use by Contractor.

F. Section 015000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

G. Section 016000 - Product Requirements: Handling and storage of items removed for salvage and relocation.

H. Section 017000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

I. Section 017419 - Construction Waste Management and Disposal: Limitations on disposal of removed materials; requirements for recycling.

J. Section 311000 - Site Clearing: Vegetation and existing debris removal; earth stripping and stockpiling.

K. Section 312323 - Fill: Filling holes, pits, and excavations generated as a result of removal operations.

1.03 REFERENCE STANDARDS

A. 29 CFR 1926 - Safety and Health Regulations for Construction.

B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with requirements in Section 017000.

B. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Use of explosives is not permitted.
   3. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
   4. Provide, erect, and maintain temporary barriers and security devices.
   5. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.

6. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
7. Do not close or obstruct roadways or sidewalks without permits from authority having jurisdiction.
8. Conduct operations to minimize obstruction of public and private entrances and exits. Do not obstruct required exits at any time. Protect persons using entrances and exits from removal operations.
9. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon, or limit access to their property.

C. Do not begin removal until receipt of notification to proceed from Owner.

D. Do not begin removal until built elements to be salvaged or relocated have been removed.

E. Do not begin removal until vegetation to be relocated has been removed and vegetation to remain has been protected from damage.

F. Protect existing structures and other elements to remain in place and not removed.
1. Provide bracing and shoring.
2. Prevent movement or settlement of adjacent structures.
3. Stop work immediately if adjacent structures appear to be in danger.

G. Minimize production of dust due to demolition operations. Do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

H. Provide and maintain daily the effectiveness of dust control walls and required asset protection.

I. Perform demolition in a manner that maximizes salvage and recycling of materials.
1. Comply with requirements of Section 017419 - Construction Waste Management and Disposal.
2. Dismantle existing construction and separate materials.
3. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

J. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.02 EXISTING UTILITIES

A. Coordinate work with utility companies. Notify utilities before starting work, comply with their requirements, and obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Unused underground piping may be abandoned in place provided it is completely drained and capped unless otherwise indicated; remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

3.03 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Existing construction and utilities indicated on drawings are based on casual field observation and existing record documents only.
1. Verify construction and utility arrangements are as indicated.
2. Report discrepancies to Architect before disturbing existing installation.
3. Record discrepancies encountered daily on record drawings.

4. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Separate areas in which demolition is being conducted from areas that remain occupied.
   1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 015000 in locations indicated on drawings.

C. Remove existing work as indicated and required to accomplish new work.
   1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction indicated.
   2. Remove items indicated on drawings.

D. Services including, but not limited to, HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications: Remove existing systems and equipment as indicated.
   1. Maintain existing active systems to remain in operation, and maintain access to equipment and operational components.
   2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
   3. See Section 011000 - Summary for limitations on outages and required notifications.
   4. Verify that abandoned services serve only abandoned facilities before removal.
   5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings. Remove back to source of supply where possible, otherwise cap stub and tag with identification.

E. Protect existing work to remain.
   1. Prevent movement of structure. Provide shoring and bracing as required.
   2. Perform cutting to accomplish removal work neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.
   4. Patch to match new work.

F. Protect items to be salvaged by the Owner or reused in the Work by the Contractor.

3.04 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site daily as it accumulates. Do not use the Owner's dumpsters.

B. Remove materials not to be reused on site; comply with requirements of Section 017419 - Waste Management.

C. Leave site in clean condition, ready for subsequent work.

D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION 024100

SECTION 028213
REMOVAL OF ASBESTOS CONTAINING MATERIALS

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Installation of Critical and Primary Barriers, and Work Area Isolation Procedures are set forth in Section 015643 Temporary Enclosures.

B. Project Decontamination procedures after removal of the Secondary Barrier are specified in Section 017333 Project Decontamination.

C. Disposal of asbestos-containing waste is specified in Section 028233 Disposal of Asbestos Containing Waste Material.

1.02 SUBMITTALS

A. Before the Start of Work: Submit the following to the Owner for review. No work shall begin until these submittals provided:
   1. Surfactant: Submit product data, use instructions and recommendations from manufacturer of surfactant intended for use. Include data substantiating that material complies with requirements.
   2. Material Safety Data Sheet: Submit the Material Safety Data Sheet, or equivalent, in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200) for each surfactant, encapsulating material and solvent proposed for use on the work. Include a separate attachment for each sheet indicating the specific worker protective equipment proposed for use with the material indicated.
   3. Glovebags: Submit product data.
   4. Mini-Enclosures: Submit sketch of mini-enclosure arrangement to be used.

PART 2 PRODUCTS

2.01 WETTING MATERIALS

A. For wetting prior to disturbance of Asbestos-Containing Materials use amended water:
   1. Amended Water: Provide water to which a surfactant has been added. Use a mixture of surfactant and water which results in wetting of the Asbestos-Containing Material and retardation of fiber release during disturbance of the material equal to or greater than that provided by the use of one ounce of a surfactant consisting of 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with five gallons of water.

2.02 POLYETHYLENE SHEET

A. Polyethylene Sheet: A single polyethylene film in the largest sheet size practicable to minimize seams, 6.0 mil (0.15 mm) thick clear, frosted, or black as indicated.

B. Provide flame resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films.

2.03 DUCT TAPE

A. Provide duct tape in 2" or 3" widths as indicated, with an adhesive which is formulated to stick aggressively to sheet polyethylene.

2.04 SPRAY CEMENT

A. Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.

2.05 DISPOSAL BAGS

A. Provide 6 mil thick leak-tight polyethylene bags labeled as required by Section 028233 Disposal of Asbestos Containing Waste Material.

2.06 FIBERBOARD DRUMS

A. Provide heavy duty leak tight fiberboard drums with tight sealing locking metal tops.

2.07 PAPER BOARD BOXES

A. Provide heavy duty corrugated paper board boxes coated with plastic or wax to retard deterioration from moisture.

B. Provide in sizes that will easily fit in disposal bags.

2.08 FELT

A. Standard felt approximately 1/16" thick and 36" to 72" in width.

PART 3 EXECUTION

3.01 WORKER PROTECTION

A. Before beginning work with any material for which a Safety Data Sheet has been submitted provide workers with the required protective equipment.

B. Require that appropriate protective equipment be used at all times.

3.02 WET REMOVAL

A. Thoroughly wet to satisfaction of Owner, Asbestos-Containing Materials to be removed prior to stripping and/or tooling to reduce fiber dispersal into the air. Accomplish wetting by a fine spray (mist) of amended water. Saturate material sufficiently to wet to the substrate without causing excess dripping. Allow time for amended water to penetrate material thoroughly. Spray material repeatedly during the work process to maintain a continuously wet condition. Perforate outer covering of any installation which has been painted and/or jacketed in order to allow penetration of amended water or use injection equipment to wet material under the covering. Where necessary, carefully strip away while simultaneously spraying amended water on the installation to minimize dispersal of asbestos fibers into the air.

B. Mist work area continuously with amended water whenever necessary to reduce airborne fiber levels.

C. Remove saturated Asbestos-Containing Material in small sections from all areas. Do not allow material to dry out. As it is removed, simultaneously pack material while still wet into disposal bags. Evacuate air from disposal bags with a HEPA filtered vacuum cleaner before sealing. Twist neck of bags, bend over and seal with minimum three wraps of duct tape. Clean outside and move to Wash Down Station adjacent to Material Decontamination Unit.

D. Removal requirements for specific materials: Floor tile and mastic, Full containment

3.03 MINI-ENCLOSURES

A. A Mini-Enclosure consists of a small Work Room with an attached separate Change Room. Worker decontamination requires a remote personnel decontamination unit.

B. Complete requirement of the following:
   1. Section 015733 Worker Protection
   2. Section 015736 Respiratory Protection

C. Sequence of Work: Before beginning work of this sub-section complete the following:
   1. Comply with all applicable OSHA Class I removal procedures, including supervision by a competent person as defined by the regulation, wet removal methods, and use of HEPA filtered vacuums.
   2. Construct a personnel decontamination unit in accordance with Section 015726 Decontamination Units.
   3. Cordon off the work zone within which the mini-enclosure will be installed with barrier tape and post signs at all entrances.
   4. Shut down HVAC system to the general area in which the mini-enclosure will be constructed or otherwise minimize air flow within the area.

D. Work Room: Utilize a prefabricated or construct Work Room in the same manner as a Primary Barrier fabricated from 6 mil sheet plastic. Line walls and floor of the Work Room with a continuous Secondary Barrier.

E. Change Room: Provide an approximately 3'-0" by 3' -0" Change Room attached to Work Room. Fabricate Change Room from 6 mil sheet plastic in the same manner as a Primary Barrier. Locate so that access to Work Area is though Change Room.

F. Step Off Area: Cover floor in front of entry to Change Room with one layer of 6 mil sheet plastic. Securely anchor sheet plastic to prevent slipping.

G. Flapped Door Construction: Provide flapped door as entry to Change Room and entry from Change Room to Work Room. Fabricate each flapped door from overlapping contacting layers of sheet plastic. Fasten each layer on the top and one side. Reinforce free side and bottom of each sheet with duct tape. Alternate sides that are fastened on each layer. Form arrows pointing to entry side from duct tape on inside and outside of door.

H. Signage: At entry to Change Room post an approximately 20 inch by 14 inch manufactured caution sign displaying letter sizes and styles of a visibility as required by 29 CFR 1926.1101

I. Entry to Work Room: Require that any time a worker enters the Work Room the following procedure is followed:
   1. Outside of Change Room remove all street clothes and don clean coveralls and respirator. A swim suit or second disposable suite may be worn beneath outer coveralls.
   2. Enter Change Room by sure that entry is completely closed.
   3. Enter Work Room be sure the entry is completely closed.

J. Worker Decontamination: Require that any time a worker leaves the mini-enclosure the following procedure be followed:
   1. Maintain a bucket of clean potable water in the Change Room. Do not amend with a wetting agent.
   2. Do not allow debris in work area to dry or accumulate. HEPA vacuum debris from floor prior to beginning exit procedures.
   3. HEPA vacuum gross debris from disposable suit and foot coverings inside the Work Area. Leave respirator in place.
   4. Proceed with respirator in place to Change Room.
   5. Be sure the entry to Work area is completely closed.
   6. Wash hands, face and surface of respirator with water and wet paper towels. Use caution to avoid breaking seal between respirator face-piece and face.
   7. In Change Room don clean disposable suit leaving respirator in place.
   8. Exit change room, be sure the entry to Change Room is completely closed. Proceed to next Mini-Enclosure, or a remote shower.
   9. At end of work day decontaminate fully in accordance with procedures in section "Worker Protection".

K. Material Decontamination: Require that the following procedure be used in removing equipment and bagged debris from the Work Room:
   1. Worker in Work Room cleans equipment and bagged debris and hands one piece of equipment of one bag of debris at a time to worker in Change Room.
   2. Worker in Change Room wet cleans each piece of equipment or bag. Equipment is sealed completely in 6 mil sheet plastic or bags in the Change Room and passed through the flapped door to the Step Off Area. Bagged waste is placed in a second clean disposal bag and passed to the Step Off Area. Ensure that only one of the two flapped doorways is open at any given time.
   3. Each bag is immediately placed in a sellable cart for transport to the load out area. No bags are to be stored outside of the Mini-Enclosure.
   4. All bag are to be transported through the building in clean sealed containers that have never been in an asbestos Work Area, Mini-Enclosure of decontamination unit.

L. Mini-Enclosure Decontamination: At completion of all Work decontaminate the Work and Changing Rooms as set forth in Section 017333 Project Decontamination.

END OF SECTION 028213

SECTION 028233
DISPOSAL OF ASBESTOS CONTAINING WASTE MATERIALS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Section 014113 Asbestos Abatement Codes, Regulations and Standards - Asbestos Abatement describes applicable federal, state and local regulations.

1.02 DESCRIPTION OF THE WORK

A. This section describes the disposal of Asbestos-Containing Materials. Disposal includes packaging of asbestos-containing waste materials. Disposal may be accomplished either by land filling or converting asbestos containing materials to non-asbestos waste.

1.03 SUBMITTALS

A. Before Start of Work: Submit the following to the Owner for review. Do not start work until these submittals are returned with Owner's approval indicating that the submittal is returned for unrestricted use.
   1. Copy of state or local license for waste hauler.
   2. Name and address of landfill where asbestos-containing waste materials are to be buried. Include contact person and telephone number.

B. Submit copies of all manifests and disposal site receipts to Owner prior to project close-out.

PART 2 PRODUCTS

2.01 DISPOSAL BAGS

2.02 FIRST LABEL:

A. Provide in accordance with 29 CFR 1910.1200(f) of OSHA's Hazard Communication standard with NESHAP additions:

DANGER
CONTAINS ASBESTOS FIBERS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
AVOID CREATING DUST

2.03 SECOND LABEL:

A. Provide in accordance with U. S. Department of Transportation regulation on hazardous waste marking. 49 CFR parts 171 and 172. Hazardous Substances: Final Rule. Published November 21, 1986 and revised October 21, 1991:

RQ ASBESTOS
NA 2212, III

2.04 THIRD LABEL:

A. Affix to asbestos waste containers a label in accordance with National Emission Standard for Hazardous Air Pollutants (NESHAP) 40 CFR Part 61, Subpart M, Section 61.150(a)(1)(v), published November 20, 1990, that includes owners name, address of where asbestos waste was generated, and the name and address of asbestos abatement contractor.

PART 3 EXECUTION

3.01 COMPLY WITH THE FOLLOWING SECTIONS DURING ALL PHASES OF THIS WORK:

A. Section 015733 Worker Protection - Asbestos Abatement

B. Section 015736 Respiratory Protection

3.02 GENERAL

A. All waste is to be hauled by a waste hauler with all required licenses from all state and local authority with jurisdiction.

B. Seal asbestos waste in leak-proof impermeable containers labeled in accordance with Title 29, Code of Federal Regulations, Section 1910.1200 (f).

C. Protect interior of truck or dumpster with Critical and Primary Barriers as described in Section 015643 Temporary Enclosures.

D. Carefully load containerized waste in fully enclosed dumpsters, trucks or other appropriate vehicles for transport. Exercise care before and during transport, to insure that no unauthorized persons have access to the material. Vehicle must be placarded with DOT label.

E. Take containers from the Work Area directly to a sealed truck or dumpster.

F. Do not transport disposal bagged materials on open trucks. Double bagged material may be transported on open trucks if they are first loaded in sealed drums. Label drums with same warning labels as bags. Uncontaminated drums may be reused. Treat drums that have been contaminated as asbestos-containing waste and dispose of in accordance with this specification.

G. Advise the landfill operator or processor, in advance of transport, of the quantity of material to be delivered.

H. At disposal site unload containerized waste:
   1. At a disposal site, sealed plastic bags may be carefully unloaded from the truck. If bags are broken or damaged, return to work site for rebagging. Clean entire truck and contents which have been in contact with containerized waste, using procedures set forth in Section 017333 Project Decontamination.
   2. Ensure that no visible emissions are released to the outside air from sealed plastic bags or impermeable containers while transporting or handling at the site where materials and waste are deposited.

I. Retain receipts from landfill or processor for materials disposed of.

J. At completion of project, submit copies of waste manifests to Owner and Owner's Representative.

END OF SECTION 028233

SECTION 028236
REMOVAL OF CLASS II ASBESTOS CONTAINING MATERIALS

PART 1 GENERAL

1.01 APPLICABILITY

A. This section applies to Class II work as defined by OSHA 29 CFR 1926.1101 and means activities involving the removal of asbestos-containing materials (ACM), which is not thermal system insulation (TSI) or surfacing material. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing, siding, shingles, and construction mastics.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Supervision by a competent person is specified in Section 013000 Administrative Requirements.

B. Installation of critical barriers is set forth in Section 015643 Temporary Enclosures.

C. Project decontamination procedures after removal are specified in Section 017333 Project Decontamination.

D. Disposal of asbestos-containing waste is specified in Section 028233 Disposal of Asbestos Containing Waste Material.

1.03 SUBMITTALS

A. Before the Start of Work: Submit the following to the Owner for review. No work shall begin until these submittals provided:
   1. Adhesive Removal Solvent: Submit product data, use instructions and recommendations from manufacturer of adhesive removal solvent intended for use.
   2. Include data substantiating that material complies with requirements.

PART 2 PRODUCTS

2.01 WETTING MATERIALS

A. For wetting prior to disturbance of Asbestos-Containing Materials use amended water:
   1. Amended Water: Provide water to which a surfactant has been added. Use a mixture of surfactant and water which results in wetting of the Asbestos-Containing Material and retardation of fiber release during disturbance of the material equal to or greater than that provided by the use of one ounce of a surfactant consisting of 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with five gallons of water.

2.02 POLYETHYLENE SHEET

A. Provide polyethylene film in the largest size possible to minimize seams, 4 or 6 mil thick as indicated, frosted or black as indicated.

2.03 DUCT TAPE

A. Provide duct tape in 2" or 3" widths as indicated, with an adhesive which is formulated to stick aggressively to sheet polyethylene.

2.04 SPRAY CEMENT

A. Provide spray adhesive in aerosol cans that is specifically formulated to stick tenaciously to sheet polyethylene.

2.05 DISPOSAL BAGS

2.06 ADHESIVE REMOVAL SOLVENT

A. Provide a slow-drying solvent intended to remove tile adhesive.

B. Provide material that is not flammable, does not create combustible vapors and has no significant inhalation hazard.

PART 3 EXECUTION

3.01 ALL CLASS II WORK

A. Competent Person: All Class II work shall be supervised by a competent person as defined by the regulation.

B. Critical Barriers: Critical barriers shall be placed over all openings to the regulated area or utilize an alternative barrier or isolation method that prevents migration of airborne asbestos from the regulated area and meets the requirements of the regulation.

C. Impermeable Dropcloths: Impermeable dropcloths shall be placed on surfaces beneath all removal activity. Dropcloths shall extend horizontally in all directions one foot for every vertical foot the work surface is above the floor.

D. Comply with the work practices specified for each type of Class II asbestos work being performed as outlined in the following sections.

E. HEPA Filtration: Vacuums, powered saws and other equipment that may generate asbestos fibers shall be equipped with HEPA-filtered exhausts.

F. Wet Methods: Wet methods or wetting agents to control employee exposures shall be employed.

G. OSHA requires the prompt cleanup of wastes and debris and placement in leak-tight containers and labeled with the following information:

H. Establish a decontamination area that is adjacent to the regulated area for decontamination of employees and their equipment. At a minimum the decontamination area shall consist of an airlock chamber and an area covered by an impermeable drop cloth on the floor or horizontal working surface of sufficient size to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination. Work clothes must be cleaned with a HEPA vacuum before clothes are removed. All equipment and surfaces of containers filled with ACM must be cleaned prior to removing them from the equipment room or area. Entry to and exit from the regulated area shall be through the decontamination area.

3.02 VINYL AND ASPHALT FLOORING MATERIALS

A. Before beginning work with any material for which a Safety Data Sheet has been submitted provide workers with the required protective equipment. Require that appropriate protective equipment be used at all times.

B. Flooring or its backing shall not be sanded.

C. Vacuums equipped with HEPA filter, disposable dust bag, and metal floor tool (no brush) shall be used to clean floors.

D. Resilient sheeting shall be removed by cutting with wetting of the snip point and wetting during delamination.

E. Rip-up of resilient sheet floor material is prohibited unless performed in a negative pressure enclosure.

F. All scraping of residual adhesive and/or backing shall be performed using wet methods.

G. Dry sweeping is prohibited.

H. Mechanical chipping is prohibited unless performed in a negative pressure enclosure.

I. Tiles shall be removed intact, unless the contractor demonstrates that intact removal is not possible.

J. When tiles can be heated and can be removed intact, wetting may be omitted.

K. Removal of vinyl and asphalt sheet flooring materials shall include all flooring mastics and/or adhesives. Contractor shall only use solvents that have been approved by Owner.

L. Removal of vinyl and asphalt sheet flooring materials shall include all floor fillers and/or leveling compounds.

1. If floor filler and/or leveling material is encountered underneath the flooring materials, the floor filler and/or leveling material shall be removed with the same requirements as the flooring materials and shall be considered a changed condition if the quantity exceeds the assumed amount included in the NTE form.

END OF SECTION 028236

SECTION 028410
HAZARDOUS WASTE MANAGEMENT

PART 1 - GENERAL

1.01 RELATED SECTIONS

A. Section 014113 - Asbestos Abatement Codes, Regulations, and Standards - Asbestos Abatement describes federal, state and local regulations applicable to asbestos.

B. Section 028233 - Disposal of Asbestos Containing Waste Materials describes the handling and disposal of asbestos-containing waste.

1.02 DESCRIPTION OF THE WORK:

A. This section describes the segregation, packaging, labeling, transport, and disposal of non-asbestos containing hazardous waste materials generated by demolition activities and the subsequent shipment of properly packaged and labeled waste materials to an approved disposal site.

1.03 CODES AND REGULATIONS

A. General Applicability of Codes and Regulations: Except to the extent that more explicit or more stringent requirements are written directly into the Contract Documents, all applicable codes and regulations have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the Contract Documents, or as if published copies are bound herewith.

B. Contractor Responsibility: The Contractor shall assume full responsibility and liability for the compliance with all applicable Federal, State, and local regulations pertaining to hazardous waste management and disposal. Hold the Owner and Designer harmless for failure to comply with any applicable work, hauling, disposal, safety, health or other regulation on the part of the Contractor, the Contractor's employees, or Subcontractors.

C. Federal Requirements: which govern the management, hauling and disposal of hazardous waste include but are not limited to the following:
   1. DOT: U. S. Department of Transportation, including but not limited to:
      a. Hazardous Substances
         1) Title 49, Part 171 and 172 of the Code of Federal Regulations
      b. Hazardous Material Regulations
         1) General Awareness and Training Requirements for Handlers, Loaders and Drivers
         2) Title 49, Parts 171-180 of the Code of Federal Regulations
      c. Hazardous Material Regulations
         1) Editorial and Technical Revisions
         2) Title 49, Parts 171-180 of the Code of Federal Regulations
   2. EPA: U. S. Environmental Protection Agency (EPA), including but not limited to:
      a. Management of Hazardous Wastes Resource Conservation and Recovery Act (RCRA)
         1) Title 40, Parts 260- 268 of the Code of Federal Regulations

D. State Requirements: Abide by all state requirements which govern the management, hauling and disposal of hazardous waste.

E. Local Requirements: Abide by all local requirements which govern the management, hauling and disposal of hazardous waste.

1.04 DEFINITIONS:

A. Toxicity Characteristic Leaching Procedure (TCLP): A laboratory test method to determine the mobility of both organic and inorganic analytes present in liquid, solid, and multiphasic wastes performed in accordance with test methods required under 40 CFR Part 268.

1.05 SUBMITTALS:

A. Before Start of Work: Submit the following to the Owner for review. Do not start work until these submittals are returned with Owner's action stamp indicating that the submittal is returned for unrestricted use.
   1. Copy of state and local licenses for waste hauler.
   2. U.S. EPA Identification Number of waste hauler.
   3. Name and address of waste disposal facility where hazardous waste materials are to be disposed including:
      a. Contact person and telephone number.
      b. Copy of state license and permit.
      c. Disposal facility permits:
   4. Specimen copy of Uniform Hazardous Waste Manifest form.
   5. Copy of EPA Notice of Hazardous Waste activity form
   6. Copy of forms requires by state and local agencies
   7. Sample of disposal label to be used.

B. During Work: Submit the following as required by the work:
   1. TCLP test results, as required to characterize waste for segregation and packaging purposes.
   2. Submit copies of all executed manifests and disposal site receipts to the Owner and/or Owner's Environmental Consultant.

PART 2 - PRODUCTS:

2.01 MATERIALS

A. Disposal Bags: Provide 6 mil thick leak-tight polyethylene bags.

B. DOT Hazardous Waste Disposal Drums: Provide DOT 17-H Open -Top Drums (55 gallon) in accordance with DOT regulations title 49 CFR Parts 173, 178, and 179.

C. DOT Hazardous Waste Labels: in accordance with DOT regulations Title 49 CFR parts 173, 178, and 179.

D. The Owner will provide boxes, drums, etc. for the proper handling, transport and disposal of these items.

PART 3 - EXECUTION

3.01 GENERAL

A. Do not mix potentially hazardous waste streams. Where feasible, separate each type of hazardous waste from other types of hazardous wastes, from asbestos waste and from construction waste.

B. Segregate, package, label, transport and dispose of Hazardous Waste in accordance with DOT, EPA, State and Local regulations.

3.02 HAZARDOUS WASTE DESIGNATION

A. Where not otherwise designated by the Owner as Hazardous waste, characterize all suspect waste products by conducting representative TCLP testing.

B. Testing of components by use of TCLP will be completed by Owner's Environmental Consultant prior to initiating this project.
   1. A schedule of materials that must be managed as hazardous waste will be coordinated during the pre-construction meeting.

C. Representative sampling of waste products will be in accordance with EPA Document SW 846.

D. TCLP test analysis will be performed in accordance with EPA Method 1311.

3.03 HAZARDOUS WASTE:

A. The following waste products are designated by the Owner as non-salvageable and as Hazardous Waste Types:

1. Waste Type A: PCB waste.
    a. PCB-containing ballasts from fluorescent light fixtures.
2. Waste Type B: Mercury-containing waste.
    a. Individually bagged mercury-containing thermostats.
    b. Fluorescent, and mercury-vapor lamps.

3.04 HAZARDOUS WASTE PACKAGING AND LABELING:

A. Package each segregated hazardous waste Type A and B in specified containers as follows (Important: Do Not mix waste streams):
    1. Waste Type A - Packaging to be provided by Owner
        a. Package in DOT 17-H Open-Top Drums
        b. Fill to capacity only with Waste Type A (Do Not Mix Waste Stream types).
        c. Install gasket on lid, apply lock ring, and seal.
        d. Apply Hazardous Waste Label to drum side.
        e. Enter DOT Shipping Data as follows: RQ Waste Polychlorinated Biphenols, 9, UN-2315, PG-II, (M001).
        f. Adjacent to each label, enter the date indicating when waste was first placed in each drum.
    2. Waste Type B - Packaging to be provided by Owner
        a. Package in DOT 17-H Open-Top Drums with Polyethylene disposal Bag liners
        b. Fill liner bags only with Waste Type B (Do Not Mix Waste Stream types); then neck liner bags down into DOT 17-H Open-Top Drum and seal with duct tape.
        c. Install gasket on lid, apply lock ring, and seal.
        d. Apply Hazardous Waste Label to drum side.
        e. Enter DOT Shipping Data as follows: RQ Hazardous Waste Solid, NOS, 9, NA3077, PG-III, (D009).
        f. Adjacent to each label, enter the date indicating when waste was first placed in each drum.

B. Sealed and Labeled Containers: maintain all containers in a continuously sealed condition after they have been sealed.
    1. Do not reopen sealed containers.
    2. Do not place additional waste in sealed containers.

3.05 TEMPORARY STORAGE:

A. Partially filled containers of hazardous waste may be stored at the work site for intermittent packaging provided that:
    1. Each container is properly labeled when it is first placed in service;
    2. Each container remains closed at all times except when compatible waste types are added; and
    3. When moved from site to site, each container remains within the geographic boundaries of the facility without moving nor crossing public access highways.

3.06 REMOVAL OF HAZARDOUS WASTES:

A. Remove containers of hazardous waste from the work site within seventy-two (72) hours of being filled.
    1. Transporting filled containers from the work site to an approved disposal site or recycling center. Coordinate with Owner prior to transportation to determine the destiny of the wastes.
    2. Continuously maintain custody of all hazardous material generated at the work site including security, short-term storage, transportation and disposition until custody is transferred to an approved disposal site or recycling center. Document continuous chain-of custody.

3. Do not remove, or cause to be removed, hazardous waste from Owner's property without a legally executed Uniform Hazardous Waste manifest, which will be provided by the Owner.
4. At completion of hauling and disposal of each load, submit copy of waste manifest, chain of custody form, and landfill receipt to Owner.

3.07 RECYCLING AND RECOVERY:

A. Turn over waste which contains materials for which recovery and/or recycling is possible to an approved recycling center. Materials subject to recycling include:
1. Fluorescent light tubes.
2. Thermostats with mercury switches.
3. Lead acid batteries
4. Combustible lead-based painted building components and lead-based paint chips.

3.08 BACKCHARGES:

A. Where Contractor fails to fulfill packaging, handling, transport or disposal requirements as outlined herein, Owner may charge back to the Contractor all costs associated with insuring that hazardous wastes are segregated, packaged, transported and disposed of in accordance with all applicable Federal and State regulations.

B. Environmental pollution of Owner's property or other environments resulting from Contractor's hazardous waste management activities may be promptly remediated under Owner's direction, to the Owner's sole satisfaction, and at the Contractor's sole expense.

C. Contractor agrees to either reimburse the Owner or reduce the Contract amount by change order to cover all costs associated with waste re-packaging, waste re-segregation, or pollution remediation efforts.

3.09 REMOVAL OF NON-HAZARDOUS WASTE MATERIALS:

A. Transport and legally dispose of non-hazardous waste products, materials, residues and refuse at a location not on Owner's property.

B. Non-hazardous waste products, materials, residues and refuse include, but are not necessarily limited to:
1. Materials which are determined to be non-hazardous wastes through objective sampling in accordance with EPA Document SW-846 and laboratory analysis in accordance with EPA Method 1311.
2. Personnel protective clothing and safety equipment with de minimis or trace contamination, as determined by visual inspection by Owner's Environmental Consultant.

C. Keep premises in a clean and orderly condition during performance of abatement work.

D. Place non-hazardous construction debris wastes on a daily basis in secure containers for local landfill disposal.

END OF SECTION 028410

SECTION 030100
MAINTENANCE OF CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cleaning of existing concrete surfaces.

B. Repair of exposed structural, shrinkage, and settlement cracks.

C. Scope of Work: As indicated on drawings.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Finishing of concrete surface to tolerance; floating, troweling, and similar operations; curing.

1.03 REFERENCE STANDARDS

A. ASTM C33/C33M - Standard Specification for Concrete Aggregates.

B. ASTM C150/C150M - Standard Specification for Portland Cement.

C. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Indicate product standards, physical and chemical characteristics, technical specifications, limitations, maintenance instructions, and general recommendations regarding each material.

C. Project Record Documents: Accurately record actual locations of structural reinforcement repairs and type of repair.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

B. Cleaner Qualifications: Company specializing in, and with minimum of 3 years of experience in, the type of cleaning specified.

C. Installer Qualifications: Company specializing in performing work of the type specified and with minimum of 3 years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturers' instructions for storage, shelf life limitations, and handling of products.

PART 2 PRODUCTS

2.01 CLEANING MATERIALS

A. Degreaser:
   1. Manufacturers:
      a. LATICRETE International, Inc; CITREX: www.laticrete.com/#sle.
      b. SpecChem, LLC; Orange Peel-Citrus Cleaner: www.specchemllc.com/#sle.
      c. W. R. Meadows, Inc: www.wrmeadows.com/#sle.
      d. Substitutions: See Section 016000 - Product Requirements.

B. Detergent: Non-ionic detergent.

2.02 CEMENTITIOUS PATCHING AND REPAIR MATERIALS

A. Finish: Repairs, cleanings, etc. materials shall be reviewed for the need for finish. Finish of new or repaired work shall match the color of adjoining concrete.

B. Manufacturers:

1. Adhesives Technology Corporation: www.atcepoxy.com/#sle.
2. ARDEX Engineered Cements: www.ardexamericas.com/#sle.
3. Dayton Superior Corporation: www.daytonsuperior.com/#sle.
4. Kaufman Products Inc: www.kaufmanproducts.net/#sle.
5. The QUIKRETE Companies: www.quikrete.com/#sle.
6. SpecChem, LLC: www.specchemllc.com/#sle.
7. Stauf USA LLC: www.staufusa.com/#sle.
8. W. R. Meadows, Inc: www.wrmeadows.com/#sle.
9. Substitutions: See Section 016000 - Product Requirements.

2.03 EPOXY PATCHING AND REPAIR MATERIALS

A. Manufacturers:
   1. Dayton Superior Corporation: www.daytonsuperior.com/#sle.
   2. Kaufman Products Inc.: www.kaufmanproducts.net/#sle.
   3. SpecChem, LLC: www.specchemllc.com/#sle.
   4. Sto Corp: www.stocorp.com/#sle.
   5. W. R. Meadows, Inc: www.wrmeadows.com/#sle.
   6. Substitutions: See Section 016000 - Product Requirements.

B. Epoxy Injection Adhesive:
   1. Manufacturers:
      a. Dayton Superior Corporation: www.daytonsuperior.com/#sle.
      b. Kaufman Products Inc; SurePoxy HM, SurePoxy HMLV, SurePoxy HMLV Class B, or SurePoxy HMSLV: www.kaufmanproducts.net/#sle.
      c. SpecChem, LLC; SpecPoxy 1000; www.specchemllc.com/#sle.
      d. W. R. Meadows, Inc; Rezi-Weld LV, Rezi-Weld LV State, Rezi-Weld (IP), or Rezi-Weld Gel Paste: www.wrmeadows.com/#sle.
      e. Substitutions: See Section 016000 - Product Requirements.

2.04 ACCESSORIES

A. Anchoring Adhesive: Self-leveling or non-sag as applicable.

B. Portland Cement: ASTM C150/C150M, Type I, grey.

C. Sand: ASTM C33/C33M or ASTM C404; uniformly graded, clean.

D. Water: Clean and potable.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work.

B. Beginning of installation means acceptance of substrate.

3.02 CLEANING EXISTING CONCRETE

A. Clean concrete surfaces of dirt or other contamination using the gentlest method that is effective.
   1. Try the gentlest method first, then, if not clean enough, use a less gentle method taking care to watch for impending damage.
   2. Clean out cracks and voids using same methods.

B. The following are acceptable cleaning methods, in order from gentlest to less gentle:
   1. Water washing using low-pressure, maximum of 100 psi, and, if necessary, brushes with natural or synthetic bristles.
   2. Increasing the water washing pressure to maximum of 400 psi.
   3. Adding detergent to washing water; with final water rinse to remove residual detergent.
   4. Steam-generated low-pressure hot-water washing.

3.03 CRACK REPAIR USING EPOXY ADHESIVE INJECTION

A. Repair exposed cracks.

B. Provide temporary entry ports spaced to accomplish movement of fluids between ports; no deeper than the depth of the crack to be filled or port size diameter no greater than the thickness of the crack. Provide temporary seal at concrete surface to prevent leakage of adhesive.

C. Inject adhesive into ports under pressure using equipment appropriate for particular application.

D. Begin injection at lower entry port and continue until adhesive appears in adjacent entry port. Continue from port to port until entire crack is filled.

E. Remove temporary seal and excess adhesive.

F. Clean surfaces adjacent to repair and blend finish.

END OF SECTION 030100

SECTION 031000
CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Formwork for cast-in-place concrete, with shoring, bracing and anchorage.

B. Openings for other work.

C. Form accessories.

D. Form stripping.

1.02 RELATED REQUIREMENTS

A. Section 032000 - Concrete Reinforcing.

B. Section 033000 - Cast-in-Place Concrete.

C. Section 042000 - Unit Masonry: Reinforcement for masonry.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties.

C. Design Data: As required by authorities having jurisdiction.

1.05 QUALITY ASSURANCE

A. Designer Qualifications: Design formwork under direct supervision of a Professional Structural Engineer experienced in design of concrete formwork and licensed in the State of Missouri.

PART 2 PRODUCTS

2.01 FORMWORK - GENERAL

A. Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.

B. Design and construct concrete that complies with design with respect to shape, lines, and dimensions.

C. Chamfer outside corners of beams, joists, columns, and walls.

D. Comply with applicable state and local codes with respect to design, fabrication, erection, and removal of formwork.

E. Comply with relevant portions of ACI CODE-318, ACI PRC-347, and ACI SPEC-301.

2.02 WOOD FORM MATERIALS

A. Application: Use for edge forms and unexposed finish concrete only.

B. Form Materials: At the discretion of the Contractor.

2.03 REMOVABLE PREFABRICATED FORMS

2.04 FORMWORK ACCESSORIES

A. Form Ties: Removable type, galvanized metal, fixed length, cone type, with waterproofing washer, free of defects that could leave holes larger than 1 inch in concrete surface.

B. Form Release Agent: Capable of releasing forms from hardened concrete without staining or discoloring concrete or forming bugholes and other surface defects, compatible with concrete and form materials, and not requiring removal for satisfactory bonding of coatings to be applied.

1. Do not use materials containing diesel oil or petroleum-based compounds.
2. Products:

a. SpecChem, LLC; Bio Strip WB (water-based): www.specchemllc.com/#sle.
b. Substitutions: See Section 016000 - Product Requirements.

C. Flashing Reglets: Galvanized steel, at least 22 gage, 0.0299 inch thick, longest possible lengths, with alignment splines for joints, foam filled, release tape sealed slots, anchors for securing to concrete formwork.

D. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.02 EARTH FORMS

A. Earth forms are not permitted unless specifically indicated on drawings.

B. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

3.03 ERECTION - FORMWORK

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI SPEC-301.

B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

D. Align joints and make watertight. Keep form joints to a minimum.

E. Obtain approval before framing openings in structural members that are not indicated on drawings.

F. Coordinate this section with other sections of work that require attachment of components to formwork.

G. If formwork is placed after reinforcement, resulting in insufficient concrete cover over reinforcement, request instructions from Architect before proceeding.

3.04 APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.05 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Provide formed openings where required for items to be embedded in passing through concrete work.

B. Locate and set in place items that will be cast directly into concrete.

C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.

D. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.

E. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

F. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

G. Form Anchors and Hangers:
   1. Do not use anchors and hangers in exposed concrete leaving exposed metal at concrete surface.
   2. Symmetrically arrange hangers supporting forms from structural steel members to minimize twisting or rotation of member.
   3. Penetration of structural steel members is not permitted.

3.06 FORM CLEANING

A. Clean forms as erection proceeds, to remove foreign matter within forms.

B. Clean formed cavities of debris prior to placing concrete.
   1. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
   2. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.07 FORMWORK TOLERANCES

A. Construct formwork to maintain tolerances required by ACI SPEC-117, unless otherwise indicated.

B. Camber slabs and beams in accordance with ACI SPEC-301.

3.08 FIELD QUALITY CONTROL

A. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.

3.09 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.

B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

C. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged forms.

END OF SECTION 031000

SECTION 032000
CONCRETE REINFORCING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Reinforcing steel for cast-in-place concrete.

B. Supports and accessories for steel reinforcement.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete.

1.03 REFERENCE STANDARDS

A. ACI MNL-66 - ACI Detailing Manual.

B. ACI SPEC-301 - Specifications for Concrete Construction.

C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

D. CRSI (DA4) - Manual of Standard Practice.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Comply with requirements of ACI MNL-66 Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.
   1. Prepare shop drawings under seal of a Professional Structural Engineer experienced in design of work of this type and licensed in the State of Missouri.

C. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.

D. Reports: Submit certified copies of mill test report of reinforcement materials analysis.

1.05 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI SPEC-301.

PART 2 PRODUCTS

2.01 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
   1. Plain billet-steel bars.
   2. Unfinished.

B. Reinforcement Accessories:
   1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch.
   2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
   3. Provide stainless steel components for placement within 1-1/2 inches of weathering surfaces.

2.02 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.

B. Locate reinforcing splices not indicated on drawings at point of minimum stress.

PART 3 EXECUTION

3.01 PLACEMENT

A. Place, support and secure reinforcement against displacement. Do not deviate from required position.

B. Accommodate placement of formed openings.

C. Maintain concrete cover around reinforcing as follows:

D. Comply with applicable code for concrete cover over reinforcement.

3.02 FIELD QUALITY CONTROL

A. An independent testing agency, as specified in Section 014000 - Quality Requirements, will inspect installed reinforcement for compliance with contract documents before concrete placement.

END OF SECTION 032000

SECTION 033000
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete formwork.

B. Concrete reinforcement.

C. Miscellaneous concrete elements, including equipment pads.

D. Concrete curing.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. ACI CODE-318 - Building Code for Structural Concrete—Code Requirements and Commentary.

B. ACI PRC-211.1 - Selecting Proportions for Normal-Density and High Density-Concrete - Guide.

C. ACI PRC-302.1 - Guide to Concrete Floor and Slab Construction.

D. ACI PRC-304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete.

E. ACI PRC-305 - Guide to Hot Weather Concreting.

F. ACI PRC-306 - Guide to Cold Weather Concreting.

G. ACI PRC-308 - Curing of Concrete—Guide.

H. ACI PRC-347 - Guide to Formwork for Concrete.

I. ACI SPEC-117 - Specification for Tolerances for Concrete Construction and Materials and Commentary.

J. ACI SPEC-301 - Specifications for Concrete Construction.

K. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

L. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars.

M. ASTM C33/C33M - Standard Specification for Concrete Aggregates.

N. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

O. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.

P. ASTM C143/C143M - Standard Test Method for Slump of Concrete.

Q. ASTM C150/C150M - Standard Specification for Portland Cement.

R. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

S. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete.

T. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.

U. ASTM C618 - Standard Specification for Coal Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

V. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing.

W. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.

C. Mix Design: Submit proposed concrete mix design.

D. Test Reports: Submit report for each test or series of tests specified.

E. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI SPEC-301 and ACI CODE-318.

B. Follow recommendations of ACI PRC-305 when concreting during hot weather.

C. Follow recommendations of ACI PRC-306 when concreting during cold weather.

PART 2 PRODUCTS

2.01 FORMWORK

A. Comply with requirements of Section 031000.

B. Formwork Design and Construction: Comply with guidelines of ACI PRC-347 to provide formwork that will produce concrete complying with tolerances of ACI SPEC-117.

C. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
   1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.
   2. Earth Cuts: Do not use earth cuts as forms for vertical surfaces. Natural rock formations that maintain a stable vertical edge may be used as side forms.
   3. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
   4. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.

2.02 REINFORCEMENT MATERIALS

A. Comply with requirements of Section 032000.

B. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
   1. Type: Deformed billet-steel bars.
   2. Finish: Unfinished, unless otherwise indicated.
   3. Finish: Epoxy coated in accordance with ASTM A775/A775M, unless otherwise indicated.

C. Reinforcement Accessories:
   1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch.
   2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

2.03 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type IL - Limestone Portland type.
   1. Acquire cement for entire project from same source.

B. Fine and Coarse Aggregates: ASTM C33/C33M.
   1. Acquire aggregates for entire project from same source.

C. Fly Ash: ASTM C618, Class C.

2.04 ADMIXTURES

A. Chemical Admixture:
   1. Manufacturers:

a. W.R. Meadows: www.wrmeadows.com/#sle.
b. Grace Construction Products: https://grace.com/products/ .
c. Fritz-Pak Corporation: www.fritzpak.com.
d. Substitutions: See Section 016000 - Product Requirements.

B. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

C. Air Entrainment Admixture: ASTM C260/C260M.

D. High Range Water Reducing and Retarding Admixture: ASTM C494/C494M Type G.

E. High Range Water Reducing Admixture: ASTM C494/C494M Type F.

F. Water Reducing and Accelerating Admixture: ASTM C494/C494M Type E.

G. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.

H. Accelerating Admixture: ASTM C494/C494M Type C.

I. Retarding Admixture: ASTM C494/C494M Type B.

J. Water Reducing Admixture: ASTM C494/C494M Type A.

2.05 ACCESSORY MATERIALS

2.06 CURING MATERIALS

A. Evaporation Reducer: Liquid thin-film-forming compound that reduces rapid moisture loss caused by high temperature, low humidity, and high winds; intended for application immediately after concrete placement.
1. Products:
a. SpecChem, LLC; SpecFilm Concentrate or SpecFilm: www.specchemllc.com/#sle.
b. W. R. Meadows, Inc; Evapre or Evapre-RTU: www.wrmeadows.com/#sle.
c. Substitutions: See Section 016000 - Product Requirements.

B. Water: Potable, not detrimental to concrete.

2.07 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI PRC-211.1 recommendations.

B. Concrete Strength: Establish required average strength for concrete on the basis of field experience or trial mixtures, as specified in ACI 301.

C. Admixtures: Add acceptable admixtures as recommended in ACI PRC-211.1 and at rates recommended or required by manufacturer.

D. Normal Weight Concrete:
1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: As indicated on drawings.
2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
3. Water-Cement Ratio: Maximum 40 percent by weight.
4. Total Air Content: 5 percent, determined in accordance with ASTM C173/C173M.
5. Maximum Slump: 4 inches +/- 1 inch (see drawings for requirements of concrete containing water reducing admixtures).
6. Maximum Aggregate Size: 5/8 inch.

2.08 MIXING

A. On Project Site: Mix in drum type batch mixer, complying with ASTM C685/C685M. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.

B. Transit Mixers: Comply with ASTM C94/C94M.

C. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with Work of this section.

B. Verify requirements for concrete cover over reinforcement

C. Verify anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete.

D. Commencement of Work shall indicate acceptance of existing conditions.

3.02 PREPARATION

A. Remove water from areas receiving concrete before concrete is placed.

B. Where new concrete with integral waterproofing is to be bonded to previously placed concrete, prepare surfaces to be treated in accordance with waterproofing manufacturer's instructions. Saturate cold joint surface with clean water, and remove excess water before application of coat of waterproofing admixture slurry. Apply slurry coat uniformly with semi-stiff bristle brush at rate recommended by waterproofing manufacturer.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

A. Fabricate and handle epoxy-coated reinforcing in accordance with ASTM D3963/D3963M.

B. Comply with requirements of ACI SPEC-301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

3.04 PLACING CONCRETE

A. Place concrete in accordance with ACI PRC-304.

B. Notify Architect not less than 24 hours prior to commencement of placement operations.

C. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

D. Ensure reinforcement will not be disturbed during concrete placement.

E. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.

F. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.05 FLOOR FLATNESS AND LEVELNESS TOLERANCES

A. An independent testing agency, as specified in Section 014000, will inspect finished slabs for compliance with specified tolerances.

B. Maximum Variation of Surface Flatness (under tanks):
   1. Exposed Concrete Floors: 1/8 inch in 10 feet.
   2. Under Seamless Resilient Flooring: 1/8 inch in 10 feet.
   3. Under Carpeting: 1/8 inch in 10 feet.

C. Correct the slab surface if tolerances are less than specified.

D. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.06 CONCRETE FINISHING

A. Repair surface defects, including tie holes, immediately after removing formwork and as directed by the Architect.

B. Concrete Slabs: Finish to requirements of ACI PRC-302.1 and as follows:
   1. As indicated on drawings: "Wood float" as described in ACI PRC-302.1;

2. As indicated on drawings (under ice storage tanks): Trowel as described in ACI PRC-302.1, minimizing burnish marks and other appearance defects.

3.07 CURING AND PROTECTION

A. Comply with requirements of ACI PRC-308. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
   1. Normal concrete: Not less than seven days.
   2. High early strength concrete: Not less than four days.

C. Formed Surfaces: Cure by moist curing with forms in place for full curing period.

D. Surfaces Not in Contact with Forms:
   1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water-fog spray or saturated burlap.
      a. Spraying: Spray water over floor slab areas and maintain wet.
      b. Saturated Burlap: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place.
   2. Final Curing: Begin after initial curing but before surface is dry.
      a. Moisture-Retaining Sheet: Lap strips not less than 3 inches and seal with waterproof tape or adhesive; secure at edges.
      b. Curing Compound: Apply in two coats at right angles, using application rate recommended by manufacturer.

3.08 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.

B. Provide free access to concrete operations at project site and cooperate with appointed firm.

C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.

D. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.

E. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cubic yards or less of each class of concrete placed.

F. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

G. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

3.09 DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.

B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.

C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

3.10 SCHEDULE - CONCRETE TYPES AND FINISHES

A. Exposed Portico Structure: 4,000 pounds per square inch 28 day concrete, air entrained, smooth rubbed finish.

END OF SECTION 033000

SECTION 040100
MAINTENANCE OF MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Steam, Detergent, Chemical, High Pressure Steam and Chemical, and Water cleaning of exterior surfaces.

B. Replacement of masonry units.

C. Repointing mortar joints.

D. Repair of damaged masonry.

E. Retrofitting masonry veneer construction with brick ties and weeps.

1.02 RELATED REQUIREMENTS

A. Section 040511 - Masonry Mortaring and Grouting.

B. Section 042000 - Unit Masonry: Brick masonry units.

C. Section 042000 - Unit Masonry: Mortar and grout.

1.03 REFERENCE STANDARDS

A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate details of special masonry shapes and special supports for the work. Detail shoring.

C. Samples: Submit 2 samples of decorative block and face brick units to illustrate matching color, texture and extremes of color range.

D. Manufacturer's Instructions: For cleaning materials, indicate special procedures, conditions requiring special attention.

E. CFRP designer's qualification statement.

F. CFRP manufacturer's qualification statement.

G. CFRP installer's qualification statement.

1.05 QUALITY ASSURANCE - MASONRY WORK

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.
   1. Maintain one copy of each document on project site.

B. Restorer: Company specializing in masonry restoration with minimum three years of documented experience.

1.06 QUALITY ASSURANCE - CFRP WORK

A. Designer Qualifications: Perform design under direct supervision of Professional Engineer experienced in design of this type of work and licensed in the State of Missouri.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.07 MOCK-UPS

A. Restore and repoint an existing masonry wall area sized 8 feet long by 6 feet high; include in mock-up area instances of mortar, accessories, wall openings, and flashings.

B. Clean a 10 ft by 10 ft panel of wall to determine extent of cleaning.
   1. Repeat, using different cleaning methods for up to three different panels.

C. Locate where directed.

D. Acceptable panel and procedures employed will become the standard for work of this section.

E. Acceptable mock-up may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver masonry neatly stacked and tied on pallets. Store clear of ground with adequate waterproof covering.

B. Store acid solution and restoration cleaner materials in manufacturer's packaging.

C. Store materials in covered, well-ventilated area protected from exposure to detrimental conditions, including airborne contaminants, dirt, dust, sunlight, temperatures lower than 40 degrees F or greater than 100 degrees F, rainfall, sparks, or flame, and in accordance with the manufacturer's requirements. Store polymer resins and hardeners in separate area from construction materials that can absorb odors.

1.09 FIELD CONDITIONS - MASONRY WORK

A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

1.10 FIELD CONDITIONS - CFRP WORK

A. Maintain materials and surrounding air temperature to minimum 55 degrees F prior to, during, and 48 hours after completion of CFRP work.

B. Do not apply primers, saturating resins, and adhesives to cold or frozen surfaces.

C. Do not apply resins and adhesives to damp or wet surfaces unless they have been formulated for such applications.

D. Provide temporary protection from direct contact by rain, dust and dirt, excessive sunlight, and high humidity during installation and until resins have cured.

1.11 WARRANTY

A. See Section 017800 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Restoration and Cleaning Chemicals:
   1. Diedrich Technologies, Inc: www.diedrichtechnologies.com.
   2. HMK Stone Care System: www.hmkstonecare.com.
   3. PROSOCO: www.prosoco.com.

2.02 CLEANING MATERIALS

A. Cleaning Agent: Detergent, Solvent cleaner, and Acid solution type.

2.03 RETROFIT ACCESSORIES

A. Manufacturers:
   1. Masonry Technology, Inc; Retrofit Weep: www.mtidry.com/#sle.
   2. Substitutions: See Section 016000 - Product Requirements.

B. Description:
   1. Retrofit Wall Ties: Type 304 stainless steel, 3/8 inch high by 7 inches long, designed for retrofit installation in rainscreen applications, anchored to stud framing with fasteners and in mortar joint with anchoring epoxy from interior.
   2. Retrofit Weeps: Polyethylene, 3/8 inch diameter by depth of brick, anchored in drilled hole in mortar joint with two-part epoxy bonding agent.

2.04 MORTAR MATERIALS

A. Comply with requirements of Section 040511.

2.05 MASONRY MATERIALS

A. Brick: Section 042000.

B. Block: Section 042000.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces to be cleaned are ready for work of this section.

3.02 PREPARATION

A. Protect surrounding elements from damage due to restoration procedures.

B. Carefully remove and store removable items located in areas to be restored, including fixtures, fittings, finish hardware, and accessories; reinstall upon completion.

C. Separate areas to be protected from restoration areas using means adequate to prevent damage.

D. Cover existing landscaping with tarpaulins or similar covers.

E. Mask immediately adjacent surfaces with material that will withstand cleaning and restoration procedures.

F. Close off adjacent occupied areas with dust proof and weatherproof partitions.

G. Protect roof membrane and flashings from damage with 1/2 inch plywood laid on roof surfaces over full extent of work area and traffic route.

H. When using cleaning methods that involve water or other liquids, install drainage devices to prevent runoff over adjacent surfaces unless those surfaces are impervious to damage from runoff.

I. Do not allow cleaning runoff to drain into sanitary or storm sewers.

3.03 PREPARATION - RETROFIT ACCESSORIES

A. Demolition:
   1. See Section 024100 - Demolition for additional requirements.

B. Removal:
   1. See Section 024100 - Demolition for additional requirements.

C. Replacement:
   1. Replace structural components as needed.
   2. Do not replace deteriorated exterior sheathing.

3.04 INSTALLATION - RETROFIT ACCESSORIES

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

3.05 REBUILDING

A. Cut out damaged and deteriorated masonry with care in a manner to prevent damage to any adjacent remaining materials.

B. Support structure as necessary in advance of cutting out units.

C. Cut away loose or unsound adjoining masonry, mortar, and stone as directed.

D. Build in new matching units following procedures for new work specified in other section(s).

E. Mortar Mix: Colored and proportioned to match existing work.

F. Ensure that anchors, ties, reinforcing, stone cramps and dowels, and flashings are correctly located and built in.

G. Install built in masonry and stone work to match and align with existing, with joints and coursing true and level, faces plumb and in line. Build in all openings, accessories and fittings.

3.06 REPOINTING

A. Perform repointing prior to cleaning masonry surfaces.

B. Cut out loose or disintegrated mortar in joints to minimum 1/2 inch depth or until sound mortar is reached.

C. Use power tools only after test cuts determine no damage to masonry units will result.

D. Do not damage masonry units.

E. When cutting is complete, remove dust and loose material by brushing.

F. Premoisten joint and apply mortar. Pack tightly in maximum 1/4 inch layers. Form a smooth, compact same type of joint to match existing.

G. Moist cure for 72 hours.

3.07 CLEANING EXISTING MASONRY

A. Low Pressure Steam Cleaning: Apply low psi pressure to masonry surfaces at all wall locations, maintaining uniform depth and surface texture throughout.

B. Cleaning Detergent: Brush clean masonry surfaces at all wall locations with cleaning agent in accordance with the manufacturer's instructions. Saturate masonry with clean water and flush loose mortar and dirt.

3.08 CLEANING NEW MASONRY

A. Verify mortar is fully set and cured.

B. Clean surfaces and remove large particles with wood scrapers, brass or nylon wire brushes.

C. Protect area below cleaning operation and keep masonry soaked with water and flushed free of acid and dissolved mortar continuously for duration of cleaning.

D. Before solution dries, rinse and remove acid solution and dissolved mortar, using clean, pressurized water.

3.09 RESTORATION CLEANING

A. Clean surfaces and remove large particles with wood scrapers or non-ferrous wire brush.

B. Spray or Brush coat masonry with restoration cleaner, mixed into solution in accordance with manufacturer's instructions.

C. Provide a second application if required to match mock-up area.

D. Allow sufficient time for solution to remain on masonry and agitate with soft fiber brush or sponge.

E. Rinse from the bottom up with potable water applied at 400 psi and at a rate of 4 gal/min.

3.10 AGING

A. Rub in new masonry work to match, as close as possible, adjacent original work.
   1. Use carbon black in small amounts, rubbing in well with medium bristle brush.

B. After each application, dust off surplus and wash down with low pressure hose. Allow surface to dry before proceeding with succeeding applications.

C. Continue process until acceptance.

3.11 CLEANING

A. Immediately remove stains, efflorescence, or other excess resulting from the work of this section.

B. Remove excess mortar, smears, and droppings as work proceeds and upon completion.

C. Clean surrounding surfaces and grounds.

END OF SECTION 040100

SECTION 040511
MASONRY MORTARING AND GROUTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Mortar for masonry.

B. Grout for masonry.

1.02 RELATED REQUIREMENTS

A. Section 040100 - Maintenance of Masonry: Bedding and pointing mortar for masonry restoration work.

B. Section 042000 - Unit Masonry: Installation of mortar and grout.

1.03 REFERENCE STANDARDS

A. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.

B. ASTM C270 - Standard Specification for Mortar for Unit Masonry.

C. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.

D. ASTM C476 - Standard Specification for Grout for Masonry.

E. ASTM C780 - Standard Test Methods for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.

F. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete.

G. ASTM C1019 - Standard Test Method for Sampling and Testing Grout for Masonry.

H. ASTM C1072 - Standard Test Methods for Measurement of Masonry Flexural Bond Strength.

I. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms.

J. ASTM E518/E518M - Standard Test Methods for Flexural Bond Strength of Masonry.

K. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used. Also include required environmental conditions and admixture limitations.

C. Samples: Submit two samples of mortar, illustrating mortar color and color range. Matching existing adjoining construction is the goal. Resubmit as directed to achieve this goal.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

1. Maintain one copy of each document on project site.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.07 FIELD CONDITIONS

A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.01 MORTAR AND GROUT APPLICATIONS

A. At Contractor's option, mortar and grout may be made from factory premixed dry materials with addition of water only or ready-mixed.

B. Mortar Color: As selected by Architect from manufacturer's standard colors.

C. Mortar Mix Designs: ASTM C270, Property Specification.

D. Grout Mix Designs:

2.02 MATERIALS

A. Packaged Dry Material for Grout for Masonry: Premixed cementitious materials and dried aggregates; capable of producing grout of the specified strength in accordance with ASTM C476 with the addition of water only.

B. Grout Aggregate: ASTM C404.

C. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
   1. Color(s): To match Architect's sample(s) when incorporated into specified mix design(s).
   2. Manufacturers:
      a. Davis Colors: www.daviscolors.com.
      b. Lambert Corporation: www.lambertusa.com.
      c. Substitutions: See Section 016000 - Product Requirements.

D. Water: Clean and potable.

2.03 MORTAR MIXING

A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.

B. Maintain sand uniformly damp immediately before the mixing process.

C. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio; mix in accordance with manufacturer's instructions, uniform in coloration.

D. Do not use anti-freeze compounds to lower the freezing point of mortar.

E. If water is lost by evaporation, re-temper only within two hours of mixing.

2.04 GROUT MIXING

A. Mix grout in accordance with ASTM C94/C94M.

B. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 for fine and coarse grout.

C. Do not use anti-freeze compounds to lower the freezing point of grout.

2.05 PRECONSTRUCTION TESTING

A. Grout Mixes: Test grout batches in accordance with ASTM C1019 procedures.

PART 3 EXECUTION

3.01 PREPARATION

A. Plug clean-out holes for grouted masonry with brick masonry units. Brace masonry to resist wet grout pressure.

3.02 INSTALLATION

A. Install mortar and grout to requirements of section(s) in which masonry is specified.

B. Do not install grout in lifts greater than 16 inches without consolidating grout by rodding.

3.03 GROUTING

A. Use either high-lift or low-lift grouting techniques, at Contractor's option, subject to other limitations of Contract Documents.

B. Low-Lift Grouting:
   1. Limit height of pours to 12 inches.
   2. Limit height of masonry to 16 inches above each pour.
   3. Pour grout only after vertical reinforcing is in place; place horizontal reinforcing as grout is poured. Prevent displacement of bars as grout is poured.
   4. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1-1/2 hours.

C. High-Lift Grouting:
   1. Verify that horizontal and vertical reinforcement is in proper position and adequately secured before beginning pours.
   2. Brick: Limit pours to maximum 12 feet in height and 25 feet horizontally.
   3. Hollow Masonry: Limit lifts to maximum 4 feet and pours to maximum height of 24 feet.
   4. Place grout for spanning elements in single, continuous pour.

3.04 FIELD QUALITY CONTROL

A. An independent testing agency will perform field tests, in accordance with provisions of Section 014000 - Quality Requirements.

B. Test and evaluate mortar in accordance with ASTM C780 procedures.
   1. Test with same frequency as specified for masonry units.

C. Test and evaluate grout in accordance with ASTM C1019 procedures.
   1. Test with same frequency as specified for masonry units.

D. Prism Tests: Test masonry and mortar panels for compressive strength in accordance with ASTM C1314, and for flexural bond strength in accordance with ASTM C1072 or ASTM E518/E518M; perform tests and evaluate results as specified in individual masonry sections.

END OF SECTION 040511

SECTION 042000
UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete block.

B. Concrete building brick.

C. Mortar and Grout.

1.02 RELATED REQUIREMENTS

A. Section 079200 - Joint Sealants: Sealing control and expansion joints.

1.03 REFERENCE STANDARDS

A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for masonry units, fabricated wire reinforcement, and masonry accessories.

C. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depths as indicated on drawings for specific locations.

2.02 MORTAR AND GROUT MATERIALS

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:
   1. Bond: Running.
   2. Coursing: One unit and one mortar joint to equal 8 inches.
   3. Mortar Joints: Concave.

3.04 PLACING AND BONDING

A. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

B. Remove excess mortar and mortar smears as work progresses.

C. Interlock intersections and external corners, except for units laid in stack bond.

D. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

E. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

F. Cut mortar joints flush where wall tile is scheduled or resilient base is scheduled.

G. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.

H. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.05 GROUTED COMPONENTS

A. Reinforce bond beams with 2, No. 3 bars, 1 inch from bottom web.

B. Lap splices minimum 24 bar diameters.

C. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.

3.06 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control or expansion joints.

B. Size control joints as indicated on drawings; if not indicated, 3/4 inch wide and deep.

3.07 BUILT-IN WORK

A. As work progresses, install built-in metal door frames, glazed frames, fabricated metal frames, window frames, wood nailing strips, anchor bolts, and plates and other items to be built into the work and furnished under other sections.

B. Install built-in items plumb, level, and true to line.

C. Do not build into masonry construction organic materials that are subject to deterioration.

3.08 TOLERANCES

A. Maximum Variation from Alignment of Columns: 1/4 inch.

B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

F. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.

G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.09 CUTTING AND FITTING

A. Cut and fit for chases. Coordinate with other sections of work to provide correct size, shape, and location.

B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.10 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.

3.11 CLEANING

A. Remove excess mortar and mortar droppings.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

D. Use non-metallic tools in cleaning operations.

3.12 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION 042000

SECTION 055000
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated miscellaneous steel and aluminum items.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. AISC (MAN) <http://www.aisc.org/store/c-2-manuals.aspx> - Steel Construction Manual; 2011.

B. AISC 303 <https://www.aisc.org/publications/> - Code of Standard Practice for Steel Buildings and Bridges; 2016.

C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

D. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.

E. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.

F. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

G. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

I. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi, 144 ksi, and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength.

J. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.

K. AWS D1.1/D1.1M - Structural Welding Code - Steel.

L. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172.

M. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer.

N. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic).

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
   1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

C. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172 or certified as AISC Approved Structural Steel Fabricator.

1.05 QUALITY ASSURANCE

A. Design under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of Missouri.

B. Fabricator Qualifications: A qualified steel fabricator that is accredited by IAS AC172 or certified as AISC Approved Structural Steel Fabricator.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.

B. Plates: ASTM A283/A283M.

C. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.

D. Slotted Channel Framing: ASTM A653/A653M, Grade 33.

E. Slotted Channel Fittings: ASTM A1011/A1011M.

F. Mechanical Fasteners: Same material as or compatible with materials being fastened; type consistent with design and specified quality level.

G. Bolts, Nuts, and Washers: ASTM A307, Grade A, plain.

H. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.

I. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

J. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

K. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 MATERIALS - ALUMINUM

2.03 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Continuously seal joined members by continuous welds.

D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

F. Furnish components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.04 FABRICATED ITEMS

A. metal supports

2.05 FINISHES - ALUMINUM

2.06 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Furnish setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Obtain approval prior to site cutting or making adjustments not scheduled.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION 055000

SECTION 061000
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Roof-mounted curbs.

B. Roofing nailers.

C. Preservative treated wood materials.

1.02 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

B. AWPA U1 - Use Category System: User Specification for Treated Wood.

C. PS 20 - American Softwood Lumber Standard.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.

C. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

1.04 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

1.05 WARRANTY

A. See Section 017800 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
   1. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
   2. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at www.alsc.org, and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Sizes: Nominal sizes as indicated on drawings, S4S.

B. Moisture Content: S-dry or MC19.

C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
   1. Lumber: S4S, No. 2 or Standard Grade.
   2. Boards: Standard or No. 3.

2.03 ACCESSORIES

A. Fasteners and Anchors:
   1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

2.04 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
   1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

B. Preservative Treatment:
   1. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
      a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
      b. Treat lumber in contact with roofing, flashing, or waterproofing.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.02 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to authorities having jurisdiction may be used in lieu of solid wood blocking.

C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.

3.03 ROOF-RELATED CARPENTRY

A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

B. Provide wood curb at each roof opening except where specifically indicated otherwise; form corners by alternating lapping side members.

C. Provide separation and no direct contact of aluminum flashings and preservative pressure treated roof blocking to avoid potential corrosion using roofing membrane or roofing felts.

3.04 TOLERANCES

A. Framing Members: 1/4 inch from true position, maximum.

B. Variation from Plane, Other than Floors: 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.05 CLEANING

A. Waste Disposal: See Section 017419 - Construction Waste Management and Disposal.
   1. Comply with applicable regulations.
   2. Do not burn scrap on project site.
   3. Do not burn scraps that have been pressure treated.
   4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

B. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION 061000

SECTION 078400
FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Firestopping of joints and penetrations in fire-resistance-rated and smoke-resistant assemblies, whether indicated on drawings or not, and other openings indicated.

1.02 REFERENCE STANDARDS

A. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestop Systems.

B. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers.

C. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

D. FM (AG) - FM Approval Guide.

E. ITS (DIR) - Directory of Listed Products.

F. UL (FRD) - Fire Resistance Directory.

G. See Section 013000 - Administrative Requirements for submittal procedures.

1.03 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
   1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
   2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
   3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Firestopping Manufacturers:
   1. 3M Fire Protection Products: www.3m.com/firestop/#sle.
   2. A/D Fire Protection Systems Inc: www.adfire.com/#sle.
   3. Hilti, Inc: www.us.hilti.com/#sle.
   4. Nelson FireStop Products: www.nelsonfirestop.com/#sle.
   5. Specified Technologies Inc: www.stifirestop.com/#sle.
   6. Tremco Commercial Sealants & Waterproofing; TREMstop Acrylic: www.tremcosealants.com/#sle.

2.02 MATERIALS

A. Prohibited Materials: Do not use asbestos.

B. Mold and Mildew Resistance: Provide firestopping materials with mold and mildew resistance rating of zero(0) in accordance with ASTM G21.

C. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

D. Fire Ratings: Refer to drawings for required systems and ratings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.

B. Remove incompatible materials that could adversely affect bond.

C. Install backing materials to prevent liquid material from leakage.

3.03 INSTALLATION

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

B. Do not cover installed firestopping until inspected by authorities having jurisdiction.

C. Install labeling required by code.

3.04 FIELD QUALITY CONTROL

A. Independent Testing Agency: Inspection agency employed and paid by Owner, will examine penetration firestopping in accordance with ASTM E2174 and ASTM E2393.

B. Repair or replace penetration firestopping and joints at locations where inspection results indicate firestopping or joints do not meet specified requirements.

3.05 CLEANING

A. Clean adjacent surfaces of firestopping materials.

3.06 PROTECTION

A. Protect adjacent surfaces from damage by material installation.

END OF SECTION 078400

SECTION 079200
JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nonsag gunnable joint sealants.

B. Self-leveling pourable joint sealants.

C. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

A. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.

1.03 REFERENCE STANDARDS

A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer.

B. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants.

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.

D. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems.

E. ASTM C1193 - Standard Guide for Use of Joint Sealants.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

C. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.

D. Test Reports: For joint sealants and backing, provide independent laboratory reports and test results showing negative asbestos containing materials content using Polarized Light Microscopy (PLM) test method.

E. Executed warranty.

1.05 QUALITY ASSURANCE

A. Maintain one copy of each referenced document covering installation requirements on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.

D. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

E. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
   1. Adhesion Testing: In accordance with ASTM C794.
   2. Compatibility Testing: In accordance with ASTM C1087.
   3. Allow sufficient time for testing to avoid delaying the work.
   4. Deliver sufficient samples to manufacturer for testing.
   5. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.

F. Field Quality Control Plan:
    1. Visual inspection of entire length of sealant joints.

1.06 WARRANTY

A. See Section 017800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide 2-year manufacturer warranty for installed sealants and accessories that fail to achieve a watertight seal, exhibit loss of adhesion or cohesion, or do not cure. Complete forms in Owner's name and register with manufacturer.

C. Extended Correction Period: Correct defective work within 2-year period commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Nonsag Sealants:
    1. Bostik Inc: www.bostik.com/us.
    2. Dow Chemical Company: www.dow.com/#sle.
    3. Hilti, Inc: www.us.hilti.com/#sle.
    4. Pecora Corporation: www.pecora.com.
    5. Sherwin-Williams Company: www.sherwin-williams.com.
    6. Sika Corporation: https://usa.sika.com.
    7. W.R. Meadows, Inc: www.wrmeadows.com/#sle.
    8. Substitutions: See Section 016000 - Product Requirements.

B. Self-Leveling Sealants:
    1. Bostik Inc: www.bostik.com/us.
    2. Dow: www.dow.com/#sle.
    3. Pecora Corporation: www.pecora.com.
    4. Sherwin-Williams Company: www.sherwin-williams.com.
    5. Sika Corporation: https://.usa.sika.com.
    6. W.R. Meadows, Inc: www.wrmeadows.com/#sle.
    7. Substitutions: See Section 016000 - Product Requirements.

2.02 JOINT SEALANT APPLICATIONS

A. Scope:
    1. Do Not Seal:
        a. Intentional weep holes in masonry.
        b. Joints indicated to be covered with expansion joint cover assemblies.
        c. Joints where sealant is specified to be furnished and installed by manufacturer of product to be sealed.
        d. Joints where sealant installation is specified in other sections.
        e. Joints between suspended ceilings and walls.

B. Exterior Joints: Use nonsag polyurethane sealant, unless otherwise indicated.
    1. Control and Expansion Joints in Concrete Paving: Self-leveling polyurethane "traffic-grade" sealant.

C. Interior Wet Areas: Bathrooms, restrooms, kitchens, and food service areas; fixtures in wet areas include plumbing fixtures, food service equipment, countertops, cabinets, and other similar items.

2.03 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products with acceptable levels of volatile organic compound (VOC) content; see Section 016116.

2.04 SELF-LEVELING JOINT SEALANTS

A. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multi-component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
   1. Movement Capability: Plus and minus 25 percent, minimum.
   2. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.
   3. Color: To be selected by Architect from manufacturer's standard range.
   4. Service Temperature Range: Minus 40 to 180 degrees F.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Preinstallation Adhesion Testing: Install a sample for each test location indicated in the test plan.
   1. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.
   2. Notify Architect of date and time that tests will be performed, at least seven days in advance.
   3. Record each test on Preinstallation Adhesion Test Log as indicated.
   4. If any sample fails, review products and installation procedures, consult manufacturer, or take other measures that are necessary to ensure adhesion; retest in a different location; if unable to obtain satisfactory adhesion, report to Architect.
   5. After completion of tests, remove remaining sample material and prepare joints for new sealant installation.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Provide joint sealant installations complying with ASTM C1193.

C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.

D. Install bond breaker backing tape where backer rod cannot be used.

E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements for additional requirements.

B. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.

C. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

3.05 POST-OCCUPANCY

A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width, i.e., at low temperature in thermal cycle. Report failures immediately and repair them.

END OF SECTION 079200

SECTION 083100
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall- and ceiling-mounted access units.

1.02 RELATED REQUIREMENTS

A. Section 099123 - Interior Painting: Field paint finish.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

C. Manufacturer's qualification statement.

D. Installer's qualification statement.

E. Project Record Documents: Record actual locations of each access unit.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

PART 2 PRODUCTS

2.01 ACCESS DOORS AND PANELS ASSEMBLIES

A. Wall-Mounted Units:
   1. Material: Aluminum.
   2. Size: 12 by 12 inches.
   3. Heavy duty, hinged door.
   4. Wall Mounting Criteria: Provide surface-mounted face frame and door surface flush with frame surface.
   5. Gypsum Board Mounting Criteria: Provide drywall bead frame with door surface flush with wall surface.
   6. Plaster Mounting Criteria: Provide drywall bead frame with door surface flush with wall surface.
   7. Masonry Mounting Criteria: Provide surface-mounted frame with door surface flush with frame surface.

B. Ceiling-Mounted Units with Return Air Grille:
   1. Material: Aluminum.
   2. Size - Lay-In Grid Ceilings: To match module of ceiling grid.
   3. Size - Other Ceilings: 12 by 12 inches.

2.02 WALL AND CEILING MOUNTED UNITS

A. Wall- and Ceiling-Mounted Units: Factory-fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
   1. Style: Exposed frame with door surface flush with frame surface.
      a. Gypsum Board Mounting Criteria: Use drywall bead type frame.
   2. Door Style: Single thickness with rolled or turned in edges.
   3. Heavy-Duty Frames: 14-gauge, 0.0747-inch minimum thickness.

4. Single Steel Sheet Door Panels: 16-gauge, 0,0625-inch minimum thickness.
5. Door Panels to Receive Wall/Ceiling Finish: Surface recessed 5/8 inch back from wall face.
6. Aluminum Finish: Natural brushed.
7. Hardware:
    a. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.
    b. Handle: Fixed.
    c. Latch/Lock: Cylinder lock-operated cam latch, two keys for each unit.
    d. Number of Locks/Latches Required: As recommended by manufacturer for size of unit.
    e. Inside Latch Release: Mechanism that allows door/panel to be opened from inside.
    f. Gasketing: Extruded neoprene, around perimeter of door panel.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that rough openings are correctly sized and located.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to proceeding with this work.

B. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

3.03 INSTALLATION

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

B. Install frames plumb and level in openings, and secure units rigidly in place.

C. Position units to provide convenient access to concealed equipment when necessary.

END OF SECTION 083100

SECTION 089100
LOUVERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Louvers, frames, and accessories.

1.02 RELATED REQUIREMENTS

A. Section 079200 - Joint Sealants: Sealing joints between frames and adjacent construction.

B. Section 233100 - HVAC Ducts and Casings: Ductwork attachment to louvers.

1.03 REFERENCE STANDARDS

A. AAMA 611 - Specification for Anodized Architectural Aluminum.

B. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating.

C. AMCA 511 - Certified Ratings Program Product Rating Manual for Air Control Devices.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Shop Drawings: Indicate louver layout plan and elevations, opening and clearance dimensions, and tolerances; head, jamb and sill details; blade configuration, screens, blank-off areas required, and frames.

C. Test Reports: Independent agency reports showing compliance with specified performance criteria.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.06 WARRANTY

A. See Section 017800 - Closeout Submittals for additional warranty requirements.

B. Provide five year manufacturer's warranty against distortion, metal degradation, and connection failures of louver components.
   1. Finish: Include twenty year coverage against degradation of exterior finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Louvers:
   1. Airolite Company, LLC: www.airolite.com.
   2. Construction Specialties, Inc: www.c-sgroup.com.
   3. Pottorff: www.pottorff.com.

2.02 LOUVERS

A. Louvers: Factory fabricated and assembled, complete with frame, mullions, and accessories; AMCA Certified in accordance with AMCA 511.
   1. Wind Load Resistance: Design to resist positive and negative wind load of 25 psf without damage or permanent deformation.
   2. Intake Louvers: Design to allow maximum of 0.01 oz/sq ft water penetration at calculated intake design velocity based on design air flow and actual free area, when tested in accordance with AMCA 500-L.

3. Drainable Blades: Continuous rain stop at front or rear of blade aligned with vertical gutter recessed into both jambs of frame.
4. Screens: Provide insect screens at intake louvers and bird screens at exhaust louvers.

2.03 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

2.04 FINISHES

A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A44 Electrolytically deposited colored anodic coating not less than 0.7 mils thick.

B. Color: as selected by the architect from manufacturer's full range of colors.

2.05 ACCESSORIES

A. Screens: Frame of same material as louver, with reinforced corners; removable, screw attached; installed on inside face of louver frame.

B. Insect Screen: existing size aluminum mesh.

C. Fasteners and Anchors: Stainless steel.

D. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that prepared openings and flashings are ready to receive this work and opening dimensions are as indicated on shop drawings.

B. Verify that field measurements are as indicated.

3.02 INSTALLATION

A. Install louver assembly in accordance with manufacturer's instructions.

B. Install louvers level and plumb.

C. Set sill members and sill flashing in continuous bead of sealant.

D. Align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.

E. Secure louver frames in openings with concealed fasteners.

F. Coordinate with installation of mechanical ductwork.

3.03 ADJUSTING

A. Adjust operable louvers for freedom of movement of control mechanism. Lubricate operating joints.

3.04 CLEANING

A. Strip protective finish coverings.

B. Clean surfaces and components.

END OF SECTION 089100

SECTION 099123
INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
   1. All miscellaneous steel and unfinished metal elements.
   2. Mechanical and Electrical:
      a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, electrical equipment, and eletrical raceways, unless otherwise indicated.

D. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
   5. Marble, granite, slate, and other natural stones.
   6. Floors, unless specifically indicated.
   7. Ceramic and other tiles.
   8. Glass.
   9. Acoustical materials, unless specifically indicated.
   10. Concealed pipes, ducts, and conduits.
   11. Bathroom and Accessories
   12. FRP Doors

1.02 RELATED REQUIREMENTS

A. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions.

1.03 DEFINITIONS

A. Comply with ASTM D16 for interpretation of terms used in this section.

1.04 REFERENCE STANDARDS

A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.

B. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association.

C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual.

D. SSPC-SP 1 - Solvent Cleaning.

E. SSPC-SP 2 - Hand Tool Cleaning.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g., "alkyd enamel").
   2. MPI product number (e.g., MPI #47).

3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.

C. Certification: By manufacturer that paints and finishes comply with VOC limits specified.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum three years experience and approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Minimum Application Temperatures for Paints: 50 degrees F for interiors unless required otherwise by manufacturer's instructions.

D. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
   1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for submittals.
   2. Substitution of MPI-approved products by a different manufacturer is preferred over substitution of unapproved products by the same manufacturer.
   3. Substitution of a different paint system using MPI-approved products by the same manufacturer will be considered.

B. Paints:
   1. Behr Process Corporation: www.behr.com/#sle.
   2. Glidden Paint: www.glidden.com
   3. PPG Paints: www.ppgpaints.com/#sle.
   4. Sherwin-Williams Company: www.sherwin-williams.com/#sle.

C. Primer Sealers: Same manufacturer as top coats.

2.02 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready-mixed, unless intended to be a field-catalyzed paint.
   1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.

3. Supply each paint material in quantity required to complete entire project's work from a single production run.
4. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Volatile Organic Compound (VOC) Content: Comply with Section 016116.

C. Flammability: Comply with applicable code for surface burning characteristics.

D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

E. Colors: As indicated on drawings.
1. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.
2. Extend colors to surface edges; colors may change at any edge as directed by Architect.
3. In utility areas, finish equipment, piping, conduit, and exposed duct work in colors according to the color coding scheme indicated.

2.03 PAINT SYSTEMS - INTERIOR

A. Paint I-TR-C - Transparent Finish on Concrete Floors.
1. 1 coat stain.
2. Sealer: Water Based Sealer for Concrete Floors; MPI #99.
3. Sealer Sheen:
a. Gloss: MPI gloss level 6; use this sheen at all locations.

B. Paint MI-OP-3L - Ferrous Metals, Unprimed, Latex, 3 Coat:
1. One coat of latex primer.
2. Semi-gloss: Two coats of latex enamel.

C. Paint MI-OP-2L - Ferrous Metals, Primed, Latex, 2 Coat:
1. Touch-up with latex primer.
2. Semi-gloss: Two coats of latex enamel; use this sheen for all locations unless otherwise indicated.

D. Paint MgI-OP-3L - Galvanized Metals, Latex, 3 Coat:
1. One coat galvanize primer.
2. Semi-gloss: Two coats of latex enamel.

E. Paint CI-OP-3E - Concrete/Masonry, Epoxy Enamel, 3 Coat:
1. One coat of catalyzed epoxy primer.
2. Gloss: Two coats of catalyzed epoxy enamel; use this sheen for all locations unless otherwise indicated.

2.04 PRIMERS

A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
1. Interior/Exterior Latex Block Filler; MPI #4.
2. Concrete Floor Primer, Waterborne; MPI #99.
3. Interior Rust-Inhibitive Water Based Primer; MPI #107.
4. Interior Water Based Primer for Galvanized Metal; MPI #134 or #134 X-Green.

2.05 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

D. Test shop-applied primer for compatibility with subsequent cover materials.

E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums:
   1. Concrete Floors and Traffic Surfaces: 8 percent.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or repair existing paints or finishes that exhibit surface defects.

D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

E. Seal surfaces that might cause bleed through or staining of topcoat.

F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

G. Masonry:
   1. Remove efflorescence and chalk. Do not coat surfaces if moisture content, alkalinity of surfaces, or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
   2. Prepare surface as recommended by top coat manufacturer.
   3. Clean surfaces with pressurized water. Use pressure range of 600 to 1,500 psi at 6 to 12 inches. Allow to dry.

H. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.

I. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.

J. Galvanized Surfaces:
   1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
   2. Prepare surface according to SSPC-SP 2.

K. Ferrous Metal:
   1. Solvent clean according to SSPC-SP 1.
   2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
   3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 Commercial Blast Cleaning. Protect from corrosion until coated.

3.03 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

E. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

F. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.

G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

3.06 SCHEDULE - PAINT SYSTEMS

A. Concrete Floors: Transparent finish for concrete floors
   1. Interior: I-TR-C, gloss

B. Concrete, Concrete Masonry Units (CMU), Concrete Block, Brick Masonry: Finish surfaces exposed to view.
   1. Interior: CI-OP-3L, semi-gloss.

C. Steel Fabrications: Finish surfaces exposed to view.
   1. Interior: MI-OP-3L, gloss.

D. Galvanized Steel: Finish surfaces exposed to view.
   1. Interior: Mgl-OP-3L.

E. Shop-Primed Metal Items: Finish surfaces exposed to view.
   1. Finish the following items:
      a. Exposed surfaces of steel stairs and railings.
      b. Mechanical equipment.
   2. Interior: MI-OP-2L.

END OF SECTION 099123

SECTION 230516
EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flexible pipe connectors.

B. Expansion joints and compensators.

C. Pipe loops, offsets, and swing joints.

1.02 RELATED REQUIREMENTS

A. Section 232113 - Hydronic Piping.

1.03 REFERENCE STANDARDS

A. ASME B31.9 - Building Services Piping.

B. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

C. EJMA (STDS) - EJMA Standards.

D. ICC (IMC) - International Mechanical Code.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data:

1. Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per foot and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.
2. Expansion Joints: Indicate maximum temperature and pressure rating, and maximum expansion compensation.

C. Maintenance Data: Include adjustment instructions.

1.05 REGULATORY REQUIREMENTS

A. Conform to and requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Mercer Rubber Company: www.mercer-rubber.com.

B. Metraflex Company: www.metraflex.com.

C. Mason Industries https://mason-ind.com.

D. Vibrex-Sausse https://mason-ind.com.

E. Hyspan; www.hyspan.com

F. Flexicraft: www.flexicraft.com.

G. Substitutions: See Section 016000 - Product Requirements.

2.02 FLEXIBLE PIPE CONNECTORS - STEEL PIPING

A. Inner Hose: Stainless Steel.

B. Exterior Sleeve: Single braided, stainless steel.

C. Pressure Rating: 125 psi up to 12 inch.

D. Size: Use pipe sized units.

E. Maximum offset: 3/4 inch on each side of installed center line.

2.03 FLEXIBLE PIPE CONNECTORS - COPPER PIPING

A. Inner Hose: Bronze.

B. Exterior Sleeve: Braided bronze.

C. Pressure Rating: 125 psi up to 2 inch.

D. Size: Use pipe sized units.

E. Maximum offset: 3/4 inch on each side of installed center line.

F. Application: Copper piping.

2.04 EXPANSION JOINTS - STAINLESS STEEL BELLOWS TYPE

A. Pressure Rating: 125 psi and 400 degrees F.

B. Maximum Compression: 1-3/4 inches.

C. Maximum Extension: 1/4 inch.

D. Size: Use pipe sized units.

E. Application: Steel piping 3 inches and under.

2.05 EXPANSION JOINTS - EXTERNAL RING CONTROLLED STAINLESS STEEL BELLOWS TYPE

A. Pressure Rating: 125 psi and 400 degrees F.

B. Maximum Compression: 15/16 inch.

C. Maximum Extension: 5/16 inch.

D. Maximum Offset: 5/16 inch.

E. Joint: As specified in piping system

F. Size: Use pipe sized units.

G. Accessories: Internal flow liner and external shroud.

H. Application: Steel piping over 2 inches.

2.06 EXPANSION JOINTS - SINGLE OR DOUBLE SPHERE, ELBOW OR FLEXIBLE COMPENSATOR

A. Maximum Compression: 1/2 inch.

B. Maximum Elongation: 3/8 inch.

C. Maximum Offset: 3/8 inch.

D. Maximum Angular Movement: 30 degrees.

E. Accessories: Control rods or control cables.

2.07 EXPANSION JOINTS - TWO-PLY BRONZE BELLOWS TYPE

A. Construction: Bronze with anti-torque device, limit stops, internal guides.

B. Pressure Rating: 125 psi and 400 degrees F.

C. Maximum Compression: 1-3/4 inches.

D. Maximum Extension: 1/4 inch.

E. Size: Use pipe sized units.

F. Application: Copper piping.

2.08 EXPANSION JOINTS - COMPENSATORS

A. Type: Two-ply 304 stainless steel bellows with carbon steel shroud.

B. Maximum Working Pressure: 200 psi.

C. Maximum Working Temperatures: 400 degrees F.

D. Maximum Compression: 1/2 inch.

E. Maximum Extension: 5/32 inch.

F. End Connections: Female copper sweat.

G. Joint: As specified in piping system

H. Application: Copper piping up to 3 inches in size or steel piping up to 4 inches in size.

2.09 EXPANSION JOINTS - STEEL WITH PACKED SLIDING SLEEVE

A. Working Pressure and Temperature: Class 150.

B. Size: Use pipe sized units.

C. Application: Steel piping 2 inches and over.

2.10 EXPANSION JOINTS - COPPER WITH PACKED SLIDING SLEEVE

A. Working Pressure: 125 psi.

B. Maximum Temperature: 250 degrees F.

C. Size: Use pipe sized units.

D. Application: Copper or steel piping 2 inches and over.

2.11 ACCESSORIES

A. Stainless Steel Pipe: ASTM A269/A269M, seamless type, Grade TP304.

B. Pipe Alignment Guides:
   1. Two piece welded steel with enamel paint, bolted, with spider to fit standard pipe, frame with four mounting holes, clearance for minimum 1 inch thick insulation, minimum 3 inches travel.

C. Swivel Joints:
   1. Bronze body, double ball bearing race, field lubricated, with rubber (Buna-N) o-ring seals.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with EJMA (Expansion Joint Manufacturers Association) Standards.

C. Install flexible pipe connectors on pipes connected to vibration isolated equipment. Provide line size flexible connectors.

D. Install flexible connectors at right angles to displacement. Install one end immediately adjacent to isolated equipment and anchor other end. Install in horizontal plane unless indicated otherwise.

E. Anchor pipe to building structure where indicated. Provide pipe guides so movement is directed along axis of pipe only. Erect piping such that strain and weight is not on cast connections or apparatus.

F. Provide support and equipment required to control expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where required.

G. Substitute grooved piping for vibration isolated equipment instead of flexible connectors. Grooved piping need not be anchored.

END OF SECTION 230516

SECTION 230517
SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe sleeves.

B. Pipe-sleeve seals.

1.02 REFERENCE STANDARDS

A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems.

PART 2 PRODUCTS

2.01 PIPE SLEEVES

A. Pipe Passing Through Below Grade Exterior Walls:
   1. Zinc coated or cast iron pipe.
   2. Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.

B. Clearances:
   1. Provide allowance for insulated piping.
   2. Wall, Floor, Partitions, and Beam Flanges: 1 inch greater than external pipe diameter.
   3. All Rated Openings: Caulked tight with fire stopping material in compliance with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.

2.02 PIPE-SLEEVE SEALS

A. Modular Mechanical Sleeve-Seal:
   1. Elastomer-based interlocking links continuously fill annular space between pipe and wall-sleeve, wall or casing opening.
   2. Watertight seal between pipe and wall-sleeve, wall or casing opening.
   3. Size and select seal component materials in accordance with service requirements.
   4. Glass-reinforced plastic pressure end plates.

B. Sealing Compounds:
   1. Provide packing and sealing compound to fill pipe to sleeve thickness.
   2. Combined packing and seal compound is to match partition fire-resistance hourly rating.

C. Pipe Sleeve Material:
   1. Bearing Walls: Steel, cast iron, or terra-cotta pipe.
   2. Masonry Structures: Sheet metal or fiber.

PART 3 EXECUTION

3.01 INSTALLATION

A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

B. Install piping to conserve building space, to not interfere with use of space and other work.

C. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

D. Provide sleeves when penetrating footings, floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.

E. Manufactured Sleeve-Seal Systems:
   1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
   2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
   3. Locate piping in center of sleeve or penetration.

4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
5. Tighten bolting for a water-tight seal.
6. Install in accordance with manufacturer's recommendations.

F. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

END OF SECTION 230517

SECTION 230519
METERS AND GAUGES FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pressure gauges and pressure gauge taps.

B. Thermometers and thermometer wells.

C. Static pressure gauges.

1.02 RELATED REQUIREMENTS

A. Section 230923 - Direct-Digital Control System for HVAC.

B. Section 230993 - Sequence of Operations for HVAC Controls.

C. Section 232113 - Hydronic Piping.

1.03 REFERENCE STANDARDS

A. ASME B40.100 - Pressure Gauges and Gauge Attachments.

B. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers.

C. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers.

D. UL 393 - Indicating Pressure Gauges for Fire-Protection Service.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

1.05 FIELD CONDITIONS

A. Do not install instrumentation when areas are under construction, except for required rough-in, taps, supports and test plugs.

PART 2 PRODUCTS

2.01 PRESSURE GAUGES

A. Pressure Gauges: ASME B40.100, UL 393 drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.
   1. Case: Steel with brass bourdon tube.
   2. Mid-Scale Accuracy: One percent.
   3. Scale: Psi and KPa.

2.02 PRESSURE GAUGE TAPPINGS

A. Gauge Cock: Tee or lever handle, brass for maximum 150 psi.

B. Needle Valve: Brass, 1/4 inch NPT for minimum 150 psi.

C. Pulsation Damper: Pressure snubber, brass with 1/4 inch connections.

D. Syphon: Steel, Schedule 40, 1/4 inch angle or straight pattern.

2.03 STEM TYPE THERMOMETERS

A. Thermometers - Adjustable Angle: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device; adjustable 360 degrees in horizontal plane, 180 degrees in vertical plane.
   1. Size: 9 inch scale.
   2. Window: Clear Lexan.
   3. Stem: 3/4 inch NPT brass.
   4. Accuracy: 2 percent, per ASTM E77.
   5. Calibration: Degrees F.

2.04 THERMOMETER SUPPORTS

A. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.

2.05 TEST PLUGS

A. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with neoprene core for temperatures up to 200 degrees F.

2.06 STATIC PRESSURE GAUGES

A. 3-1/2 inch diameter dial in metal case, diaphragm actuated, black figures on white background, front recalibration adjustment, 2 percent of full scale accuracy.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide one pressure gauge per pump, installing taps before strainers and on suction and discharge of pump. Pipe to gauge.

C. Install pressure gauges with pulsation dampers. Provide gauge cock to isolate each gauge. Provide siphon on gauges in steam systems. Extend nipples and siphons to allow clearance from insulation.

D. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inch for installation of thermometer sockets. Ensure sockets allow clearance from insulation.

E. Install thermometer sockets adjacent to controls system thermostat, transmitter, or sensor sockets. Refer to Section 230923. Where thermometers are provided on local panels, duct or pipe mounted thermometers are not required.

F. Provide instruments with scale ranges selected according to service with largest appropriate scale.

G. Install gauges and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.

H. Adjust gauges and thermometers to final angle, clean windows and lenses, and calibrate to zero.

I. Locate test plugs adjacent thermometers and thermometer sockets.

END OF SECTION 230519

SECTION 230548
VIBRATION AND SEISMIC CONTROLS FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Vibration isolation requirements.

B. Seismic control requirements.
   1. Includes requirements for seismic qualification of equipment not specified in this section.

C. External seismic snubber assemblies.

D. Seismic restraint systems.

1.02 RELATED REQUIREMENTS

1.03 DEFINITIONS

A. HVAC Component: Where referenced in this section in regards to seismic controls, applies to any portion of the HVAC system subject to seismic evaluation in accordance with applicable codes, including distributed systems (e.g., ductwork, piping).

B. Seismic Restraint: Structural members or assemblies of members or manufactured elements specifically designed and applied for transmitting seismic forces between components and the seismic force-resisting system of the structure.

1.04 REFERENCE STANDARDS

A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures.

B. ASCE 19 - Structural Applications of Steel Cables for Buildings.

C. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications.

D. FEMA 412 - Installing Seismic Restraints for Mechanical Equipment.

E. FEMA 413 - Installing Seismic Restraints for Electrical Equipment.

F. FEMA 414 - Installing Seismic Restraints for Duct and Pipe.

G. FEMA E-74 - Reducing the Risks of Nonstructural Earthquake Damage.

H. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172.

I. ICC-ES AC156 - Acceptance Criteria for Seismic Certification by Shake-Table Testing of Nonstructural Components.

J. MFMA-4 - Metal Framing Standards Publication.

K. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data:
   1. Provide manufacturer's product literature documenting compliance with PART 2 PRODUCTS.
   2. Include seismic rating documentation for each isolator and restraint component accounting for horizontal, vertical, and combined loads.

C. Shop Drawings:

D. Manufacturer's Instructions: Indicate installation instructions with special procedures and setting dimensions.

1.06 QUALITY ASSURANCE

A. Comply with applicable building code.

B. Perform design and installation in accordance with applicable codes.

C. Designer Qualifications: Perform design under direct supervision of a Professional Engineer experienced in design of this type of work and registered and licensed in the State of Missouri.

PART 2 PRODUCTS

2.01 VIBRATION ISOLATION REQUIREMENTS

A. Design and provide vibration isolation systems to reduce vibration transmission to supporting structure from vibration-producing HVAC equipment and/or HVAC connections to vibration-isolated equipment.

B. Comply with applicable general recommendations of ASHRAE (HVACA), where not in conflict with other specified requirements:

C. General Requirements:
   1. Select vibration isolators to provide required static deflection.
   2. Select vibration isolators for uniform deflection based on distributed operating weight of actual installed equipment.

D. Equipment Isolation: As indicated on drawings.

2.02 SEISMIC CONTROL REQUIREMENTS

A. Design and provide HVAC component restraints, supports, and attachments suitable for seismic loads determined in accordance with applicable codes, as well as gravity and operating loads and other structural design considerations of the installed location. Consider wind loads for outdoor HVAC components.

B. Seismic Design Criteria: As indicated on drawings.

C. Component Importance Factor (Ip): HVAC components essential to life safety to be assigned a component importance factor (Ip) of 1.5 as indicated or as required. This includes but is not limited to:
   1. HVAC components required to function for life safety purposes after an earthquake.
   2. HVAC components that support or otherwise contain hazardous substances.

D. Seismic Qualification of Equipment:
   1. Provide special certification for HVAC equipment furnished under other sections and assigned a component importance factor (Ip) of 1.5, certifying that equipment will remain operable following a design level earthquake.
   2. Seismic qualification to be by shake table testing in accordance with recognized testing standard procedure, such as ICC-ES AC156, acceptable to authorities having jurisdiction.
   3. Notify Architect and obtain direction where mounting restrictions required by conditions of seismic certification conflict with specified requirements.
   4. Seismically qualified equipment to be furnished with factory-installed labels referencing certificate of compliance and associated mounting restrictions.

E. Seismic Restraints:
   1. Provide seismic restraints for HVAC components except where exempt according to applicable codes and specified seismic design criteria, as approved by authorities having jurisdiction.
   2. Comply with applicable general recommendations of the following, where not in conflict with applicable codes, seismic design criteria, or other specified requirements:
      a. ASHRAE (HVACA).
      b. FEMA 412.
      c. FEMA 413.
      d. FEMA 414.
      e. FEMA E-74.
      f. SMACNA (SRM).
   3. Seismic restraint capacities to be verified by a Nationally Recognized Testing Laboratory (NRTL) or certified by an independent third-party registered professional engineer acceptable to authorities having jurisdiction.

4. Seismic Type Vibration Isolators:
    a. Comply with seismic design requirements, including conditions of equipment seismic certification where applicable.
5. External Seismic Snubber Assemblies:
    a. Provide quantity and arrangement of external seismic snubber assemblies as required to restrain equipment in all directions (both lateral and vertical).
    b. Do not use external seismic snubber assemblies that restrain equipment only in one or more lateral directions (but not vertical) except where uplift forces are zero or are addressed by other restraints.
6. Seismic Restraint Systems:
    a. Except where otherwise restricted, use of either cable or rigid restraints is permitted.
    b. Use only cable restraints to restrain vibration-isolated HVAC components, including distributed systems.
    c. Use only one restraint system type for a given HVAC component or distributed system (e.g., ductwork, piping) run; mixing of cable and rigid restraints on a given component/run is not permitted.
    d. Size restraint elements, including anchorage, to resist seismic loads as necessary to restrain HVAC component in all lateral directions; consider bracket geometry in anchor load calculations.
    e. Use rod stiffener clips to attach bracing to hanger rods as required to prevent rod buckling from vertical (upward) compressive load introduced by cable or rigid restraints loaded in tension, in excess of downward tensile load due to supported HVAC component weight.
    f. Select hanger rods and associated anchorage as required to accommodate vertical (downward) tensile load introduced by rigid restraints loaded in compression, in addition to downward tensile load due to supported HVAC component weight.
    g. Clevis hangers may only be used for attachment of transverse restraints; do not use for attachment of longitudinal restraints.
    h. Where seismic restraints are attached to clevis hangers, provide clevis bolt reinforcement accessory to prevent clevis hanger deformation.
    i. Do not introduce lateral loads on open bar joist chords or the weak axis of beams, or loads in any direction at other than panel points unless approved by project Structural Engineer of Record.
7. Ductwork Applications:
    a. Provide independent support and seismic restraint for in-line components (e.g., fans, heat exchangers, humidifiers) having an operating weight greater than 75 pounds.
    b. Positively attach appurtenances (e.g., dampers, louvers, diffusers) with mechanical fasteners.

F. Seismic Attachments:
1. Attachments to be bolted, welded, or otherwise positively fastened without consideration of frictional resistance produced by the effects of gravity.
2. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) or qualified evaluation service acceptable to authorities having jurisdiction for compliance with applicable building code, and qualified for seismic applications; concrete anchors to be qualified for installation in both cracked and uncracked concrete.
3. Do not use power-actuated fasteners.
4. Do not use friction clips (devices that rely on mechanically applied friction to resist loads). Beam clamps may be used for supporting sustained loads where provided with restraining straps.
5. Comply with anchor minimum embedment, minimum spacing, minimum member thickness, and minimum edge distance requirements.
6. Concrete Housekeeping Pads:
    a. Increase size of pad as required to comply with anchor requirements.

b. Provide pad reinforcement and doweling to ensure integrity of pad and connection and to provide adequate load path from pad to supporting structure.

G. Seismic Interactions:
1. Include provisions to prevent seismic impact between HVAC components and other structural or nonstructural components.
2. Include provisions such that failure of a component, either essential or nonessential, does not cause the failure of an essential component.

H. Seismic Relative Displacement Provisions:
1. Use suitable fittings or flexible connections to accommodate:
a. Relative displacements at connections between components, including distributed systems (e.g., ductwork, piping); do not exceed load limits for equipment utility connections.
b. Relative displacements between component supports attached to dissimilar parts of structure that may move differently during an earthquake.
c. Design displacements at seismic separations.
d. Anticipated drifts between floors.

2.03 MANUFACTURERS

A. The VMC Group; thevmcgroup.com

B. B-line: www.cooper-electric.com/brands/eaton-bline

C. Substitutions: See Section 016000 - Product Requirements.

2.04 PERFORMANCE REQUIREMENTS

A. General:
1. All vibration isolators, base frames and inertia bases to conform to all uniform deflection and stability requirements under all operating loads.
2. Steel springs to function without undue stress or overloading.
3. Steel springs to operate in the linear portion of the load versus deflection curve over deflection range of not less than 50 percent above specified deflection.
4. Lateral to vertical stiffness ratio to not exceed 0.08 with spring deflection at minimum 75 percent of specified deflection.
5. All equipment mounted on vibration isolated bases to have minimum operating clearance of 2 inches between the base and floor or support beneath unless noted otherwise.

2.05 VIBRATION ISOLATORS

A. General Requirements:
1. Resilient Materials for Vibration Isolators: Oil, ozone, and oxidant resistant.
2. Spring Elements for Spring Isolators:
a. Color code or otherwise identify springs to indicate load capacity.
b. Lateral Stability: Minimum lateral stiffness to vertical stiffness ratio of 0.8.
c. Designed to operate in the linear portion of their load versus deflection curve over deflection range of not less than 50 percent above specified deflection.
d. Designed to provide additional travel to solid of not less than 50 percent of rated deflection at rated load.
e. Selected to provide designed deflection of not less than 75 percent of specified deflection.
f. Selected to function without undue stress or overloading.
3. Seismic Snubbing Elements for Seismic Isolators:
a. Air Gap: Between 0.125 inches and 0.25 inches unless otherwise indicated.
b. Points of Contact: Cushioned with resilient material, minimum 0.25 inch thick; capable of being visually inspected for damage and replaced.

B. Vibration Isolators for Nonseismic Applications:
1. Resilient Material Isolator Pads:

a. Description: Single or multiple layer pads utilizing elastomeric (e.g., neoprene, rubber) or fiberglass isolator material.
b. Pad Thickness: As required for specified minimum static deflection; minimum 0.25 inch thickness.
c. Multiple Layer Pads: Provide bonded, galvanized sheet metal separation plate between each layer.

2. Resilient Material Isolator Mounts, Nonseismic:
   a. Description: Mounting assemblies for bolting equipment to supporting structure utilizing elastomeric (e.g., neoprene, rubber) or fiberglass isolator material; fail-safe type.
3. Open (Unhoused) Spring Isolators:
   a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) without a housing.
   b. Bottom Load Plate: Nonskid, molded, elastomeric isolator material or steel with nonskid elastomeric isolator pad with provisions for bolting to supporting structure as required.
   c. Furnished with integral leveling device for positioning and securing supported equipment.
4. Housed Spring Isolators:
   a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) within a metal housing.
   b. Furnished with integral elastomeric snubbing elements, nonadjustable type, for limiting equipment movement and preventing metal-to-metal contact between housing elements.
   c. Bottom Load Plate: Steel with nonskid, elastomeric isolator pad with provisions for bolting to supporting structure as required.
   d. Furnished with integral leveling device for positioning and securing supported equipment.
5. Restrained Spring Isolators, Nonseismic:
   a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) within a metal housing designed to prevent movement of supported equipment above an adjustable vertical limit stop.
   b. Bottom Load Plate: Steel with nonskid elastomeric isolator pad with provisions for bolting to supporting structure as required.
   c. Furnished with integral leveling device for positioning and securing supported equipment.
   d. Provides constant free and operating height.
6. Resilient Material Isolator Hangers, Nonseismic:
   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing elastomeric (e.g., neoprene, rubber) or fiberglass isolator material for the lower hanger rod connection.
7. Spring Isolator Hangers, Nonseismic:
   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) in series with an elastomeric element for the lower hanger rod connection.
   b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short-circuiting of isolation.
8. Combination Resilient Material/Spring Isolator Hangers, Nonseismic:
   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) for the lower hanger rod connection and elastomeric (e.g., neoprene, rubber) or fiberglass isolator material for the upper hanger rod connection.
   b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short-circuiting of isolation.

9. Thrust Restraints:
    a. Description: Assembly utilizing free-standing, laterally stable steel spring designed for resisting horizontal motion due to thrust (e.g., air pressure from a fan), and intended for installation in pairs.

C. Vibration Isolators for Seismic Applications:
1. Resilient Material Isolator Mounts, Seismic:
    a. Description: Mounting assemblies for bolting equipment to supporting structure utilizing elastomeric (e.g., neoprene, rubber) isolator material; specifically designed and rated for seismic applications with integral snubbing in all directions.
2. Resilient Material Isolator Hangers, Seismic:
    a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing elastomeric (e.g., neoprene, rubber) isolator material for the lower hanger rod connection; specifically designed and rated for seismic applications with vertical limit stop to prevent upward travel of hanger rod and cushion impact.
3. Spring Isolator Hangers, Seismic:
    a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) in series with an elastomeric element for the lower hanger rod connection; specifically designed and rated for seismic applications with vertical limit stop to prevent upward travel of hanger rod and cushion impact.
    b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short-circuiting of isolation.
4. Combination Resilient Material/Spring Isolator Hangers, Seismic:
    a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) for the lower hanger rod connection and elastomeric (e.g., neoprene, rubber) isolator material for the upper hanger rod connection; specifically designed and rated for seismic applications with vertical limit stop to prevent upward travel of hanger rod and cushion impact.
    b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short-circuiting of isolation.

D. Non-Seismic Type:
1. All Elastomeric-Fiber Glass Pads:
2. Elastomeric Mounts:
3. Steel Springs:
4. Restrained Steel Springs:
5. Elastomeric Hangers:
6. Spring Hanger:
7. Combination Elastomeric-Spring Hanger:
8. Thrust Restraints:

E. Seismic Type:
1. Coil Springs Consisting of Single Elements:
2. All Directional Elastomeric:

2.06 EXTERNAL SEISMIC SNUBBER ASSEMBLIES

A. Description: Steel snubbing assemblies designed for external attachment to both equipment and supporting structure that, as part of a complete system, restrain equipment motion in all directions during a seismic event while maintaining vibration isolation during normal operation.

B. Seismic Snubbing Elements:
1. Air Gap: Between 0.125 inches and 0.25 inches unless otherwise indicated.
2. Points of Contact: Cushioned with resilient material, minimum 0.25 inch thick; capable of being visually inspected for damage and replaced.

C. Comply with:

2.07 SEISMIC RESTRAINT SYSTEMS

A. Description: System components and accessories specifically designed for field assembly and attachment of seismic restraints.

B. Cable Restraints:
   1. Comply with ASCE 19.
   2. Cables: Pre-stretched, galvanized steel wire rope with certified break strength.
   3. Cable Connections: Use only swaged end fittings. Cable clips and wedge type end fittings are not permitted in accordance with ASCE 19.
   4. Use protective thimbles for cable loops where potential for cable damage exists.

C. Rigid Restraints: Use MFMA-4 steel channel (strut), steel angle, or steel pipe for structural element; suitable for both compressive and tensile design loads.

D. Comply with:
   1. ASHRAE (HVACA) Handbook - HVAC Applications.
   2. FEMA 412.
   3. FEMA 413.
   4. FEMA 414.
   5. FEMA E-74.
   6. SMACNA (SRM).

E. Cable Restraints:
   1. Connections:

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that mounting surfaces are ready to receive vibration isolation and/or seismic control components and associated attachments.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

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

B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

C. Secure fasteners according to manufacturer's recommended torque settings.

D. Install flexible piping connections to provide sufficient slack for vibration isolation and/or seismic relative displacements as indicated or as required.

E. Vibration Isolation Systems:
   1. Spring Isolators:
      a. Position equipment at operating height; provide temporary blocking as required.
      b. Lift equipment free of isolators prior to lateral repositioning to avoid damage to isolators.
      c. Level equipment by adjusting isolators gradually in sequence to raise equipment uniformly such that excessive weight or stress is not placed on any single isolator.
   2. Isolator Hangers:
      a. Use precompressed isolator hangers where required to facilitate installation and prevent damage to equipment utility connection provisions.
      b. Locate isolator hangers at top of hanger rods in accordance with manufacturer's instructions.
   3. Thrust Restraints:
      a. Adjust restraint movement under normal operating static pressure.

4. Clean debris from beneath vibration-isolated equipment that could cause short-circuiting of isolation.
5. Use elastomeric grommets for attachments where required to prevent short-circuiting of isolation.
6. Adjust isolators to be free of isolation short circuits during normal operation.
7. Do not overtighten fasteners such that resilient material isolator pads are compressed beyond manufacturer's maximum recommended deflection.

F. Seismic Controls:
1. Provide specified snubbing element air gap; remove any factory-installed spacers, debris, or other obstructions.
2. Use only specified components, anchorage, and hardware evaluated by seismic design. Comply with conditions of seismic certification where applicable.
3. Where mounting hole diameter exceeds bolt diameter by more than 0.125 inch, use epoxy grout, elastomeric grommet, or welded washer to reduce clearance to 0.125 inch or less.
4. Equipment with Sheet Metal Housings:
   a. Use Belleville washers to distribute stress over a larger surface area of the sheet metal connection interface as approved by manufacturer.
   b. Attach additional steel as approved by manufacturer where required to transfer loads to structure.
   c. Where mounting surface is irregular, do not shim housing; reinforce housing with additional steel as approved by manufacturer.
5. Concrete Housekeeping Pads:
   a. Size in accordance with seismic design to meet anchor requirements.
   b. Install pad reinforcement and doweling in accordance with seismic design to ensure integrity of pad and associated connection to slab.
6. Seismic Restraint Systems:
   a. Do not attach seismic restraints and gravity supports to dissimilar parts of structure that may move differently during an earthquake.
   b. Install restraints within permissible angles in accordance with seismic design.
   c. Install cable restraints straight between component/run and structural attachment; do not bend around other nonstructural components or structural elements.
   d. Install cable restraints for vibration-isolated components slightly slack to prevent short-circuiting of isolation.
   e. Install hanger rod stiffeners where indicated using only specified clamps; do not weld stiffeners to hanger rod.

3.03 INSTALLATION - GENERAL

A. Install in accordance with manufacturer's instructions.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect vibration isolation and/or seismic control components for damage and defects.

C. Vibration Isolation Systems:
1. Verify isolator static deflections.
2. Verify vibration isolation performance during normal operation; investigate sources of isolation short circuits.

D. Seismic Controls:
1. Verify snubbing element air gaps.

E. Correct deficiencies and replace damaged or defective vibration isolation and/or seismic control components.

F. Inspect isolated equipment after installation and submit report. Include static deflections.

3.05 SCHEDULE

END OF SECTION 230548

SECTION 230553
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Stencils.

D. Pipe markers.

E. Ceiling tacks.

1.02 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems.

B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, and function.

D. Product Data: Provide manufacturers catalog literature for each product required.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. All HVAC Equipment (air and water): Nameplates, and Ceiling tacks, where located above lay-in ceiling

B. Control Panels and Control Modules: Nameplates.

C. Fire Dampers and Combination Fire & Smoke Dampers: Nameplates, and Ceiling tacks, where located above lay-in ceiling.

D. Instrumentation: Tags, and Ceiling tacks, where located above lay-in ceiling.

E. Piping: Pipe markers.

F. Relays: Tags, and Ceiling tacks, where located above lay-in ceiling

G. Small-sized Equipment: Tags, and Ceiling tacks, where located above lay-in ceiling.

H. Tanks: Nameplates.

I. Valves: Tags, and ceiling tacks where located above lay-in ceiling.

J. Water Treatment Devices: Nameplates.

2.02 IDENTIFICATION MANUFACTURERS

A. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com.

B. Seton Identification Products: www.seton.com.

C. Brady Corp: www.bradyid.com.

D. Craftmark Identification Systems.

E. Labelmaster

F. VisionMark, Inc.

G. Almetek Industries, Inc.

H. Advanced Graphic Engraving: www.advancedgraphicengraving.com.

I. MIFAB, Inc.: www.mifab.com.

J. Substitutions: See Section 016000 - Product Requirements.

2.03 NAMEPLATES

A. Letter Color: White.

B. Letter Height: 1/4 inch.

C. Background Color: Black.

D. Plastic: Comply with ASTM D709.

2.04 TAGS

A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.

B. Metal Tags: Aluminum with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

C. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.05 STENCILS

A. Stencils: With clean cut symbols and letters of following size:
   1. 3/4 to 1-1/4 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 1/2 inch high letters.
   2. 1-1/2 to 2 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 3/4 inch high letters.
   3. 2-1/2 to 6 inch Outside Diameter of Insulation or Pipe: 12 inch long color field, 1-1/4 inch high letters.
   4. 8 to 10 inch Outside Diameter of Insulation or Pipe: 24 inch long color field, 2-1/2 inch high letters.
   5. Over 10 inch Outside Diameter of Insulation or Pipe: 32 inch long color field, 3-1/2 inch high letters.
   6. Ductwork and Equipment: 2-1/2 inch high letters.

2.06 PIPE MARKERS

A. Color: Comply with ASME A13.1.

B. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure-sensitive adhesive backing and printed markings.

D. Underground Plastic Pipe Markers: Bright-colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil, 0.004 inch thick, manufactured for direct burial service.

E. Color code as follows:
   1. Heating, Cooling, and Boiler Feedwater: Green with white letters.
   2. Toxic and Corrosive Fluids: Orange with black letters.
   3. Compressed Air: Blue with white letters.

2.07 CEILING TACKS

A. Description: Steel with 3/4 inch diameter color coded head.

B. Color code as follows:
   1. HVAC Equipment: Yellow.
   2. Fire Dampers and Smoke Dampers: Red.
   3. Heating/Cooling Valves: Blue.

PART 3 EXECUTION

3.01 PREPARATION

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

3.02 INSTALLATION

A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags with corrosion resistant chain.

C. Install plastic pipe markers in accordance with manufacturer's instructions.

D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

E. Use tags on piping 3/4 inch diameter and smaller.
   1. Identify service, flow direction, and pressure.

F. Install in clear view and align with axis of piping.

G. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

H. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION 230553

SECTION 230593
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Testing, adjustment, and balancing of air systems.

B. Testing, adjustment, and balancing of hydronic and refrigerating systems.

C. Field quality-control testing of Laboratory fume hoods.

1.02 RELATED REQUIREMENTS

A. Section 014000 - Quality Requirements: Employment of testing agency and payment for services.

1.03 REFERENCE STANDARDS

A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition.

B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems.

C. NEBB (TAB) - Procedural Standard for Testing, Adjusting and Balancing of Environmental Systems.

D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.

C. Control System Coordination Reports: Communicate in writing to the controls installer all setpoint and parameter changes made or problems and discrepancies identified during TAB that affect, or could affect, the control system setup and operation.

D. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
   1. Submit under provisions of Section 014000.
   2. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
   3. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
   4. Units of Measure: Report data in both I-P (inch-pound) and SI (metric) units.
   5. Include the following on the title page of each report:
      a. Name of Testing, Adjusting, and Balancing Agency.
      b. Address of Testing, Adjusting, and Balancing Agency.
      c. Telephone number of Testing, Adjusting, and Balancing Agency.
      d. Project name and owner project number.
      e. Project location.
      f. Project Architect.
      g. Project Engineer.
      h. Project Contractor.
      i. Project altitude.
      j. Report date.

E. Project Record Documents: Record actual locations of flow measuring stations and balancing valves and rough setting.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. Perform total system balance in accordance with one of the following:
   1. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
   2. SMACNA (TAB).
   3. Maintain at least one copy of the standard to be used at project site at all times.

B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.

C. TAB Agency Qualifications:
   1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
   2. Having minimum of three years documented experience.
   3. Certified by one of the following:
      a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.
      b. NEAABC BB, National Environmental Balancing Bureau: www.nebb.org/#sle.
      c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org/#sle.

D. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

3.02 EXAMINATION

A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
   1. Systems are started and operating in a safe and normal condition.
   2. Temperature control systems are installed complete and operable.
   3. Proper thermal overload protection is in place for electrical equipment.
   4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
   5. Duct systems are clean of debris.
   6. Fans are rotating correctly.
   7. Fire and volume dampers are in place and open.
   8. Air coil fins are cleaned and combed.
   9. Access doors are closed and duct end caps are in place.
   10. Air outlets are installed and connected.
   11. Duct system leakage is minimized.
   12. Hydronic systems are flushed, filled, and vented.
   13. Pumps are rotating correctly.
   14. Proper strainer baskets are clean and in place.
   15. Service and balance valves are open.

B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.

C. Beginning of work means acceptance of existing conditions.

3.03 PREPARATION

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

B. Provide additional balancing devices as required.

3.04 ADJUSTMENT TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.

B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.05 RECORDING AND ADJUSTING

A. Field Logs: Maintain written logs including:
   1. Running log of events and issues.
   2. Discrepancies, deficient or uncompleted work by others.
   3. Contract interpretation requests.
   4. Lists of completed tests.

B. Ensure recorded data represents actual measured or observed conditions.

C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

D. Mark on drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.

E. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

3.06 AIR SYSTEM PROCEDURE (AS APPLICABLE TO THE PROJECT)

3.07 WATER SYSTEM PROCEDURE (AS APPLICABLE TO THE PROJECT)

A. Adjust water systems to provide required or design quantities.

B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gauges to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.

C. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.

D. Effect system balance with automatic control valves fully open to heat transfer elements.

E. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.

F. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

3.08 SCOPE

A. Test of existing prior to commencement of demolition.
   1. As specified on drawings.

B. Test, adjust, and balance the following:
   1. HVAC Pumps.
   2. Water-Cooled Rotary Screw Chillers
   3. Induced Draft Cooling Towers.

C. See drawing for additional information and requirement.

3.09 MINIMUM DATA TO BE REPORTED

A. Electric Motors:
   1. Manufacturer.

2. Model/Frame.
3. HP/BHP.
4. Phase, voltage, amperage; nameplate, actual, no load.
5. RPM.
6. Service factor.
7. Starter size, rating, heater elements.
8. Sheave Make/Size/Bore.

B. Pumps:
1. Identification/number.
2. Manufacturer.
3. Size/model.
4. Impeller.
5. Service.
6. Design flow rate, pressure drop, BHP.
7. Actual flow rate, pressure drop, BHP.
8. Discharge pressure.
9. Suction pressure.
10. Total operating head pressure.
11. Shut off, discharge and suction pressures.
12. Shut off, total head pressure.

C. Chillers:
1. Identification/number.
2. Manufacturer.
3. Capacity.
4. Model number.
5. Serial number.
6. Evaporator entering water temperature, design and actual.
7. Evaporator leaving water temperature, design and actual.
8. Evaporator pressure drop, design and actual.
9. Evaporator water flow rate, design and actual.
10. Condenser entering water temperature, design and actual.
11. Condenser pressure drop, design and actual.
12. Condenser water flow rate, design and actual.

D. Cooling Tower:
1. Tower identification/number.
2. Manufacturer.
3. Model number.
4. Serial number.
5. Rated capacity.
6. Entering air WB temperature, specified and actual.
7. Leaving air WB temperature, specified and actual.
8. Ambient air DB temperature.
9. Condenser water entering temperature.
10. Condenser water leaving temperature.
11. Condenser water flow rate.
12. Fan RPM.

E. Air Distribution Tests:
1. Air terminal number.
2. Room number/location.
3. Terminal type.
4. Terminal size.

5. Area factor.
6. Design velocity.
7. Design air flow.
8. Test (final) velocity.
9. Test (final) air flow.
10. Percent of design air flow.

F. Sound Level Reports:
1. in general sound test and report are not required when system sound level is accepted by Owner at a visual inspection. If the system/component has a sound problem, upon the request of Owner, the sound and report shall be performed to assist the Engineer and/or contractor to analyze the problem for resolution, at contractor's cost.
2. Location.
3. Octave bands - equipment off.
4. Octave bands - equipment on.

G. Vibration Tests:
1. In general vibration test is not required when system vibration level is accepted by Owner at a visual inspection. If the system/component has a sound problem, upon the request of Owner, the sound and report shall be performed to assist the Engineer and/or contractor to analyze the problem for resolution, at contractor's cost.
2. Location of points:
   a. Fan bearing, drive end.
   b. Fan bearing, opposite end.
   c. Motor bearing, center (if applicable).
   d. Motor bearing, drive end.
   e. Motor bearing, opposite end.
   f. Casing (bottom or top).
   g. Casing (side).
   h. Duct after flexible connection (discharge).
   i. Duct after flexible connection (suction).
3. Test readings:
   a. Horizontal, velocity and displacement.
   b. Vertical, velocity and displacement.
   c. Axial, velocity and displacement.
4. Normally acceptable readings, velocity and acceleration.
5. Unusual conditions at time of test.
6. Vibration source (if non-complying).

END OF SECTION 230593

SECTION 230716
HVAC EQUIPMENT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Equipment insulation.

1.02 RELATED REQUIREMENTS

A. Section 230553 - Identification for HVAC Piping and Equipment.

B. Section 232113 - Hydronic Piping: Placement of hangers and hanger inserts.

C. Section 232114 - Hydronic Specialties.

1.03 REFERENCE STANDARDS

A. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.

B. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

D. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for equipment scheduled.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with not less than three years of documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum 3 years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.07 FIELD CONDITIONS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, UL 723, ASTM E84, or UL 723.

2.02 CELLULAR GLASS

A. Block Insulation: ASTM C552, Type I, Grade 6.

2.03 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

A. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1, in sheet form.
   1. Minimum Service Temperature: Minus 40 degrees F.

2. Maximum Service Temperature: 220 degrees F.
3. Connection: Waterproof vapor barrier adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that equipment has been tested before applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Cover glass fiber insulation with metal mesh and finish with heavy coat of insulating cement.

END OF SECTION 230716

SECTION 230719
HVAC PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.

B. Flexible removable and reusable blanket insulation.

C. Weather barrier coatings.

D. Jacketing and accessories.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.

B. Section 232113 - Hydronic Piping: Placement of hangers and hanger inserts.

1.03 REFERENCE STANDARDS

A. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

B. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.

C. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

D. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.

E. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement.

F. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.

G. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.

H. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation.

I. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation.

J. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.

K. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.

L. ASTM C1423 - Standard Guide for Selecting Jacketing Materials for Thermal Insulation.

M. ASTM D610 - Standard Practice for Evaluating Degree of Rusting on Painted Steel Surfaces.

N. ASTM D5590 - Standard Test Method for Determining the Resistance of Paint Films and Related Coatings to Fungal Defacement by Accelerated Four-Week Agar Plate Assay.

O. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

P. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.

Q. SAE AMS3779 - Tape, Adhesive, Pressure-Sensitive Thermal Radiation Resistant, Aluminum Coated Glass Cloth.

R. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

C. Test Reports: For HVAC pipe and fitting insulaton, provide independent laboratory reports and test results showing negative asbestos containing materials content using Polarized Light Microscopy (PLM) test method.

D. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.06 FIELD CONDITIONS

A. Maintain ambient conditions required by manufacturers of each product.

B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, UL 723, ASTM E84, or UL 723.

2.02 GLASS FIBER, RIGID

A. Manufacturers:
   1. CertainTeed Corporation: www.certainteed.com.
   2. Johns Manville Corporation: www.jm.com.
   3. Knauf Insulation: www.knaufinsulation.com.
   4. Owens Corning Corp: www.owenscorning.com.
   5. Substitutions: See Section 016000 - Product Requirements.

B. Insulation: ASTM C547and ASTM C795; rigid molded, noncombustible.
   1. K Value: ASTM C177, 0.24 at 75 degrees F.
   2. Maximum Service Temperature: 850 degrees F.
   3. Maximum Moisture Absorption: 0.2 percent by volume.

C. Insulation: ASTM C547and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
   1. K Value: ASTM C177, 0.24 at 75 degrees F.
   2. Maximum Service Temperature: 650 degrees F.
   3. Maximum Moisture Absorption: 0.2 percent by volume.

D. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.

E. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

F. Vapor Barrier Lap Adhesive: Compatible with insulation.

G. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.

H. Fibrous Glass Fabric:
   1. Cloth: Untreated; 9 oz/sq yd weight.
   2. Blanket: 1.0 pcf density.
   3. Weave: 5 by 5.

I. Indoor Vapor Barrier Finish:
   1. Cloth: Untreated; 9 oz/sq yd weight.
   2. Vinyl emulsion type acrylic, compatible with insulation, black color.

J. Outdoor Vapor Barrier Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

K. Outdoor Breather Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

L. Insulating Cement: ASTM C449.

2.03 CELLULAR GLASS

A. Manufacturers:
   1. Owens Corning www.foamglas.com
   2. Substitutions: See Section 016000 - Product Requirements.

B. Block Insulation: ASTM C552, Type I, Grade 6.
   1. K Value: 0.35 at 100 degrees F.
   2. Service Temperature: 800 degrees F, maximum.
   3. Water Absorption: 0.5 percent by volume, maximum.

2.04 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

A. Manufacturers:
   1. Aeroflex USA, Inc; Aerocel Stay-Seal with Protape (SSPT): www.aeroflexusa.com/#sle.
   2. Armacell LLC; ArmaFlex Ultra with FlameDefense: www.armacell.com/en-US
   3. K-Flex USA LLC; K-Flex Titan: www.kflexusa.com/#sle.
   4. RBX Industries/Rubatex .
   5. Substitutions: See Section 016000 - Product Requirements.

B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
   1. Minimum Service Temperature: Minus 40 degrees F.
   2. Maximum Service Temperature: 180 degrees F.
   3. Connection: Waterproof vapor barrier adhesive.

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

D. Weather Barrier Coating: Air dried, contact adhesive, compatible with insulation and ASTM E84 compliant.

2.05 WEATHER BARRIER COATINGS

A. Weather-Resistive Barrier Coating: Fire-resistive, UV resistant, water-based mastic for use over closed cell polyethylene and polyurethane foam insulation; applied with glass fiber or synthetic reinforcing mesh.
   1. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, Class A, when tested in accordance with ASTM E84.
   2. Water Vapor Permeance: Greater than 1.0 perm in accordance with ASTM E96/E96M.
   3. Resistance to Fungal Growth: No growth when tested in accordance with ASTM D5590.

2.06 JACKETING AND ACCESSORIES

A. PVC Plastic.
   1. Manufacturers:
      a. Johns Manville Corporation: www.jm.com.
      b. Substitutions: See Section 016000 - Product Requirements.
   2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
      a. Minimum Service Temperature: 0 degrees F.
      b. Maximum Service Temperature: 150 degrees F.
      c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
      d. Thickness: 10 mil, 0.010 inch.
      e. Connections: Brush on welding adhesive.
   3. Covering Adhesive Mastic: Compatible with insulation.

B. Aluminum Jacket:

1. Comply with ASTM B209/B209M, Temper H14, minimum thickness of 0.016 inch with factory-applied polyethylene and kraft paper moisture barrier on the inside surface.

C. Stainless Steel Jacket: ASTM A666/A666M, Type 304 stainless steel.
   1. Thickness: 0.010 inch.
   2. Finish: Smooth.
   3. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

D. Reinforced Tape:
   1. FSK tape suitable for sealing seams between insulation, insulated pipe bends, and fittings resulting in a tight, smooth surface without wrinkles.
   2. Comply with UL 723, ASTM E84.
   3. Moisture Vapor Permeability: 0.00 perm inch, when tested in accordance with ASTM E96/E96M.
   4. Finish: Match insulation.

E. Plain Foil Tape:
   1. Aluminum foil with pressure-sensitive adhesive on paper release liner.

2.07 ACCESSORIES

A. General Requirements:
   1. Furnish compatible materials which do not contribute to corrosion, soften, or otherwise attack surfaces to which applied, in either the wet or dry state.
   2. Comply with ASTM C795 requirements for materials to be used on stainless steel surfaces.
   3. Supply materials that are asbestos free.

B. Corrosion Inhibitors:
   1. Corrosion Control Gel:
      a. Corrosion Protection: Comply with ASTM B117 and ASTM D610.

PART 3 EXECUTION

3.01 EXAMINATION

A. Test piping for design pressure, liquid tightness, and continuity prior to applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NAIMA National Insulation Standards.

C. Exposed Piping: Locate insulation and cover seams in least visible locations.

D. Glass Fiber Insulated Pipes Conveying Fluids Below Ambient Temperature:
   1. Provide vapor barrier jackets, factory-applied or field-applied; secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
   2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

E. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.

F. Glass Fiber Insulated Pipes Conveying Fluids Above Ambient Temperature:
   1. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.

G. Inserts and Shields:
   1. Application: Piping 1-1/2 inches diameter or larger.
   2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
   3. Insert location: Between support shield and piping and under the finish jacket.

4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

H. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, see 078400 078400 - Firestopping

I. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with PVC jacket and fitting covers.

J. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping. Provide two coats of UV resistant finish for flexible elastomeric cellular insulation without jacketing.

K. Buried Piping: Provide factory-fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with 1 mil, 0.001 inch thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with polyester film.

L. Heat Traced Piping: Insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

3.03 SCHEDULE

A. Heating Systems:
1. Heating Water Supply and Return:

B. Cooling Systems:
1. Chilled Water:

END OF SECTION 230719

SECTION 230913
INSTRUMENTATION AND CONTROL DEVICES FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Control panels.

B. Control Valves:
   1. Ball valves and actuators.
   2. Electronic operators.

C. HVAC&R Sensors:
   1. Temperature sensors.
   2. Humidity sensors.

D. Time clocks.

E. Sensors with transmitters:
   1. Building static pressure transmitters.

F. Control valves.

G. Damper operators.

H. Time clocks.

I. Input/Output sensors.

J. Miscellaneous accessories.

1.02 RELATED REQUIREMENTS

A. Section 232113 - Hydronic Piping: Installation of control valves, flow switches, temperature sensor sockets, and gauge taps.

B. Section 232114 - Hydronic Specialties.

C. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

D. Section 262726 - Wiring Devices: Elevation of exposed components.

1.03 REFERENCE STANDARDS

A. AMCA 500-D - Laboratory Methods of Testing Dampers for Rating.

B. ANSI/FCI 70-2 - Control Valve Seat Leakage.

C. NEMA BS 31032 - Residential Controls–Electrical Wall-Mounted Room Thermostats.

D. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

E. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems.

F. UL 94 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Submit all submital documents listed in this Section under Section 230923 - Direct-Digital Control System for HVAC.

C. Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.

D. Shop Drawings: Indicate complete operating data, system drawings, wiring diagrams, and written detailed operational description of sequences.
   1. Submit schedule of valves indicating size, flow, and pressure drop for each valve.
      a. Valve submittals shall be coordinated for type, quantity, size, and piping configuration to ensure compatibility with pipe design.

2. Submit automatic dampers indicating arrangement, velocities, and static pressure drops for each system.
    a. Damper submittals shall be coordinated for type, quantity, and size to ensure compatibility with sheet metal design.

E. Manufacturer's Instructions: Provide for all manufactured components.

F. Operation and Maintenance Data: Include inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.

1.05 QUALITY ASSURANCE

1.06 WARRANTY

A. See Section 017800 - Closeout Submittals for additional warranty requirements.

B. Provide five year manufacturer's warranty for contro valves.

PART 2 PRODUCTS

2.01 SYSTEM PERFORMANCE

A. Reporting Accuracy. System shall report values with minimum end-to-end accuracy listed in Table below.

Measured Variable	Reported Accuracy
Space Temperature	±0.5ºC (±1ºF)
Ducted Air	±0.5ºC (±1ºF)
Outside Air	±1.0ºC (±2ºF)
Dew Point	±1.5ºC (±3ºF)
Water Temperature	±0.5ºC (±1ºF)
Delta-T	±0.15º (±0.25ºF)
Relative Humidity	±5% RH
Water Flow	±2% of full scale
Airflow (terminal)	±10% of full scale (Accuracy applies to 10%–100% of scale)
Airflow (measuring stations)	±5% of full scale
Airflow (pressurized spaces)	±3% of full scale
Air Pressure (ducts)	±25 Pa (±0.1 in. w.g.)
Air Pressure (space)	±3 Pa (±0.01 in. w.g.)
Water Pressure	±2% of full scale (For both absolute and differential pressure)
Electrical	±1% of reading (Not including utility-supplied meters)
Carbon Monoxide (CO)	±5% of reading
Carbon Dioxide (CO2)	±50 ppm

B. Control Stability and Accuracy. Control loops shall maintain measured variable at setpoint within tolerances listed in Table below.

Controlled Variable	Control Accuracy	Range of Medium
Air Pressure	±50 Pa (±0.2 in. w.g.) ±3 Pa (±0.01 in. w.g.)	0–1.5 kPa (0–6 in. w.g.) -25 to 25 Pa (-0.1 to 0.1 in. w.g.)
Airflow	±10% of full scale	
Space Temperature	±1.0ºC (±2.0ºF)	
Duct Temperature	±1.5ºC (±3ºF)	
Humidity	±5% RH	

Fluid Pressure	±10 kPa (±1.5 psi) ±250 Pa (±1.0 in. w.g.)	MPa (1–150 psi) 0–12.5 kPa (0–50 in. w.g.) differential

2.02 EQUIPMENT - GENERAL

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

2.03 CONTROL PANELS

A. NEMA EN 10250, general purpose utility enclosures with enameled finished face panel.

B. Provide common keying for all panels.

2.04 CONTROL VALVES

A. Ball Valves and Actuators:
   1. Service: Use for brine (30 percent glycol), chilled water, hot water, or steam at 15 to 25 psig (104.4 to 172.4).
   2. Flow Characteristic: Include 2-way and 3-way diverting operation configured to fail normally closed (NC).
   3. Replacements in Kind: Provide pressure-independent type.
   4. Rangeability: 500 to 1.
   5. ANSI Rating: Class 150.
   6. Leakage: Class IV (0.1 percent of rated capacity) per ANSI/FCI 70-2.
   7. Body Size:
      a. Under 2-1/2 inches:
         1) Connection: NPT.
         2) Materials:
            (a) Body: Brass.
            (b) Flanges: Ductile iron.
            (c) Ball: Chrome-plated brass.
            (d) Stem: Nickel-plated brass.
            (e) Seat: Graphite-reinforced PTFE with EPDM O-Ring backing.
            (f) Stem Seal: EPDM O-Rings.
            (g) Flow Control Disk: Thermoplastic synthetic-resin.
      b. 2-1/2 inches and Above:
         1) Connection Type: Flanged.
         2) Materials:
            (a) Body: Brass.
            (b) Flanges: Ductile iron.
            (c) Ball: 300 series stainless steel.
            (d) Stem: 300 series stainless steel.
            (e) Seat: Graphite-reinforced PTFE with EPDM O-Ring backing.
            (f) Stem Seal: EPDM O-Rings.
            (g) Flow Control Disk: Thermoplastic synthetic-resin.
      c. Service Temperature:
         1) Fluid Side: 0 to 284 degrees F liquid or 25 psig steam.
         2) Ambient Side: From minus 4 to 122 degrees F.
   8. Actuator Requirements:
      a. Assembly: Factory-mounted.
      b. Input: 0 to 5 VDC configured for proportional control.
      c. Accessories: Provide with valve position indicator and manual override.

B. Manufacturer:
   1. BELIMO.

C. Control Valves:
   1. Factory fabricated of type, body material, and pressure class based on maximum pressure and temperature rating of piping system, unless otherwise indicated.
   2. Sizing:
      a. Two-Position: Line size or size using a pressure differential of 1 psi.
      b. Two-Way Modulating: 5 psid or twice the load pressure drop, whichever is more.
      c. Three-Way Modulating: Twice the load pressure drop, but not more than 5 psid

D. The manufacturer shall warrant all components for a period of 5 years from the date of production, with the first two years unconditional (except as noted).

E. Characterized Control Valves:
   1. 3" and Smaller: Nickel-plated forged brass body rated at no less than 400 psi, stainless steel ball and blowout proof stem, female NPT end fittings, with a dual EPDM O-ring packing design, fiberglass reinforced Teflon seats, and a TEFZEL or stainless steel flow characterizing disc.
   2. 2-1/2" through 6": GG25 cast iron body, ANSI 125, class B, stainless steel ball and blowout proof stem, flange to match ANSI 125 with a dual EPDM O-ring package design, PTFE seats, and a stainless steel flow characterizing disc.
   3. Valve assemblies shall be maintenance free.
   4. NPS 2" and smaller characterized control valves shall be provided as part of a pipe package supplied by the valve manufacturer. The supply side of the coil shall contain a strainer/shut-off ball valve/drain with hose connection/[an integrated isolation ball valve/manual air vent with a P/T port. The return side of the coil shall contain a union fitting with a P/T port, characterized control valve, an integrated manual balancing valve/union/isolation ball valve/manual air vent with P/T port. Shut-off valves as an integrated part of the characterized control valve are prohibited. For 3-way installations, supply an integrated 100% port isolation valve/manual air vent with a P/T port for field installation in the bypass of the circuit . A 12" or 24" flexible hose set shall be provided for each coil supply and return connection for all pipe packages.

F. Globe valves shall have the following characteristics:
   1. Hydraulic system globe valves shall have the following characteristics:
      a. NPS 2 and Smaller: ANSI Class 250 bronze body, stainless steel stem, brass plug, bronze seat, and a TFE packing.
      b. NPS 2-1/2 and Larger: ANSI Class 125 [250] cast iron body, stainless steel stem, bronze plug, bronze seat, and a TFE V-ring packing.
      c. Flow Characteristics: Two-way valves shall have equal percentage characteristics; three-way valves shall have linear characteristics.
      d. Two- and three-way globe valves shall be used only if characterized control valves do not fit the sizing criteria or application.

G. Butterfly Valves - Resilient Seat:
   1. NPS 2 to 12: Valve body shall be full lugged ductile iron 200 psig body with a 304 stainless steel disc, EPDM seat, extended neck and shall meet ANSI Class 125/150 flange standards. Disc-to-stem connection shall utilize an internal spline. The shaft shall be supported at four locations by RPTFE bushings. A coated disc shell is not acceptable.
   2. NPS 14 and Larger: Valve body shall be full lugged ductile iron 150 psig body with a 304 stainless steel disc, EPDM seat, extended neck and shall meet ANSI Class 125/150 flange standards. Disc-to-stem connection shall utilize a dual-pin method to prevent the disc from settling onto the liner. The shaft shall be supported at four locations by RPTFE bushings. A coated disc shell is not acceptable.
   3. Sizing: Two-Position (on/off) butterfly valves shall be sized using the 900 Cv rating. Modulating butterfly valves shall be sized using the 600 Cv rating.
   4. Flow Characteristics: Modified equal percentage, unidirectional dead end service.
   5. Close-Off Pressure Rating: Bubble-tight shutoff (no leakage).

6. The combination of two 2-way butterfly valves in a tee configuration cross-linked to ensure proper flow orientation shall be permitted. The tee shall be constructed of cast iron/stainless steel.

H. Butterfly Valves - High Performance:
   1. Valve body shall be full lugged carbon steel ANSI Class 150 [300] body with a 316 stainless steel disc without a nylon coating, RTFE seat, and be ANSI Class 150 [300] flange standards. Blowout-proof shaft shall be 17-4ph stainless steel and shall be supported at four locations by glass-backed TFE bushings. Valve packing shall be Chevron TFE and shall include fully adjustable packing flange and separable packing gland. Valve body shall have long stem design to allow for 2" insulation (minimum). Valve face-to-face dimensions shall comply with API 609 and MSS-SP-68. Valve assembly shall be completely assembled and tested, ready for installation.
   2. Sizing: Two-Position (on/off) butterfly valves shall be sized using the 900 Cv rating. Modulating butterfly valves shall be sized using the 600 Cv rating.
   3. Flow Characteristics: Modified equal percentage, full rated, bi-directional, dead end service with either flange removed.
   4. Close-Off Pressure Rating: Bubble-tight shutoff (no leakage).
   5. Media Temperature Range: ANSI Class 150 [300] limitations.
   6. Max Differential Pressure: 285 psi @ 100 deg F for ANSI 150 (725 psi @ 100 deg F for ANSI 300).
   7. The combination of two 2-way butterfly valves in a tee configuration cross-linked to ensure proper flow orientation shall be permitted. The tee should be constructed of cast iron/stainless steel.

I. Water valves shall fail normally open or closed, as scheduled on plans, or as follows:
   1. Water zone valves-normally open preferred.
   2. Heating coils in air handlers-normally open.
   3. Chilled water control valves-normally closed.
   4. Other applications-as scheduled or as required by sequences of operation.

J. Electronic Operators:
   1. Control valves shall be two-way or three-way type for two-position or modulating service as indicated.
   2. Valves shall spring return to normal position as indicated on freeze, fire, or temperature protection.
   3. Close-off (differential) Pressure Rating: Valve actuator and trim shall be furnished to provide the following minimum close-off pressure ratings:
      a. Water Valves:
         1) Two-way: 150% of total system (pump) head.
         2) Three-way: 300% of pressure differential between ports A and B at design flow or 100% of total system (pump) head.
   4. Select operator for full shut off at maximum pump differential pressure.
   5. Signal and Range. Proportional actuators shall accept a 0-10 Vdc or a 0-20 mA control signal and shall have a 2-10 Vdc or 4-20 mA operating range. (Floating motor actuators may be substituted for proportional actuators in terminal unit applications)
   6. Wiring. 24 Vac and 24 Vdc actuators shall operate on Class 2 wiring.
   7. Manual Positioning. Operators shall be able to manually position each actuator when the actuator is not powered. Non-spring-return actuators shall have an external manual gear release. Spring-return actuators with more than 60 in.-lb torque capacity shall have a manual crank.
   8. Product:
      a. Belimo
      b. Industrial Actuators (Butterfly Valves)

2.05 DAMPER OPERATORS

A. General: Provide smooth proportional control with sufficient power for air velocities 20 percent greater than maximum design velocity and to provide tight seal against maximum system pressures. Provide spring return for two position control and for fail safe operation.
   1. Provide sufficient number of operators to achieve unrestricted movement throughout damper range.
   2. Provide one operator for maximum 24 sq ft damper section.

2.06 HVAC&R SENSORS

A. Temperature Sensors:
   1. Use RTD (Resistance Temperature Device) type temperature sensing elements with characteristics resistant to moisture, vibration, and other conditions consistent with the application without affecting accuracy and life expectancy.
   2. Construct RTD of nickel or platinum with base resistance of 1000 ohms at 70 degrees F.
   3. 100 ohm platinum RTD is acceptable if used with project DDC controllers.
   4. Temperature Sensing Device: Compatible with project DDC controllers.
   5. Performance Characteristics:
      a. RTD:
         1) Room Sensor Accuracy: Plus/minus 0.50 degrees F minimum.
         2) Duct Averaging Accuracy: Plus/minus 0.50 degrees F minimum.
         3) Chilled Water Accuracy: Plus/minus 0.50 degrees F minimum.
         4) All Other Accuracy: Plus/minus 0.75 degrees F minimum.
         5) Range: Minus 40 degrees F through 220 degrees F minimum.
      b. Thermistor:
         1) Accuracy (All): Plus/minus 0.36 degrees F minimum.
         2) Range: Minus 25 degrees F through 122 degrees F minimum.
         3) Heat Dissipation Constant: 2.7 mW per degree C.
      c. Temperature Transmitter:
         1) Accuracy: 0.10 degree F minimum or plus/minus 0.20 percent of span.
         2) Output: 4 to 20 mA.
      d. Sensing Range:
         1) Provide limited range sensors if required to sense the range expected for a respective point.
         2) Use RTD type sensors for extended ranges beyond minus 30 to 230 degrees F.
         3) Use temperature transmitters in conjunction with RTD's when RTD's are incompatible with DDC controller direct temperature input.
      e. Wire Resistance:
         1) Use appropriate wire size to limit temperature offset due to wire resistance to 1.0 degree F or use temperature transmitter when offset is greater than 1.0 degree F due to wire resistance.
         2) Compensate for wire resistance in software input definition when feature is available in the DDC controller.
      f. Room Sensors: Locking cover as indicated on drawing.
      g. Outside Air Sensors: Watertight inlet fitting shielded from direct rays of the sun.
      h. Room Temperature Sensors:
         1) Construct for surface or wall box mounting.
         2) Provide the following:
            (a) Setpoint reset slide switch with an adjustable temperature range.
            (b) Momentary override request push button for activation of after-hours operation as indicated on drawing.
            (c) Analog thermometer.
         3) Product: BAPI; www.bapihvac.com
            (a) Substitutions: See Section 01 6000 - Product Requirements.

i. Temperature Averaging Elements:
   1) Use on duct sensors for ductwork 10 sq ft or larger.
   2) Use averaging elements where prone to stratification with sensor length 8 ft or 16 ft.
   3) Provide for all mixed air and heating coil discharge sensors regardless of duct size.

j. Insertion Elements:
   1) Use in ducts not affected by temperature stratification or smaller than 11 sq inches.
   2) Provide dry type, insertion elements for liquids, installed in immersion wells, with minimum insertion length of 2.5 inches.

k. Immersion Sensors. Provide immersion sensors with a separable stainless steel well. Well pressure rating shall be consistent with system pressure it will be immersed in. Well shall withstand pipe design flow velocities.

B. Humidity Sensors:
   1. Drift: No more than 1% of full scale annually.
   2. Room Sensors: Span of 20 - 80 percent relative humidity.
      a. Provide locking cove as indicated on drawing.
   3. Duct and Outside Air Sensors: With element guard and mounting plate, range of 0 - 100 percent relative humidity.
      a. Duct Sensors: have a sampling chamber.
      b. Outside Air Sensors: suitable for ambient conditions of -40°F–170°F.

C. Static Pressure Sensors:
   1. Unidirectional with ranges not exceeding 150 percent of maximum expected input.
   2. Temperature compensate with typical thermal error or 0.06 percent of full scale in temperature range of 40 to 100 degrees F.
   3. Accuracy: One percent of full scale with repeatability 0.3 percent.
   4. Output: 0 - 5 vdc with power at 12 to 28 vdc.

D. Equipment Operation Sensors:
   1. Status Inputs for Fans: Differential pressure switch with adjustable range of 0 to 5 inches wg.
   2. Status Inputs for Pumps: Differential pressure switch piped across pump with adjustable pressure differential range of 8 to 60 psi.
   3. Status Inputs for Electric Motors: Current sensing relay with current transformers, adjustable and set to 175 percent of rated motor current.

E. Damper Position Indication: Potentiometer mounted in enclosure with adjustable crank arm assembly connected to damper to transmit 0 - 100 percent damper travel.

F. Carbon Monoxide Detectors:
   1. Single or multichannel dual level detectors, using solid state sensors with three year minimum life. Sensor replacement shall take maximum 15 minutes. Suitable over temperature range of 23 to 130 degrees F.
   2. Provide individual indicators and contractors for each level, initially calibrated for 50 ppm and 100 ppm.
   3. Maximum response time to 100 ppm CO calibration gas: Two minutes.

G. Carbon Dioxide Sensors:
   1. General: Provide non-dispersive infrared (NDIR) CO2 sensors with integral transducers and linear output.
      a. Linear, CO2 Concentration Range Display: 0 to 2000 ppm.
      b. Full Scale Accuracy: Plus/minus 100 ppm or plus/minus 5 percent of reading which ever is higher.
      c. Maximum Response Time: 1 minute.
      d. Analog Output: 0-10 VDC.

e. Rated Ambient Conditions:
1) Air Temperature: Range of 32 to 122 degrees F.
2) Relative Humidity: Range of 0 to 95 percent (non-condensing).

2. Calibration Characteristics:
a. Automatically compensating algorithm for sensor drift due to sensor degradation.
b. Maximum Drift: 2 percent.
c. User calibratable with a minimum calibration interval of 5 years.

3. Construction:
a. Sensor Chamber: Non-corrosive material for neutral effect on carbon dioxide sample.
b. Provide duct mounted sensors with duct probe designed to protect sensing element from dust accumulation and mechanical damage.

2.07 TIME CLOCKS

A. Seven day programming switch timer with synchronous timing motor and seven day dial, continuously charged Ni-cad battery driven power failure 8 hour carry over and multiple switch trippers to control systems for minimum of two and maximum of eight signals per day with two normally open and two normally closed output switches.

2.08 OVERRIDE TIMERS.

A. Unless implemented in control software, override timers shall be spring-wound line voltage, UL Listed, with contact rating and configuration required by application. Provide 0-6 hour calibrated dial unless otherwise specified. Flush mount timer on local control panel face or where shown.

2.09 FLOW SWITCHES.

A. Flow-proving switches shall be paddle (water service only) or differential pressure type (air or water service) as shown. Switches shall be UL listed, SPDT snap-acting, and pilot duty rated (125 VA minimum).

B. Paddle switches shall have adjustable sensitivity and NEMA 1 enclosure unless otherwise specified.

C. Differential pressure switches shall have scale range and differential suitable for intended application and NEMA 1 enclosure unless otherwise specified.

2.10 RELAYS.

A. Control Relays. Control relays shall be plug-in type, UL listed, and shall have dust cover and LED “energized” indicator. Contact rating, configuration, and coil voltage shall be suitable for application.

B. Time Delay Relays. Time delay relays shall be solid-state plug-in type, UL listed, and shall have adjustable time delay. Delay shall be adjustable ±100% from setpoint shown. Contact rating, configuration, and coil voltage shall be suitable for application. Provide NEMA 1 enclosure for relays not installed in local control panel.

2.11 SENSORS WITH TRANSMITTERS

A. Building Static Pressure Transmitters:
1. One pipe, direct acting, double bell, scale range 0.01 to 6.0 in-wc positive or negative, and sensitivity of 0.0005 in-wc. Transmit electronic signal to receiver with matching scale range.

B. Pressure Transmitters:
1. One pipe direct acting for gas, liquid, or steam service, range suitable for system, proportional electronic output.

C. Temperature Transmitters:
1. One pipe, directly proportional output signal to measured variable, linearity within plus or minus 1/2 percent of range for 200 degrees F span and plus or minus 1 percent for 50 degrees F span, with 50 degrees F. temperature range, compensated bulb, averaging capillary, or rod and tube operation on 20 psig input pressure and 3 to 15 psig output.

D. Humidity Transmitters:
   1. One pipe, directly proportioned output signal to measured variable, linearity within plus or minus 1 percent for 70 percent relative humidity span, capable of withstanding 95 percent relative humidity without loss of calibration.

E. Current Transmitters.
   1. AC current transmitters shall be self-powered, combination split-core current transformer type with built-in rectifier and high-gain servo amplifier with 4-20 mA two-wire output. Full-scale unit ranges shall be 10 A, 20 A, 50 A, 100 A, 150 A, and 200 A, with internal zero and span adjustment. Unit accuracy shall be ±1% full-scale at 500 ohm maximum burden.
   2. Transmitter shall meet or exceed ANSI/ISA S50.1 requirements and shall be UL/CSA recognized.
   3. Unit shall be split-core type for clamp-on installation on existing wiring.

F. Voltage Transmitters.
   1. AC voltage transmitters shall be self-powered single-loop (two-wire) type, 4-20 mA output with zero and span adjustment.
   2. Adjustable full-scale unit ranges shall be 100-130 Vac, 200-250 Vac, 250-330 Vac, and 400-600 Vac. Unit accuracy shall be ±1% full-scale at 500 ohm maximum burden.
   3. Transmitters shall meet or exceed ANSI/ISA S50.1 requirements and shall be UL/CSA recognized at 600 Vac rating.

2.12 TRANSFORMERS

A. Current Transformers.
   1. AC current transformers shall be UL/CSA recognized and shall be completely encased (except for terminals) in approved plastic material.
   2. Transformers shall be available in various current ratios and shall be selected for ±1% accuracy at 5 A full-scale output.
   3. Use fixed-core transformers for new wiring installation and split-core transformers for existing wiring installation.

B. Voltage Transformers.
   1. AC voltage transformers shall be UL/CSA recognized, 600 Vac rated, and shall have built-in fuse protection.
   2. Transformers shall be suitable for ambient temperatures of 4°C-55°C (40°F-130°F) and shall provide ±0.5% accuracy at 24 Vac and 5 VA load.
   3. Windings (except for terminals) shall be completely enclosed with metal or plastic.

2.13 DIFFERENTIAL PRESSURE SWITCHES.

A. Differential pressure switches (air or water service) shall be UL listed, SPDT snap-acting, pilot duty rated (125 VA minimum) and shall have scale range and differential suitable for intended application and NEMA 1 enclosure unless otherwise specified.

2.14 PRESSURE-ELECTRIC (PE) SWITCHES.

A. Shall be metal or neoprene diaphragm actuated, operating pressure rated for 0-175 kPa (0-25 psig), with calibrated scale minimum setpoint range of 14-125 kPa (2-18 psig) minimum, UL listed.

B. Provide one- or two-stage switch action (SPDT, DPST, or DPDT) as required by application Electrically rated for pilot duty service (125 VA minimum) and/or for motor control.

C. Switches shall be open type (panel-mounted) or enclosed type for remote installation. Enclosed type shall be NEMA 1 unless otherwise specified.

D. Each pneumatic signal line to PE switches shall have permanent indicating gauge.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that systems are ready to receive work.

C. Beginning of installation means installer accepts existing conditions.

D. Sequence work to ensure installation of components is complementary to installation of similar components in other systems.

E. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

F. Ensure installation of components is complementary to installation of similar components.

G. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Check and verify location of thermostats with plans and room details before installation. Locate 60 inches above floor. Align with lighting switches and humidistats; see Section 262726.

C. Provide valves with position indicators and with pilot positioners where sequenced with other controls.

D. Mount control panels adjacent to associated equipment on vibration free walls or free standing angle iron supports. One cabinet may accommodate more than one system in same equipment room. Provide engraved plastic nameplates for instruments and controls inside cabinet and engraved plastic nameplates on cabinet face.

E. Install "hand/off/auto" selector switches to override automatic interlock controls when switch is in "hand" position.

F. Provide conduit and electrical wiring in accordance with Section 260583.

G. Control Valve Installation
   1. Slip-stem control valves shall be installed so that the stem position is not more than 60 degrees from the vertical up position. Ball type control valves shall be installed with the stem in the horizontal position.
   2. Valves shall be installed in accordance with the manufacturer's recommendations.
   3. Control valves shall be installed so that they are accessible and serviceable and so that actuators may be serviced and removed without interference from structure or other pipes and/or equipment.
   4. Isolation valves shall be installed so that the control valve body may be serviced without draining the supply/return side piping system. Unions shall be installed at all connections to screw-type control valves.
   5. Provide tags for all control valves indicating service and number. Tags shall be brass, 1.5 inch in diameter, with ¼ inch high letters. Securely fasten with chain and hook. Match identification numbers as shown on approved controls shop drawings.

H. Installation of Sensors
   1. Install sensors in accordance with the manufacturer's recommendations.
   2. Mount sensors rigidly and adequately for environment within which the sensor operates.
   3. Room temperature sensors shall be installed on concealed junction boxes properly supported by wall framing.
   4. All wires attached to sensors shall be sealed in their raceways or in the wall to stop air transmitted from other areas from affecting sensor readings.
   5. Sensors used in mixing plenums and hot and cold decks shall be of the averaging type. Averaging sensors shall be installed in a serpentine manner vertically across the duct. Each bend shall be supported with a capillary clip.
   6. Low-limit sensors used in mixing plenums shall be installed in a serpentine manner horizontally across duct. Each bend shall be supported with a capillary clip. Provide 3 m (1 ft) of sensing element for each 1 m2(1 ft2) of coil area.

7. Do not install temperature sensors within the vapor plume of a humidifier. If installing a sensor downstream of a humidifier, install it at least 3 m (10 ft) downstream.
8. All pipe-mounted temperature sensors shall be installed in wells. Install liquid temperature sensors with heat-conducting fluid in thermal wells.
9. Install outdoor air temperature sensors on north wall, complete with sun shield at designated location.

I. Flow Switch Installation
1. Use correct paddle for pipe diameter.
2. Adjust flow switch according to manufacturer's instructions.

J. Actuators
1. General. Mount and link control damper actuators according to manufacturer's instructions.
   a. To compress seals when spring-return actuators are used on normally closed dampers, power actuator to approximately 5° open position, manually close the damper, and then tighten the linkage.
   b. Check operation of damper/actuator combination to confirm that actuator modulates damper smoothly throughout stroke to both open and closed positions.
   c. Provide all mounting hardware and linkages for actuator installation.
2. Electric/Electronic
   a. Dampers: Actuators shall be direct mounted on damper shaft or jackshaft unless shown as a linkage installation. For low-leakage dampers with seals, the actuator shall be mounted with a minimum 5° travel available for tightening the damper seal. Actuators shall be mounted following manufacturer’s recommendations.
   b. Valves: Actuators shall be connected to valves with adapters approved by the actuator manufacturer. Actuators and adapters shall be mounted following the actuator manufacturer's recommendations.

END OF SECTION 230913

SECTION 230923
DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

1.02 RELATED REQUIREMENTS

A. Section 230913 - Instrumentation and Control Devices for HVAC.

B. Section 230993 - Sequence of Operations for HVAC Controls.

C. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. ANSI/CEA 709.1.D - Control Network Protocol Specification.

B. ASHRAE Std 135 - BACnet - A Data Communication Protocol for Building Automation and Control Networks.

C. NFPA 70 - National Electrical Code.

D. UL (DIR) - Online Certifications Directory.

1.04 COODINATION REQUIREMENTS

A. Coordinate with HVAC equipment supplier and system field installer to clarly identify the following components to ensure the entire system meets the design intent:
   1. Interface requirment for HVAC equipment factory provided controllers.
   2. HVAC equipment factory supplied and installed control components.
   3. HVAC equipment factory installed control components.
   4. Field installed components.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data and Shop Drawing: Provide data and shop drawingfor each system hardware, software module and equipment to be installed or provided.
   1. DDC System Hardware
      a. A complete bill of materials to be used indicating quantity, manufacturer, model number, and relevant technical data of equipment to be used.
      b. Manufacturer's description and technical data such as performance curves, product specifications, and installation and maintenance instructions for items listed below and for relevant items not listed below:
         1) Direct digital controllers (controller panels)
         2) Control panels
         3) Power supplies
         4) Batteries
         5) Operator interface equipment
         6) Wiring
      c. Wiring diagrams and layouts for each control panel. Show termination numbers.
      d. Schematic diagrams for all field sensors and controllers. Provide floor plans of all sensor locations and control hardware.
   2. Central System Hardware and Software
      a. A complete bill of material of equipment used indicating quantity, manufacturer, model number, and relevant technical data.
      b. Manufacturer's description and technical data such as product specifications and installation and maintenance instructions for items listed below and for relevant items furnished under this contract not listed below:
         1) Central Processing Unit (CPU) or web server
         2) Monitors

3) Keyboards
4) Power supplies
5) Battery backups
6) Interface equipment between CPU or server and control panels
7) Operating System software
8) Operator interface software
9) Color graphic software
10) Third-party software

c. Schematic diagrams for all control, communication, and power wiring. Provide a schematic drawing of the central system installation. Label all cables and ports with computer manufacturers' model numbers and functions. Show interface wiring to control system.
d. Network riser diagrams of wiring between central control unit and control panels.
e. Controlled Systems
1) Riser diagrams showing control network layout, communication protocol, and wire types.
2) A schematic diagram of each controlled system. The schematics shall have all control points labeled with point names shown or listed. The schematics shall graphically show the location of all control elements in the system.
3) A schematic wiring diagram of each controlled system. Label control elements and terminals. Where a control element is also shown on control system schematic, use the same name.
4) An instrumentation list (Bill of Materials) for each controlled system. List each control system element in a table. Show element name, type of device, manufacturer, model number, and product data sheet number.
5) A mounting, wiring, and routing plan-view drawing. The design shall take into account HVAC, electrical, and other systems' design and elevation requirements. The drawing shall show the specific location of all concrete pads and bases and any special wall bracing for panels to accommodate this work.
6) A complete description of the operation of the control system, including sequences of operation. The description shall include and reference a schematic diagram of the controlled system.
7) A point list for each control system. List I/O points and software points specified in Section 230993. Indicate alarmed and trended points.

3. Quantities of items submitted shall be reviewed but are the responsibility of the Contractor.
4. BACnet Protocol Implementation Conformance Statement (PICS) for each submitted type of controller and operator interface.

C. Manufacturer's Instructions: Indicate manufacturer's installation instructions for all manufactured components.

D. Project Record Documents: Record actual locations of control components, including control units, thermostats, and sensors.
1. Revise shop drawings to reflect actual installation and operating sequences.
2. Include submittals data in final "Record Documents" form.

E. Operation and Maintenance Data:
1. Include interconnection wiring diagrams complete field installed systems with identified and numbered, system components and devices.
2. Include keyboard illustrations and step-by-step procedures indexed for each operator function.
3. Include inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.

1.06 QUALITY ASSURANCE

A. Perform work in accordance with NFPA 70.

B. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for purpose specified and indicated.

1.07 OWNERSHIP OF PROPRIETARY MATERIAL

A. Project-specific software and documentation shall become Owner's property. This includes, but is not limited to:
   1. Graphics
   2. Record drawings
   3. Database
   4. Application programming code; software.
   5. Documentation

1.08 DEFINITION

A. BACnet Interoperability Building Blocks (BIBB): A BIBB defines a small portion of BACnet functionality that is needed to perform a particular task. BIBBS are combined to build the BACnet functional requirements for a device in a specification.

B. BACnet/BACnet Standard: BACnet communication requirements as defined by the latest version of ASHRAE/ANSI 135 and approved addenda.

C. Control Systems Server: A computer(s) that maintain(s) the systems configuration and programming database.

D. Controller: Intelligent stand-alone control device. Controller is a generic reference to building controllers, custom application controllers, and application specific controllers.

E. Direct Digital Control: Microprocessor-based control including Analog/Digital conversion and program logic.

F. Gateway: Bi-directional protocol translator connecting control systems that use different communication protocols.

G. Local Area Network: Computer or control system communications network limited to local building or campus.

H. Master-Slave/Token Passing: Data link protocol as defined by the BACnet standard.

I. Point-to-Point Serial communication as defined in the BACnet standard.

J. Primary Controlling LAN: High speed, peer-to-peer controller LAN connecting BCs and optionally AACs and ASCs. Refer to System Architecture below.

K. Protocol Implementation Conformance Statement: A written document that identifies the particular options specified by BACnet that are implemented in a device.

L. Router: A device that connects two or more networks at the network layer.

M. Wiring: Raceway, fittings, wire, boxes and related items.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Automated Logic: www.automatedlogic.com
   1. Local Representative: ACES, Justin Vogt, (314) 722-2727; jmvogt@automaticcontrols.net.

B. Substitutions: See Section 016000 - Product Requirements.

2.02 SYSTEM PERFORMANCE

A. Performance Standards. System shall conform to the following minimum standards over network connections. Systems shall be tested using manufacturer’s recommended hardware and software for operator workstation (server and browser for web-based systems).

1. Graphic Display. A graphic with 20 dynamic points shall display with current data within 10 sec.
2. Graphic Refresh. A graphic with 20 dynamic points shall update with current data within 8 sec.and shall automatically refresh every 15 sec.
3. Configuration and Tuning Screens. Screens used for configuring, calibrating, or tuning points, PID loops, and similar control logic shall automatically refresh within 6 sec.
4. Object Command. Devices shall react to command of a binary object within 2 sec. Devices shall begin reacting to command of an analog object within 2 sec.
5. Alarm Response Time. An object that goes into alarm shall be annunciated at the workstation within 45 sec.
6. Program Execution Frequency. Custom and standard applications shall be capable of running as often as once every 5 sec. Select execution times consistent with the mechanical process under control.
7. Performance. Programmable controllers shall be able to completely execute DDC PID control loops at a frequency adjustable down to once per sec. Select execution times consistent with the mechanical process under control.
8. Multiple Alarm Annunciation. Each workstation on the network shall receive alarms within 5 sec of other workstations.

2.03 MATERIALS

A. Use new products the manufacturer is currently manufacturing and selling for use in new installations. Do not use this installation as a product test site unless explicitly approved in writing by Owner. Spare parts shall be available for at least five years after completion of this contract.

2.04 COMMUNICATION

A. Control products, communication media, connectors, repeaters, hubs, and routers shall comprise a BACnet internetwork. Controller and operator interface communication shall conform to ANSI/ASHRAE Standard 135, BACnet.

B. Install new wiring and network devices as required to provide a complete and workable control network.

C. Use existing Ethernet backbone for network segments marked "existing" on project drawings.

D. Each controller shall have a communication port for temporary connection to a laptop computer or other operator interface. Connection shall support memory downloads and other commissioning and troubleshooting operations.

E. Internetwork operator interface and value passing shall be transparent to internetwork architecture.
   1. An operator interface connected to a controller shall allow the operator to interface with each internetwork controller as if directly connected. Controller information such as data, status, and control algorithms shall be viewable and editable from each internetwork controller.
   2. Inputs, outputs, and control variables used to integrate control strategies across multiple controllers shall be readable by each controller on the internetwork. Program and test all cross-controller links required to execute control strategies specified in Section 23 09 93. An authorized operator shall be able to edit cross-controller links by typing a standard object address or by using a point-and-click interface.

F. Workstations, Building Control Panels, and Controllers with real-time clocks shall use the BACnet Time Synchronization service. System shall automatically synchronize system clocks daily from an operator-designated device via the internetwork. The system shall automatically adjust for daylight saving and standard time as applicable.

G. System shall be expandable to at least twice the required input and output objects with additional controllers, associated devices, and wiring.

H. System shall support Web services data exchange with any other system that complies with XML (extensible markup language) and SOAP (simple object access protocol) standards specified by the Web Services Interoperability Organization(WS-I) Basic Profile 1.0 or higher. Web services support shall as a minimum be provided at the workstation or web server level and shall enable data to be read from or written to the system.
   1. System shall support Web services read data requests by retrieving requested trend data or point values (I/O hardware points, analog value software points, or binary value software points) from any system controller or from the trend history database.
   2. System shall support Web services write data request to each analog and binary object that can be edited through the system operator interface by downloading a numeric value to the specified object.
   3. For read or write requests, the system shall require user name and password authentication and shall support SSL (Secure Socket Layer) or equivalent data encryption.
   4. System shall support discovery through a Web services connection or shall provide a tool available through the Operator Interface that will reveal the path/identifier needed to allow a third party Web services device to read data from or write data to any object in the system which supports this service.

2.05 CONTROLLERS

A. General:
   1. Provide an adequate number of the following as required to achieve performance specified in Section 23 09 23 Article 2.03 (System Performance):
      a. Building Controllers (BC)
      b. Advanced Application Controllers (AAC)
      c. Application Specific Controllers (ASC)
      d. Smart Actuators (SA)
      e. Smart Sensors (SS)
   2. Every device in the system which executes control logic and directly controls HVAC equipment must conform to a standard BACnet Device profile as specified in ANSI/ASHRAE 135, BACnet Annex L.

B. BACnet.
   1. BCs: Each BC shall conform to BACnet Building Controller (B-BC) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L, and shall be listed as a certified B-BC in the BACnet Testing Laboratories (BTL) Product Listing.
   2. AACs: Each AAC shall conform to BACnet Advanced Application Controller (B-AAC) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L and shall be listed as a certified B-AAC in the BTL Product Listing.
   3. ASCs: Each ASC shall conform to BACnet Application Specific Controller (B-ASC) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L and shall be listed as a certified B-ASC in the BTL Product Listing.
   4. SSs: Each SS shall conform to BACnet Smart Sensor (B-SS) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L and shall be listed as a certified B-SS in the BTL Product Listing.
   5. BACnet Communication.
      a. Each BC shall reside on or be connected to a BACnet network using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol and BACnet/IP addressing.
      b. BACnet routing shall be performed by BCs or other BACnet device routers as necessary to connect BCs to networks of AACs and ASCs.
      c. Each AAC shall reside on a BACnet network using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol with BACnet/IP addressing, or it shall reside on a BACnet network using the ARCNET or MS/TP Data Link/Physical layer protocol.
      d. Each ASC shall reside on a BACnet network using the ARCNET or MS/TP Data Link/Physical layer protocol.

e. Each SA shall reside on a BACnet network using the ARCNET or MS/TP Data Link/Physical layer protocol.
f. Each SS shall reside on a BACnet network using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol with BACnet/IP addressing, or it shall reside on a BACnet network using ARCNET or MS/TP Data Link/Physical layer protocol.

C. Communication:
1. Service Port:
a. Each controller shall provide a service communication port for connection to a Portable Operator's Terminal.
1) Connection shall be extended to space temperature sensor ports where shown on drawings.
2. Signal Management:
a. BC and ASC operating systems shall manage input and output communication signals to allow distributed controllers to share real and virtual object information and to allow for central monitoring and alarms.
3. Data Sharing:
a. Each BC and AAC shall share data as required with each networked BC and AAC.
4. Stand-Alone Operation:
a. Each piece of equipment specified in Section 23 09 93 shall be controlled by a single controller to provide stand-alone control in the event of communication failure.
b. All I/O points specified for a piece of equipment shall be integral to its controller. Provide stable and reliable stand-alone control using default values or other method for values normally read over the network such as outdoor air conditions, supply air or water temperature coming from source equipment, etc.

D. Environment:
1. Controller hardware shall be suitable for anticipated ambient conditions:
a. Controllers used outdoors or in wet ambient conditions shall be mounted in waterproof enclosures and shall be rated for operation at -20°F to 140°F.
b. Controllers used in conditioned space shall be mounted in dust-protective enclosures and shall be rated for operation at 32°F to 120°F.

E. Keypad and Display:
1. Provide a local keypad and display for each BC and AAC
2. Use for interrogating and editing data.
3. System security password prevents unauthorized use.

F. Real-Time Clock:
1. Controllers that perform scheduling shall have a real-time clock.

G. Serviceability:
1. Diagnostic LEDs for power, communication, and processor.
2. Make all wiring connections to field removable, modular terminal strips, or to a termination card connected by a ribbon cable.
3. Each BC and AAC shall continually check its processor and memory circuit status and shall generate an alarm on abnormal operation.
4. System shall continuously check controller network and generate alarm for each controller that fails to respond.

H. Memory:
1. Controller memory shall support operating system, database, and programming requirements.
2. Each BC and AAC shall retain BIOS and application programming for at least 72 hours in the event of power loss.
3. Each ASC and SA shall use nonvolatile memory and shall retain BIOS and application programming in the event of power loss. System shall automatically download dynamic control parameters following power loss.

I. Immunity to Power and Noise:
   1. Maintain operation at 90 to 110 percent of nominal voltage rating.
   2. Perform orderly shutdown below 80 percent of nominal voltage.
   3. Operation protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W. at 3 feet.

J. Transformer:
   1. ASC power supply shall be fused or current limiting and shall be rated at a minimum of 125% of ASC power consumption.

2.06 INPUT AND OUTPUT INTERFACE

A. General:
   1. Hard-wire input and output points to BCs, AACs, ASCs, or SAs.

B. Protection:
   1. All input points and output points shall be protected such that shorting of the point to itself, to another point, or to ground shall cause no damage to the controller.
   2. All input and output points shall be protected from voltage up to 24 V of any duration, such that contact with this voltage will cause no controller damage.

C. Binary Inputs.
   1. Allow the monitoring of ON/OFF signals from remote devices.
   2. Provide a wetting current of at least 12 mA to be compatible with commonly available control devices and shall be protected against contact bounce and noise.
   3. Sense dry contact closure without application of power external to the controller.

D. Pulse Accumulation Inputs:
   1. Conform to binary input requirements and shall also accumulate up to 10 pulses per second.

E. Analog Inputs:
   1. Allow for monitoring low-voltage (0-10 Vdc), current (4-20 mA), or resistance (thermistor or RTD) signals.
   2. Compatible with and field configurable to commonly available sensing devices.

F. Binary Outputs:
   1. Used for On/Off operation or a pulsed low-voltage signal for pulse width modulation control.
   2. On building Controllers, outputs provided with three position (On/Off/Auto) override switches.
   3. Status lights for BCs and AACs to be selectable for normally open or normally closed operation.

G. Analog Outputs:
   1. Analog outputs shall not drift more than 0.4% of range annually.
   2. Monitoring signal provides a 0 to 10 VDC or a 4 to 20 mA output signal for end device control.
   3. Each BC and AAC analog output shall have a two-position (auto-manual) switch, a manually adjustable potentiometer for manual override, and status lights.
   4. Drift to not exceed 0.4 percent of range per year.

H. Tri-State Outputs:
   1. Coordinate two binary outputs to control three point, floating type, electronic actuators without feedback.
   2. Limit the use of three point, floating devices to the following zone and terminal unit control applications:
      a. VAV terminal units.
      b. Duct mounted heating coils.
      c. Zone dampers.

d. Radiation.

3. Control algorithms run the zone actuator to one end of its stroke once every 24 hours for verification of operator tracking.

I. System Object Capacity:

1. System size to be expandable to at keast twice the number of input / output objects required providing additional controllers, including associated devices and wiring as necessary to achieve this capacity requirement.
2. Hardware additions or software revisions for the installed operator interfaces are not to be required for future, system expansions.

2.07 AUXILIARY CONTROL DEVICES

A. Refer to Section 230913 - Instrumentation and Control Devices

2.08 WIRING AND RACEWAYS

A. General. Provide copper wiring, plenum cable, and raceways as specified in applicable sections of Division 26.

B. Insulated wire shall use copper conductors and shall be UL listed for 200°F minimum service.

2.09 FIBER OPTIC CABLE SYSTEM

A. Optical Cable. Optical cables shall be duplex 900 mm tight-buffer construction designed for intra-building environments. Sheath shall be UL listed OFNP in accordance with NEC Article 770. Optical fiber shall meet the requirements of FDDI, ANSI X3T9.5 PMD for 62.5/125mm.

B. Connectors. Field terminate optical fibers with ST type connectors. Connectors shall have ceramic ferrules and metal bayonet latching bodies.

PART 3 EXECUTION

3.01 INSTALLERS

A. Installer List:

1. Automatic Controls Equipment Systems, Inc.http://www.automaticcontrols.net
2. Contact: Justin Vogt at 314-722-2972

B. Substitution Limitations: Same as specified for products; see Section 016000 - Product Requirements.

3.02 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that conditioned power supply is available to the control units and to the operator work station. Verify that field end devices, wiring installed prior to installation proceeding.

C. Examine the drawings and specifications for other parts of the work. If head room or space conditions appear inadequatem, or if any discrepancies occur between the plans and the contractor’s work and the plans and the work of others, report these discrepancies to the Owner and shall obtain written instructions for any changes necessary to accommodate the contractor’s work with the work of others. Any changes in the work covered by this specification made necessary by the failure or neglect of the contractor to report such discrepancies shall be made by and at the expense of the contractor.

3.03 PROTECTION

A. The contractor shall protect all work and material from damage by his/her work or employees and shall be liable for all damage thus caused.

B. The contractor shall be responsible for his/her work and equipment until finally inspected, tested, and accepted. The contractor shall protect any material that is not immediately installed. The contractor shall close all open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects.

3.04 COORDINATION

A. Site
   1. Where the mechanical work will be installed in close proximity to, or will interfere with, work of other trades, the contractor shall assist in working out space conditions to make a satisfactory adjustment. If the contractor installs his/her work before coordinating with other trades, so as to cause any interference with work of other trades, the contractor shall make the necessary changes in his/her work to correct the condition without extra charge.
   2. Coordinate and schedule work with other work in the same area and with work dependent upon other work to facilitate mutual progress.

B. Submittals. See Section 230923 Article 1.05 (Submittals).

C. Test and Balance.
   1. Provide a qualified technician to assist in the test and balance process.

D. Life Safety (By Others).
   1. Duct smoke detectors required for air handler shutdown are provided and controled under Division 28.
   2. Smoke dampers and actuators required for duct smoke isolation are provided under Division 23 and are controled under Division 28.
   3. Fire and smoke dampers and actuators required for fire-rated walls are provided under Division 23. Fire and smoke damper control is provided under Division 28.

E. Coordination with controls specified in other sections or divisions. Other sections and/or divisions of this specification include controls and control devices that are to be part of or interfaced to the control system specified in this section. These controls shall be integrated into the system and coordinated by the contractor as follows:
   1. All communication media and equipment shall be provided as specified in Section 230923 Article 2.04 (Communication).
   2. Each supplier of a controls product is responsible for the configuration, programming, start up, and testing of that product to meet the sequences of operation described in Section 230993.
   3. The contractor shall coordinate and resolve any incompatibility issues that arise between control products provided under this section and those provided under other sections or divisions of this specification.
   4. The contractor is responsible for providing all controls described in the contract documents regardless of where within the contract documents these controls are described.
   5. The contractor is responsible for the interface of control products provided by multiple suppliers regardless of where this interface is described within the contract documents.

3.05 GENERAL WORKMANSHIP

A. Install equipment, piping, and wiring/raceway parallel to building lines (i.e. horizontal, vertical, and parallel to walls) wherever possible.

B. Provide sufficient slack and flexible connections to allow for vibration of piping and equipment.

C. Install equipment in readily accessible locations as defined by Chapter 1 Article 100 Part A of the National Electrical Code (NEC).

D. Verify integrity of all wiring to ensure continuity and freedom from shorts and grounds.

E. All equipment, installation, and wiring shall comply with industry specifications and standards for performance, reliability, and compatibility and be executed in strict adherence to local codes and standard practices.

3.06 FIELD QUALITY CONTROL

A. All work, materials, and equipment shall comply with rules and regulations of applicable local, state, and federal codes and ordinances.

B. Contractor shall continually monitor the field installation for code compliance and quality of workmanship.

C. Contractor shall have work inspection by local and/or state authorities having jurisdiction over the work.

3.07 EXISTING EQUIPMENT

A. Wiring. Interconnecting control wiring shall be removed and shall become the property of the contractor unless specifically noted or shown to be reused.

B. Local Control Panels. Remove and deliver existing control panels to Owner.

C. Repair. Unless otherwise directed, the contractor is not responsible for repair or replacement of existing energy equipment and systems, valves, dampers, or actuators. Should the contractor find existing equipment that requires maintenance, the engineer is to be notified immediately.

D. Indicator Gauges. Where these devices remain and are not removed, they must be made operational and recalibrated to ensure reasonable accuracy.

E. Room Thermostats. Remove and deliver existing room thermostats to Owner unless otherwise noted. Patch and finish holes and marks left by removal to match existing walls.

F. Electronic Sensors and Transmitters. Remove and deliver existing sensors and transmitters to Owner.

G. Controllers and Auxiliary Electronic Devices. Remove and deliver existing controllers and auxiliary electronic devices to Owner.

H. Damper Actuators, Linkages, and Appurtenances. Remove and deliver existing damper actuators, linkages and appurtenances to Owner.

I. Control Valves. Replace existing control valves with new. Deliver removed control valves to Owner.

J. Control Compressed Air Systems. Replace existing control compressed air systems with new unless otherwise noted. Deliver removed systems to Owner.

K. Existing System Operating Schedule. Existing mechanical system may be disabled during this work.

L. The scheduling of fans through existing or temporary time clocks or control system shall be maintained throughout the DDC system installation

M. Install control panels where shown.

N. Modify existing starter control circuits, if necessary, to provide hand-off-auto control of each controlled starter. If new starters or starter control packages are required, these shall be included as part of this contract.

O. Patch holes and finish to match existing walls.

3.08 WIRING

A. All control and interlock wiring shall comply with national and local electrical codes, and Division 26 of this specification, Where the requirements of this section differ from Division 26, the requirements of this section shall take precedence.

B. All NEC Class 1 (line voltage) wiring shall be UL listed in approved raceway according to NEC and Division 26 requirements.

C. All low-voltage wiring shall meet NEC Class 2 requirements. Low-voltage power circuits shall be subfused when required to meet Class 2 current limit.

D. Where NEC Class 2 (current-limited) wires are in concealed and accessible locations, including ceiling return air plenums, approved cables not in raceway may be used provided that cables are UL listed for the intended application.

E. All wiring in mechanical, electrical, or service rooms - or where subject to mechanical damage - shall be installed in raceway at levels below 3 m (10ft).

F. Do not install Class 2 wiring in raceways containing Class 1 wiring. Boxes and panels containing high-voltage wiring and equipment may not be used for low-voltage wiring except for the purpose of interfacing the two (e.g. relays and transformers).

G. Do not install wiring in raceway containing tubing.

H. Where Class 2 wiring is run exposed, wiring is to be run parallel along a surface or perpendicular to it and neatly tied at 3 m (10 ft) intervals.

I. Where plenum cables are used without raceway, they shall be supported from or anchored to structural members. Cables shall not be supported by or anchored to ductwork, electrical raceways, piping, or ceiling suspension systems.

J. All wire-to-device connections shall be made at a terminal block or terminal strip. All wire-to-wire connections shall be at a terminal block.

K. All wiring within enclosures shall be neatly bundled and anchored to permit access and prevent restriction to devices and terminals.

L. Maximum allowable voltage for control wiring shall be 120 V. If only higher voltages are available, the contractor shall provide step-down transformers.

M. All wiring shall be installed as continuous lengths, with no splices permitted between termination points.

N. Install plenum wiring in sleeves where it passes through walls and floors. Maintain fire rating at all penetrations.

O. Size of raceway and size and type of wire type shall be the responsibility of the contractor in keeping with the manufacturer’s recommendations and NEC requirements, except as noted elsewhere.

P. Include one pull string in each raceway 2.5 cm (1 in.) or larger.

Q. Use color-coded conductors throughout with conductors of different colors.

R. Control and status relays are to be located in designated enclosures only. These enclosures include packaged equipment control panel enclosures unless they also contain Class 1 starters.

S. Conceal all raceways except within mechanical, electrical, or service rooms. Install raceway to maintain a minimum clearance of 15 cm (6 in.) from high-temperature equipment (e.g. steam pipes or flues).

T. Secure raceways with raceway clamps fastened to the structure and spaced according to code requirements. Raceways and pull boxes may not be hung on flexible duct strap or tie rods. Raceways may not be run on or attached to ductwork.

U. Adhere to this specification's Division 26 requirements where raceway crosses building expansion joints.

V. Install insulated bushings on all raceway ends and openings to enclosures. Seal top end of vertical raceways.

W. The contractor shall terminate all control and/or interlock wiring and shall maintain updated (as-built) wiring diagrams with terminations identified at the job site.

X. Flexible metal raceways and liquid-tight flexible metal raceways shall not exceed 1 m (3 ft) in length and shall be supported at each end. Flexible metal raceway less than ½ in. electrical trade size shall not be used. In areas exposed to moisture, including chiller and boiler rooms, liquid-tight, flexible metal raceways shall be used.

Y. Raceway must be rigidly installed, adequately supported, properly reamed at both ends, and left clean and free of obstructions. Raceway sections shall be joined with couplings (according to code). Terminations must be made with fittings at boxes, and ends not terminating in boxes shall have bushings installed.

3.09 COMMUNICATION WIRING

A. The contractor shall adhere to the items listed in the "Wiring" article in Part 3 of the specification.

B. All cabling shall be installed in a neat and workmanlike manner. Follow manufacturer's installation recommendations for all communication cabling

C. Do not install communication wiring in raceways and enclosures containing Class 1 or other Class 2 wiring.

D. Maximum pulling, tension, and bend radius for the cable installation, as specified by the cable manufacturer, shall not be exceeded during installation.

E. Contractor shall verify the integrity of the entire network following cable installation. Use appropriate test measures for each particular cable.

F. When a cable enters or exits a building, a lightning arrestor must be installed between the lines and ground. The lighting arrestor shall be installed according to manufacturer’s instructions.

G. All runs of communication wiring shall be unspliced length when that length is commercially available.

H. All communication wiring shall be labeled to indicate origination and destination data.

I. Grounding of coaxial cable shall be in accordance with NEC regulations article on "Communications Circuits, Cable, and Protector Grounding."

J. BACnet MS/TP communications wiring shall be installed in accordance with ASHRAE/ANSI Standard 135. This includes but is not limited to:
   1. The network shall use shielded, twisted-pair cable with characteristic impedance between 100 and 120 ohms. Distributed capacitance between conductors shall be less than 100 pF per meter (30 pF per foot.)
   2. The maximum length of an MS/TP segment is 1200 meters (4000 ft) with AWG 18 cable. The use of greater distances and/or different wire gauges shall comply with the electrical specifications of EIA-485.
   3. The maximum number of nodes per segment shall be 32, as specified in the EIA 485 standard. Additional nodes may be accommodated by the use of repeaters.
   4. An MS/TP EIA-485 network shall have no T connections.

3.10 FIBER OPTIC CABLE

A. Maximum pulling tensions as specified by the cable manufacturer shall not be exceeded during installation. Post-installation residual cable tension shall be within cable manufacturer's specifications.

B. All cabling and associated components shall be installed in accordance with manufacturers' instructions. Minimum cable and unjacketed fiber bend radii, as specified by cable manufacturer, shall be maintained.

3.11 INSTALLATION

A. Install control units and other hardware in position on permanent walls where not subject to excessive vibration.

B. Install software in control units and in operator work station. Implement all features of programs to specified requirements and appropriate to sequence of operation. Refer to Section 230993.

C. Provide with 120v AC, 15 amp dedicated emergency power circuit to each programmable control unit.

D. Provide conduit and electrical wiring in accordance with Section 260583. Electrical material and installation shall be in accordance with appropriate requirements of .

3.12 MANUFACTURER'S FIELD SERVICES

A. Start and commission systems. Allow sufficient time for start-up and commissioning prior to placing control systems in permanent operation.

3.13 WARNING LABELS

A. Permanent warning labels shall be affixed to all equipment that can be automatically started by the control system.
   1. Labels shall use white lettering (12-point type or larger) on a red background.
   2. Warning labels shall read as follows.

C A U T I O N

THIS EQUIPMENT IS OPERATING UNDER AUTOMATIC CONTROL AND MAY START OR STOP AT ANY TIME WITHOUT WARNING. SWITCH DISCONNECT TO"OFF"POSITION BEFORE SERVICING.

B. Permanent warning labels shall be affixed to all motor starters and control panels that are connected to multiple power sources utilizing separate disconnects.
   1. Labels shall use white lettering (12-point type or larger) on a red background.
   2. Warning labels shall read as follows.

C A U T I O N

THIS EQUIPMENT IS FED FROM MORE THAN ONE POWER SOURCE WITH SEPARATE DISCONNECTS. DISCONNECT ALL POWER SOURCES BEFORE SERVICING.

3.14 IDENTIFICATION OF HARDWARE AND WIRING

A. All wiring and cabling, including that within factory-fabricated panels shall be labeled at each end within 5 cm (2 in.) of termination with control system address or termination number.

B. All pneumatic tubing shall be labeled at each end within 5 cm (2 in.) of termination with a descriptive identifier.

C. Permanently label or code each point of field terminal strips to show the instrument or item served.

D. Identify control panels with minimum 1 cm (½ in.) letters on laminated plastic nameplates.

E. Identify all other control components with permanent labels. All plug-in components shall be labeled such that label removal of the component does not remove the label.

F. Identify room sensors related to terminal boxes or valves with nameplates.

G. Manufacturers' nameplates and UL or CSA labels shall be visible and legible after equipment is installed.

H. Identifiers shall match record documents.

3.15 CONTROLLERS

A. Provide a separate controller for each AHU or other HVAC system. A DDC controller may control more than one system provided that all points associated with the system are assigned to the same DDC controller. Points used for control loop reset, such as outside air or space temperature, are exempt from this requirement.

B. Building Controllers and Custom Application Controllers shall be selected to provide the required I/O point capacity required to monitor all of the hardware points listed in Section 230993 (Sequences of Operation).

3.16 PROGRAMMING

A. Provide sufficient internal memory for the specified sequences of operation and trend logging.

B. Point Naming. Name points as shown on the equipment points list provided with each sequence of operation. See Section 230993 (Sequences of Operation). If character limitations or space restrictions make it advisable to shorten the name, the abbreviations given in Appendix B to Section 230993 may be used. Where multiple points with the same name reside in the same controller, each point name may be customized with its associated Program Object number. For example, "Zone Temp 1" for Zone 1, "Zone Temp 2" for Zone 2.

C. Software Programming.
   1. Provide programming for the system and adhere to the sequences of operation provided. All other system programming necessary for the operation of the system, but not specified in this document, also shall be provided by the contractor. Embed into the control program sufficient comment statements to clearly describe each section of the program. The comment statements shall reflect the language used in the sequences of operation. Use the appropriate technique based on the following programming types:
      a. Text-based:
         1) Must provide actions for all possible situations
         2) Must be modular and structured
         3) Must be commented
      b. Graphic-based:
         1) Must provide actions for all possible situations
         2) Must be documented
      c. Parameter-based:
         1) Must provide actions for all possible situations
         2) Must be documented.

D. Operator Interface.
   1. Standard Graphics. Provide graphics for all mechanical systems and floor plans of the building. This includes each chilled water system, hot water system, chiller, boiler, air handler, and all terminal equipment. Point information on the graphic displays shall dynamically update. Show on each graphic all input and output points for the system. Also show relevant calculated points such as setpoints. As a minimum, show on each equipment graphic the input and output points and relevant calculated points as indicated on the applicable Points List in Section 230993.
   2. The contractor shall provide all the labor necessary to install, initialize, start up, and troubleshoot all operator interface software and its functions as described in this section. This includes any operating system software, the operator interface database, and any third-party software installation and integration required for successful operation of the operator interface.

3.17 CONTROL SYSTEM CHECKOUT AND TESTING

A. Startup Testing. All testing listed in this article shall be performed by the contractor and shall make up part of the necessary verification of an operating control system. This testing shall be completed before the owner’s representative is notified of the system demonstration.
   1. The contractor shall furnish all labor and test apparatus required to calibrate and prepare for service of all instruments, controls, and accessory equipment furnished under this specification.
   2. Verify that all control wiring is properly connected and free of all shorts and ground faults. Verify that terminations are tight.
   3. Enable the control systems and verify calibration of all input devices individually. Perform calibration procedures according to manufacturers’ recommendations.
   4. Verify that all binary output devices (relays, solenoid valves, two-position actuators and control valves, magnetic starters, etc.) operate properly and that the normal positions are correct.

5. Verify that all analog output devices (I/Ps, actuators, etc.) are functional, that start and span are correct, and that direction and normal positions are correct. The contractor shall check all control valves and automatic dampers to ensure proper action and closure. The contractor shall make any necessary adjustments to valve stem and damper blade travel.
6. Verify that the system operation adheres to the sequences of operation. Simulate and observe all modes of operation by overriding and varying inputs and schedules. Tune all DDC loops.
7. Alarms and Interlocks:
    a. Check each alarm separately by including an appropriate signal at a value that will trip the alarm.
    b. Interlocks shall be tripped using field contacts to check the logic, as well as to ensure that the fail-safe condition for all actuators is in the proper direction.
    c. Interlock actions shall be tested by simulating alarm conditions to check the initiating value of the variable and interlock action

3.18 CLEANING

A. The contractor shall clean up all debris resulting from his/her activities daily. The contractor shall remove all cartons, containers, crates, etc., under his/her control as soon as their contents have been removed. Waste shall be collected and placed in a designated location.

B. At the completion of work in any area, the contractor shall clean all work, equipment, etc., keeping it free from dust, dirt, and debris, etc.

C. At the completion of work, all equipment furnished under this section shall be checked for paint damage, and any factory-finished paint that has been damaged shall be repaired to match the adjacent areas. Any cabinet or enclosure that has been deformed shall be replaced with new material and repainted to match the adjacent areas.

3.19 TRAINING

A. Provide training for a designated staff of Owner’s representatives. Training shall be provided via self-paced training, web-based or computer-based training, classroom training, or a combination of training methods.

3.20 CONTROLS COMMUNICATION PROTOCOL

A. General. The electronic controls packaged with this equipment shall communicate with the building direct digital control (DDC) system. The DDC system shall communicate with these controls to read the information and change the control setpoints as shown in the points list, sequences of operation, and control schematics. The information to be communicated between the DDC system and these controls shall be in the standard object format as defined in ANSI/ASHRAE Standard 135 (BACnet). Controllers shall communicate with other BACnet objects on the internetwork using the Read (Execute) Property service as defined in Clause 15.5 of Standard 135.

B. Distributed Processing. The controller shall be capable of stand-alone operation and shall continue to provide control functions if the network connection is lost.

C. I/O Capacity. The controller shall contain sufficient I/ O capacity to control the target system.

D. The Controller shall have a physical connection for a laptop computer or a portable operator’s tool.

E. Environment. The hardware shall be suitable for the anticipated ambient conditions.
    1. Controllers used outdoors and/or in wet ambient conditions shall be mounted within waterproof enclosures and shall be rated for operation at 40°C to 60°C (40°F to 140°F).
    2. Controllers used in conditioned space shall be mounted in dust-proof enclosures and shall be rated for operation at 0°C to 50°C (32°F to 120°F).

F. Serviceability. Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to field removable, modular terminal strips or to a termination card connected by a ribbon cable.

G. Memory. The Controller shall maintain all BIOS and programming information in the event of a power loss for at least 30 days.

H. Power. Controller shall be able to operate at 90% to 110% of nominal voltage rating.

I. Transformer. Power supply for the Controller must be rated at minimum of 125% of ASC power consumption and shall be fused or current limiting type.

3.21 START-UP AND CHECKOUT PROCEDURES

A. Start up, check out, and test all hardware and software and verify communication between all components.
   1. Verify that all control wiring is properly connected and free of all shorts and ground faults. Verify that terminations are tight.
   2. Verify that all analog and binary input/output points read properly.
   3. Verify alarms and interlocks.
   4. Verify operation of the integrated system.

3.22 SEQUENCES OF OPERATION

A. See Section 230993 - Sequences of Operation, With Points Lists.

END OF SECTION 230923

SECTION 230934
VARIABLE-FREQUENCY MOTOR CONTROLLERS FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Variable-frequency motor controllers for low-voltage (600 V and less) AC motor applications.

B. Overcurrent protective devices for motor controllers, including overload relays.

1.02 RELATED REQUIREMENTS

A. Section 230553 - Identification for HVAC Piping and Equipment: Identification products and requirements.

B. Section 260526 - Grounding and Bonding for Electrical Systems.

C. Section 262813 - Fuses.

1.03 REFERENCE STANDARDS

A. IEC 60529 - Degrees of Protection Provided by Enclosures (IP Code).

B. NEMA BS 31047 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum).

C. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

D. NEMA IA 10030 - Industrial Control and Systems: Enclosures.

E. NEMA ICS 61800-2 - Adjustable Speed Electrical Power Drive Systems, Part 2: General Requirements-Rating Specifications for Low Voltage Adjustable Frequency AC Power Drive Systems.

F. NEMA IS 10033 - Industrial Control and Systems: Adjustable-Speed Drives.

G. NEMA IS 10034 - Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable Speed Drive Systems.

H. NEMA IS 10035 - Application Guide for AC Adjustable Speed Drive Systems.

I. NEMA MG 00001 - Motors and Generators.

J. NETA ATS - Standard for Acceptance Testing Specifications for Electrical Power Equipment And Systems.

K. NFPA 70 - National Electrical Code.

L. UL 98 - Enclosed and Dead-Front Switches.

M. UL 508A - Industrial Control Panels.

N. UL 61800-5-1 - Standard for Adjustable Speed Electrical Power Drive Systems - Part 5-1: Safety Requirements – Electrical, Thermal, and Energy (Ed. 2).

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. ABB: www.abb.com/#sle.

B. Danfoss: www.danfoss.com/#sle.

C. Schneider Electric: www.se.com/#sle.

D. Yaskawa America, Inc; : www.yaskawa.com/#sle.

E. Substitutions: See Section 016000 - Product Requirements.

2.02 VARIABLE-FREQUENCY MOTOR CONTROLLERS

A. Provide variable-frequency motor control system consisting of required controller assemblies, operator interfaces, control power transformers, instrumentation and control wiring, sensors, accessories, system programming, etc. as necessary for complete operating system.

B. Provide products listed, classified, and labeled as suitable for purpose intended.

C. Variable-Frequency Motor Controller:

D. Controller Assemblies: Comply with NEMA IS 10033, NEMA IS 10034, and NEMA ICS 61800-2; list and label as complying with UL 61800-5-1 or UL 508A as applicable.

E. Provide controllers selected for actual installed motors and coupled mechanical loads in accordance with NEMA IS 10035, NEMA MG 00001 Part 30, and recommendations of manufacturers of both controller and load, where not in conflict with specified requirements; considerations include, but are not limited to:
   1. Motor type (e.g., induction, reluctance, and permanent magnet); consider NEMA MG 00001 design letter or inverter duty rating for induction motors.
   2. Motor load type (e.g., constant torque, variable torque, and constant horsepower); consider duty cycle, impact loads, and high inertia loads.
   3. Motor nameplate data.
   4. Requirements for speed control range, speed regulation, and braking.
   5. Motor suitability for bypass starting method, where applicable.

F. Devices on Load Side of Controller: Suitable for application across full controller output frequency range.

G. Operating Requirements:
   1. Input Voltage Tolerance: Plus/minus 10 percent of nominal.
   2. Input Frequency Tolerance: Plus/minus 5 percent of nominal.
   3. Efficiency: Minimum of 96 percent at full speed and load.
   4. Input Displacement Power Factor: Minimum of 0.96 throughout speed and load range.
   5. Overload Rating:
      a. Variable Torque Loads: Minimum of 110 percent of nominal for 60 seconds.
      b. Constant Torque Loads: Minimum of 150 percent of nominal for 60 seconds.

H. Power Conversion System: Microprocessor-based, pulse width modulation type.

I. Control System:
   1. Provide microprocessor-based control system for automatic control, monitoring, and protection of motors. Include sensors, wiring, and connections necessary for functions and status/alarm indications specified.
   2. Provide integral operator interface for controller programming, display of status/alarm indications, fault reset, and local control functions including motor run/stop, motor forward/reverse selection, motor speed increase/decrease, and local/remote control selection.
   3. Control Functions:
      a. Control Method: Selectable vector and scalar/volts per hertz unless otherwise indicated.
         1) Scalar/Volts per Hertz Control: Provide IR compensation for improved low-speed torque.
         2) Vector Control: Provide selectable autotuning function.
      b. Adjustable acceleration and deceleration time; linear and S-curve ramps; selectable coast to stop.
      c. Selectable braking control; DC injection or flux braking.
      d. Adjustable minimum/maximum speed limits.
      e. Adjustable pulse width modulation switching carrier frequency.
      f. Adjustable motor slip compensation.

g. Selectable autorestart after noncritical fault; programmable number of time delay between restart attempts.

4. Status Indications:
   a. Motor run/stop status.
   b. Motor forward/reverse status.
   c. Local/remote control status.
   d. Output voltage.
   e. Output current.
   f. Output frequency.
   g. DC bus voltage.
   h. Motor speed.
5. Protective Functions/Alarm Indications:
   a. Overcurrent.
   b. Motor overload.
   c. Undervoltage.
   d. Overvoltage.
   e. Controller overtemperature.
   f. Input/output phase loss.
   g. Output short circuit protection.
   h. Output ground fault protection.
6. Inputs:
   a. Digital Input(s): Three.
   b. Analog Input(s): Two.
7. Outputs:
8. Communications: Compatible with connected systems. Provide accessories necessary for proper interface.
9. Features:
   a. Password-protected security access.
   b. Event log.

J. Power Conditioning/Filtering:
   1. Provide DC link choke or input/line reactor for each controller unless otherwise indicated or required.
   2. Reactor Impedance: 3 percent, unless otherwise indicated or required.

K. Packaged Controllers: Controllers factory-mounted in separate enclosure with externally operable disconnect and specified accessories.
   1. Disconnects: Circuit breaker or disconnect switch type.
      a. Disconnect Switches: Fusible type or nonfusible type with separate input fuses.
      b. Provide externally operable handle with means for locking in OFF position. Provide safety interlock to prevent opening cover with disconnect in ON position with capability of overriding interlock for testing purposes.
      c. Provide auxiliary interlock for disconnection of external control power sources where applicable.
   2. Provide door-mounted remote operator interface.

L. Service Conditions:
   1. Provide controllers and associated components suitable for operation under following service conditions without derating:
      a. Altitude: Less than 3,300 feet.
      b. Ambient Temperature: Between 32 degrees F and 104 degrees F.
   2. Provide controllers and associated components suitable for operation at indicated ratings under service conditions at installed location.

M. Short Circuit Current Rating:

1. Provide controllers with listed short circuit current rating not less than available fault current at installed location as indicated on drawings.
2. Provide line/input reactors where specified by manufacturer for required short circuit current rating.

N. Conductor Terminations: Suitable for use with conductors to be installed.

O. Enclosures:
1. Comply with NEMA IA 10030.
2. NEMA EN 10250 Environment Type or Equivalent IEC 60529 Rating: Unless otherwise indicated, as specified for following installation locations:
3. Finish: Manufacturer's standard unless otherwise indicated.
4. Cooling: Forced air or natural convection as determined by manufacturer.

P. Interface with Other Work:
1. Provide products compatible with other systems requiring interface with controllers.

2.03 OVERCURRENT PROTECTIVE DEVICES

A. Fusible Disconnect Switches:
1. Description: Quick-make, quick-break, dead-front fusible switch units complying with NEMA BS 31047, and listed and labeled as complying with UL 98; ratings, configurations, and features as indicated or as required.
2. Fuse Clips: As required to accept indicated fuses.
3. Provide externally operable handle with means for locking in OFF position. Provide means for locking switch cover in closed position. Provide safety interlock to prevent opening of cover with switch in ON position with capability of overriding interlock for testing purposes.

2.04 SOURCE QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Factory test controllers in accordance with NEMA ICS 61800-2.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that ratings of controllers are consistent with indicated requirements.

C. Verify that mounting surfaces are ready to accept controllers.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

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

B. Install in accordance with NEMA IS 10034 and manufacturer's instructions.

C. Do not exceed manufacturer's recommended maximum cable length between controller and motor.

D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

E. Install controllers plumb and level.

F. Provide grounding and bonding in accordance with Section 260526.

G. Install field-installed devices, components, and accessories.

H. Provide fuses complying with Section 262813 for fusible switches as indicated.

I. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.

J. Set field-adjustable settings of controllers and associated components according to installed motor requirements, in accordance with recommendations of manufacturers of controller and load.

3.03 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.17. Insulation-resistance test on control wiring listed as optional is not required.

C. Fusible Switches: Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.

D. Correct deficiencies and replace damaged or defective controllers or associated components.

3.04 CLOSEOUT ACTIVITIES

A. See Section 017800 - Closeout Submittals, for closeout submittals.

B. See Section 017900 - Demonstration and Training, for additional requirements.

3.05 PROTECTION

A. Protect installed controllers from subsequent construction operations.

END OF SECTION 230934

SECTION 230993
SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section defines the manner and method by which controls function. Requirements for each type of control system operation are specified. Equipment, devices, and system components required for control systems are specified in other sections.

B. Sequence of operation for:

1.02 RELATED REQUIREMENTS

A. Section 230913 - Instrumentation and Control Devices for HVAC.

B. Section 230923 - Direct-Digital Control System for HVAC.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Submit all submittal documents listed in this Section under Section 230923 - Direct-Digital Control System for HVAC.

C. Sequence of Operation Documentation: Submit written sequence of operation for entire HVAC system and each piece of equipment.
   1. Preface: 1 or 2 paragraph overview narrative of the system describing its purpose, components and function.
   2. State each sequence in small segments and give each segment a unique number for referencing in Functional Test procedures; provide a complete description regardless of the completeness and clarity of the sequences specified in Contract Documents.
   3. Include at least the following sequences:
      a. Start-up.
      b. Warm-up mode.
      c. Normal operating mode.
      d. Unoccupied mode.
      e. Shutdown.
      f. Capacity control sequences and equipment staging.
      g. Temperature and pressure control, such as setbacks, setups, resets, etc.
      h. Detailed sequences for all control strategies, such as economizer control, optimum start/stop, staging, optimization, demand limiting, etc.
      i. Effects of power or equipment failure with all standby component functions.
      j. Sequences for all alarms and emergency shut downs.
      k. Seasonal operational differences and recommendations.
      l. Interactions and interlocks with other systems.
   4. Include initial and recommended values for all adjustable settings, setpoints and parameters that are typically set or adjusted by operating staff; and any other control settings or fixed values, delays, etc. that will be useful during testing and operating the equipment.
   5. For packaged controlled equipment, include manufacturer's furnished sequence of operation amplified as required to describe the relationship between the packaged controls and the control system, indicating which points are adjustable control points and which points are only monitored.
   6. Include schedules, if known.

D. Control System Diagrams: Submit graphic schematic of the control system showing each control component and each component controlled, monitored, or enabled.
   1. Label with settings, adjustable range of control and limits.
   2. Include flow diagrams for each control system, graphically depicting control logic.

3. Include the system and component layout of all equipment that the control system monitors, enables or controls, even if the equipment is primarily controlled by packaged or integral controls.
4. Include draft copies of graphic displays indicating mechanical system components, control system components, and controlled function status and value.
5. Include all monitoring, control and virtual points specified in elsewhere.
6. Include a key to all abbreviations.

E. Points List: Submit list of all control points indicating at least the following for each point.
1. Name of controlled system.
2. Point abbreviation.
3. Point description; such as dry bulb temperature, airflow, etc.
4. Display unit.
5. Control point or setpoint (Yes / No); i.e. a point that controls equipment and can have its setpoint changed.
6. Monitoring point (Yes / No); i.e. a point that does not control or contribute to the control of equipment but is used for operation, maintenance, or performance verification.
7. Intermediate point (Yes / No); i.e. a point whose value is used to make a calculation which then controls equipment, such as space temperatures that are averaged to a virtual point to control reset.
8. Calculated point (Yes / No); i.e. a “virtual” point generated from calculations of other point values.

F. Project Record Documents: Record actual locations of components and setpoints of controls, including changes to sequences made after submission of shop drawings.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 COOLING PLANT SYSTEMS

A. System General Description:
1. The cooling plant control system shall monitor and control the system's chiller(s), pump(s), cooling tower(s) and control valves as shown on the cooling plant flow diagram, on the cooling plant points list and as detailed in the sequence of operation listed below.
2. The cooling plant system consists of water-cooled chiller(s) with its piping configuration arranged as a primary / secondary loop supplying chilled water to the facility.
3. The cooling system includes ice thermal storage.
4. The manifolded chilled water distribution pumps are configured as lead / lag control. The manifolded condenser water pump(s) are configured as lead / lag control and are able to supply condenser water flow between any cooling tower and any chiller that has been enabled for operation by the system.

B. Cooling Plant System Enable/Disable:
1. The cooling plant system shall be enabled/disabled by the cooling plant controller as requested by the Building Automation System (BAS) operator interface panel or the BAS time of day schedule. The cooling plant control system shall start and stop the chilled water pumps and chillers based upon system load.
2. When the cooling plant system is enabled the system shall enable the lead secondary chilled water pump to start based on a call for cooling from the BAS. When flow status for the pump is proven, the system shall report running status to the BAS.
3. When the cooling plant system is enabled the system shall send an enable signal to the lead chiller. Upon receiving the enable signal the chiller shall send a chilled water pump request signal to the control system to enable the chilled water pumping sequence.

4. When the cooling plant system is enabled, the system shall respond to a chilled water pump request from any system chiller. The system shall command the associated chilled water isolation valve open and enable the lead primary chilled water pump to start. As additional chillers make chilled water pump requests, open the associated chilled water isolation valve and enable the next [lag] primary chilled water pump to start.
5. When the cooling plant system is enabled, the system controller shall also enable the condenser water system to maintain the condenser water temperature to its setpoint. Refer to condenser water and cooling tower sequences of this document for detailed operation of these systems.
6. The cooling plant is disabled when all chillers are disabled and there is not an active chilled water pump request. When the plant is disabled, the chilled water pumps shall be commanded off and the chiller isolation valves shall be closed.

C. Chiller Staging:
1. Chillers shall operate in a lead/lag sequence, so that the last chiller enabled is the first to be disabled. The cooling plant system shall initiate the start of the next chiller in the sequence whenever adding the next chiller in the sequence shall result in lower total power, (as determined by chiller characteristics, plant load, and operating conditions) and have been satisfied for 20 minutes (adj.) or whenever the chilled water load, as determined by the system supply water temperature, is not met for 20 minutes (adj.). The system shall initiate the shutdown of the next chiller in the sequence whenever excess chilled water capacity exists, as determined a real time load calculation, AND the shutdown of the next chiller in the sequence shall result in lower total power, (as determined by chiller characteristics, plant load, and operating conditions) have been satisfied for 20 minutes (adj.). Chiller lead/lag sequence order shall be based on a round robin logic. (Round robin logic example: 1-2-3, then 2-3-1, then 3-1-2, then 1-2-3, etc.).
2. The chiller sequence order can be rotated on a schedule. Chiller rotations shall be programmed to occur at one of the following operator-defined intervals:
   a. NEVER: Chillers shall always have the same sequence number.
   b. DAY OF WEEK: Chillers shall rotate on a user-specified day and time once per week.
   c. FIXED NUMBER OF DAYS: Chillers shall rotate after the number of days specified has elapsed.
   d. RUN HOURS: Chillers rotate to attempt to even out the amount of time each chiller runs. When any chiller reaches the user-defined run hours setpoint (which is measured only from the last rotation), the system controller can re-sequence the chillers, if necessary, to put the chiller with the least total run hours into a higher-use position in the sequence.
   e. ROTATIONAL INPUT: Chillers shall rotate when the specified reference commands them to rotate.
3. From the BAS operator interface, an operator shall be able to manually change the lead/lag sequence or request any chiller to be unavailable which would remove it from the rotation sequence.

D. **Chiller Isolation Valves:**
1. Chiller isolation valves shall prevent the flow of fluid through non-operating chillers. When the system receives a chiller water pump request from a chiller, the chiller isolation valve shall be controlled to 100% open. Chiller isolation valve stroke time shall be (60-120) seconds (adj.) to reduce operating chiller flow transients. When the valve is confirmed to be 100% open the system shall start the respective chilled water and condenser water pumps. If the chiller's isolation valve is not confirmed open after (valve stroke time plus 60 sec) 180 seconds (adj.), the system shall annunciate a chiller isolation valve failure alarm to the BAS operator interface.

E. **Series Ice Storage Downstream of Chiller - Operating Modes**

1. The purpose of the ice thermal storage operation is to carry all or part of the facilities cooling load when possible. Sufficient ice thermal storage capacity and duration is a function of the thermal storage device and the building load. When ice thermal storage is used in this configuration it is expected that the recirculating fluid throughout the system is a glycol mixture.
2. The ice storage / series chiller operation modes are as follows:
    a. CHILLER ONLY COOLING
    b. ICE STORAGE ONLY COOLING
    c. SIMULTANEOUS CHILLER and ICE COOLING
    d. ICE MAKING
    e. MAKING ICE AND COOLING
    f. SYSTEM OFF (Tanks Secured)
3. There are two control valves specifically related to the series ice storage mode of operation.
4. The ice storage mixing valve is used to maintain temperature as the tanks discharge. The ice mode valve shall be positioned based on the mode of operations listed below. These valves shall be positioned for temperature and mode control as detailed in the sequences of each mode listed below.
5. CHILLER ONLY COOLING MODE:
    a. When the system controller determines that this mode is preferred, the control system shall enable chiller only cooling and disable the ice storage cooling.
    b. The Chiller Minimum Flow Bypass Valve shall be modulated to maintain the minimum operating flow through the chiller evaporator.
    c. The ice storage mixing valve shall fully bypass the thermal storage tanks, the ice storage mode valve shall open to the building load.
    d. The chiller(s) shall be enabled to maintain the chilled water setpoint, the primary and secondary pumps shall operate as described in their respective pumping sequences of this document.
6. ICE STORAGE ONLY COOLING MODE:
    a. When the system controller determines that this mode is preferred, the control system shall enable ice storage only cooling and disable the chiller cooling. When all chillers have been disabled and there is not an active chilled water pump request, the chiller chilled water bypass valve shall open and the chiller's manifold chilled water pump(s) shall remain running to allow full chilled water flow around the chillers. The ice storage mode valve shall be positioned to supply chilled water to the building and the ice storage mixing control valve shall modulate to supply 42 deg. F (adj.) chilled water to the building load.
    b. If indications are that ice may be running out prior to the end of the on-peak period an alarm shall be generated and simultaneous chiller cooling and ice tank Cooling shall be enabled.
7. SIMULTANEOUS CHILLER AND ICE COOLING MODE:
    a. When the system controller determines that this mode is preferred, the control system shall enable both chiller and ice tank discharge control, the system pump(s) shall be enabled if not already enabled, and the and the ice storage mixing valve shall modulate to maintain 42 deg. F (adj.) to the building load.
    b. The cooling plant control system shall limit the chiller capacity to meet the Demand Limit strategy.
    c. If the ice tank supply temperature reaches its high limit (xx) deg. F (adj.) for 5-minutes, then the ice mixing valve shall bypass the ice storage tanks and an alarm shall be generated at the BAS operator interface. The plant shall transition into chiller only cooling mode of operation.

d. The system controller shall monitor the target discharge rate, the chiller minimum flow, the chiller minimum load, and the building load to determine whether to stay in simultaneous chiller and ice cooling mode or transition to either chiller only or ice only cooling modes.
e. Primary and secondary chilled water pumps shall be controlled as called out in the pump sequences below.

8. ICE MAKING MODE:
   a. When ice making mode is scheduled, and when tank inventory is below 80% (adj.) (note: 80% is high limit) the ice storage mode valve shall be positioned to bypass the building load and provide full flow back to the to the chillers. The ice mixing valve shall modulate to full flow through the tanks, the pump(s) shall be enabled if not already enabled, the variable speed drive(s) set to ice making GPM, and once chiller flow is proven the chiller shall be enabled in its ice making mode. The chiller shall operate in the ice making mode until the ice making period expires or the return temperature from the ice tank(s) drops below 27 deg. F (adj.) indicating the tanks are fully charged. There shall be a 5-minute delay (adj.) before transitioning out of the ice making mode.
   b. Note: When tank inventory is below 5% at the beginning of the ice making mode, the ice tank leaving temperatures may drop below 27 deg. F within the initial first 1- 2 hours of ice making. To avoid premature false terminations the system shall ignore these low temperature readings for the first 2-hours (adj.) of ice making, when starting with low ice inventory,
9. MAKING ICE AND COOLING MODE:
   a. This mode occurs on a call for cooling during the ice making mode, the ice storage mode valve shall slowly modulate to a position to allow a minimal amount of chilled water to flow to the building loop while a majority of the flow recirculates back to the chillers to continue to ice making. The ice storage mode valve shall continue to modulate its position to control the chilled water supply temperature to it's setpoint. The amount of flow sent through the mode valve to the building shall be limited by the chiller leaving temperature, to continue to efficiently make ice. (Note: It is recommended that this is a slow responding control loop to prevent upsets in the ice making process.)
   b. If the ice making mode ends prior to full charge of thermal storage tanks an alarm shall be generated and the chiller shall continue to run. If during this mode no further building cooling is required the mode shall switch back to ice making only mode.
   c. If both the ice making has completed and there is no call for building cooling the system shall switch to the off mode.
10. SYSTEM OFF (Storage Tanks Secured):
   a. When cooling is not required, and other modes have been satisfied the cooling plant controller shall transition to ice storage system off mode. After 5 minutes (adj.) the ice storage mixing valve shall bypass the ice tanks and the ice storage mode valve shall be positioned to full flow to the building load.

F. Primary Chilled Water Pump Commands:
   1. When the chilled water system is enabled, the system shall start a chilled water pump through a contact closure of the pumps motor starter enable contacts. The system shall detect primary chilled water pump run status by a current switch.
   2. The manifolded primary chilled water pumps shall operate in a lead/lag sequence that shall be rotated on a weekly schedule. The rotation sequence shall be based on calculated run time with the pump having the least run time designated as lead, the pump with the next lowest run time shall be the second in the sequence (or lag pump) and so on. From the BAS operator interface, an operator shall be able to manually change the lead/lag sequence or request any pump to be unavailable which would remove it from the rotation sequence.

G. Primary Chilled Water Pump Failure:

1. If the lead start/stop relay is enabled and the pump's running status is off for more than 30 seconds (adj.), the system shall annunciate a chilled water pump failure alarm to the BAS and start the next pump in the sequence. Once the problem has been corrected, the operator shall be able to clear the alarm failure from the BAS operator interface or by manually overriding the pump on. This shall re-enable the lead/standby sequence.

H. Primary Chilled Water Pump Commands:
   1. The system shall start a secondary chilled water pump through a contact closure of the pump's variable speed drive run-enable contacts. The system shall detect secondary chilled water pump run status by a variable speed drive current switch.
   2. The secondary chilled water pump(s) lead/lag sequence shall be rotated on a weekly schedule. The rotation sequence shall be based on calculated run time with the pump having the least run time designated as lead, the pump with the next lowest run time shall be the second in the sequence (or lag pump) and so on. From the BAS operator interface, an operator shall be able to manually change the lead/lag sequence or request any pump to be unavailable which would remove it from the rotation sequence.
   3. If the chilled water system differential pressure falls 0.5 psig (adj.) below setpoint and the lead pump is at 100% (adj.) for more than 5 minutes (adj.), the next pump in the sequence shall start. If the pump speed control output is below 65% (adj.) for more than 5 minutes (adj.), the last operating pump in the sequence shall be disabled.

I. Secondary Chilled Water Pump Speed:
   1. The system shall monitor the secondary chilled water system differential pressure sensor. When the pump variable speed drive is enabled, the system shall control the analog speed signal that is sent to the variable speed drives of operating pumps to maintain a chilled water system differential pressure setpoint of 15 psig (adj.).

J. Secondary Chilled Water Pump Failure:
   1. If the lead start/stop relay is enabled and the pump's running status is off for more than 30 seconds (adj.), the system shall annunciate a secondary chilled water pump failure alarm to the BAS and start the lag pump. When a secondary chilled water pump failure exists, lead/lag/standby automation shall be disabled and the currently running pump becomes the lead pump. Once the problem has been corrected, the operator shall be able to clear the alarm failure from the BAS operator interface. This shall re-enable the lead/lag/standby sequence.

K. Optimized Distribution Pump Differential Pressure Control:
   1. The system shall monitor the chilled water system differential pressure sensor. The system shall control the chilled water pump(s) variable speed drive to maintain the chilled water system differential pressure to its setpoint. The BAS shall monitor the position of all chilled water control valves served by the cooling plant. At chilled water system startup, the chilled water system pressure setpoint shall be set to the system design value of XX psi (adj). In all cases the distribution pump(s) differential pressure setpoint shall be bound between a minimum of 30 psi (adj) and a maximum of the system design value.
   2. The setpoint control shall be based on ASHRAE Guideline 36 "Trim and Respond Logic": At a frequency of once every 10 minutes (adj), the control system shall calculate requests for cooling based on the criteria shown below:
      a. The air handler unit (AHU) other equipment served by the cooling plant has been running in a Cooling Mode for 15 minutes (adj).
      b. If an AHU's (or other equipment) chilled water valve is greater than 95%, send 1 request until the chilled water valve is less than 70%.
      c. If an AHU's (or other equipment) chilled water valve is serving a critical load (i.e data center) , send 2 requests (adj) if an AHU's chilled water valve is greater than 95%, send 1 request when the chilled water valve is between 80% and 95%. Send zero requests when the chilled water valve is less than 65%.
      d. Else if the chilled water valve is less than 95%, send 0 requests.

3. The BAS shall default to ignoring the first 2 requests (adj).(Note: At startup set Ignore value to at least 40% of the number of AHUs served).
4. When (Requests greater than Ignores) the system shall respond by adjusting the chilled water pump differential pressure setpoint upward by ((Requests – Ignores) * (3) psi) (adj), but no larger than 10 psi (adj). When requests are equal to, or less than Ignores, the setpoint shall be reset downward by 2 psi (adj).

L. Condenser Water System Enable/Disable:
1. The condenser water system shall be enabled from the cooling plant system controller or from an optional higher level Building Automation System (BAS) based on cooling plant status. When enabled, the cooling plant system shall use the plant's operating capacity to control the tower fan variable speed drive enable/disable and speed control inputs. The cooling plant system and optional higher level BAS also controls the chiller condenser flow on a load based condenser optimization strategy. When enabled, the cooling plant system shall control the condenser water temperature to its setpoint (adj.) by controlling the tower fan variable speed drive enable/disable and speed control inputs and the tower bypass valve position. The cooling plant system and optional higher level BAS also controls the chiller condenser flow based on a differential pressure setpoint (adj.) by controlling the condenser water pump variable speed drive enable/disable and speed control inputs.
2. When the condenser water system is disabled, the condenser water pump(s) and cooling tower fan(s) shall be commanded off, when the condenser water pumps are confirmed off the lag tower isolation valves shall be closed. The isolation valves for the first tower in the sequence shall be an exception to this. It shall remain open so that the pump(s) can start immediately when the plant is enabled.

M. Condenser Water Pump Commands:
1. The system shall start a condenser water pump through a contact closure of the pumps variable speed drive run-enable contacts. The system shall detect condenser water pump run status by a variable speed drive current switch. The condenser water pump(s) lead/lag sequence shall be rotated on a weekly schedule. The rotation sequence shall be based on calculated run time with the pump having the least run time designated as lead, the pump with the next lowest run time shall be the second in the sequence (or lag pump) and so on. From the BAS operator interface, an operator shall be able to manually change the lead/lag sequence or request any pump to be unavailable which would remove it from the rotation sequence.

N. Condenser Water Pump Speed:
1. Similar to the fan speed control, the system shall determine the plant's operating capacity by considering the number of active chillers, their current power consumption, and their designed power consumption.
2. Based on this calculated operating capacity, the system shall proportionally adjust the condenser pump speed, including a bias set during TAB, this to achieve the load based condenser control. The pump speed shall be restricted by a predefined minimum limit.

O. Condenser Water Pump Failure:
1. If the lead pump start/stop relay is enabled and the current switch status is off for more than 30 seconds (adj.), the system shall annunciate a condenser water pump failure alarm to the BAS the lag pump shall be commanded on. Once the problem has been corrected, the operator shall be able to clear the alarm failure from the BAS operator interface or by manually overriding the pump on.

P. Cooling Tower Isolation Valves:
1. Cooling towers shall operate with condenser water pumps. With operation of a pump, the selected tower isolation valve shall be controlled to allow tower temperature control to function.

Q. Cooling Tower Bypass Control:

1. When the condenser water system is enabled, the cooling tower shall maintain the chiller entering condenser water temperature by first modulating the normally open bypass valve. When the valve is in full tower bypass and the entering condenser water temperature is greater than the entering condenser water temperature setpoint minus 2 deg.F (adj.), the bypass valve shall begin to close sending water to the cooling tower. The bypass valve shall continue to modulate closed to maintain the entering condenser water temperature to its setpoint without the tower fans. When the bypass valve is fully closed and the entering condenser water temperature reaches condenser water temperature setpoint plus 2 deg.F(adj.) the condenser water temperature shall be maintained by operating the cooling tower fans to maintain the entering condenser water temperature to its setpoint.

R. Cooling Tower Fan Start/Stop:
   1. The system shall command a tower fan on through a contact closure of the fans variable speed drive run-enable contacts. The system shall detect tower fan status by a variable speed drive current switch.

S. Cooling Tower Control:
   1. Cooling tower staging sequence shall be rotated on a weekly schedule. The rotation sequence shall be based on calculated run time with the tower having the least run time designated as lead, the tower with the next lowest run time shall be the second in the sequence (or lag tower) and so on. From the BAS operator interface, an operator shall be able to manually change the staging an operator shall be able to manually change the lead/lag sequence or request any tower to be unavailable which would remove it from the rotation sequence.
   2. The control system shall enable the cooling tower fans whenever the cooling tower condenser entering water temperature exceeds 70.0 deg. F, there is an active call for cooling tower operation, and the condenser pumps are confirmed to be running. The fans shall be disabled when the cooling tower condenser entering water temperature drops below the enable temperature of 70.0 deg. F minus a deadband of 20.0 deg. F.When the cooling tower fans are enabled, the system shall incrementally turn on additional fans when the condenser entering water temperature exceeds the fan enable setpoint of 70.0 deg. F by 1.0 deg. F. Conversely, the system shall stage down fans if the condenser entering water temperature falls 15.0 deg. F below the fan enable setpoint of 70.0 deg. F.
   3. The system shall use a 5-minute delay between fan stages.
   4. The control system shall determine the plant's operating capacity by considering the number of active chillers, their current power consumption, and their designed power consumption. Based on this calculated operating capacity, the system shall proportionally adjust the fan speed of the cooling towers, including a bias set during TAB. The fan speed shall be restricted by a predefined minimum limit.

T. Cooling Tower Failure:
   1. If the lead tower fan start/stop relay is enabled and the current switch status is off for more than 15 seconds (adj.) or whenever the tower vibration switch is activated the system shall annunciate a tower fan failure alarm to the BAS operator interface. When a tower fan failure exists the system shall start the next [lag] tower in the sequence and disable the lead/lag automation. The currently running tower cell shall become the lead cell. Once the problem has been corrected, the operator shall be able to clear the alarm failure from the from the BAS operator interface, by manually overriding the fan on. This action shall re-enable the lead/lag sequence.

U. Cooling Tower Sump Heat Control:
   1. The sump heat shall only be enabled when tower's condenser water system flow is disabled and the outdoor temperature is below 38 deg.F (adj.) When enabled, cooling tower sump heaters shall be controlled to maintain a sump temperature of 45 deg.F (adj.
   2. A multiple position cooling tower sump level sensor shall provide High Water Alarm and Low Water Alarm information to the BAS operator interface.

V. Chiller-Tower Optimization:

1. The optimal tower leaving water setpoint shall be determined based on a chiller-tower oOptimization program. The program shall take into account ambient wet bulb, chiller type, plant load, cooling tower design approach, and number of cooling tower cells active when determining the optimal leaving water setpoint to balance the chiller – tower load reducing the total power consumption of both chiller(s) plus cooling tower(s) while maintaining the chilled water setpoint. At all times the tower leaving setpoint shall be limited within the high and low values as specified by the chiller manufacturer.

END OF SECTION 230993

SECTION 232113
HYDRONIC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hydronic system requirements.

B. Chilled water piping, buried.

C. Chilled water piping, above grade.

D. Condenser water piping, buried.

E. Condenser water piping, above grade.

F. Equipment drains and overflows.

G. Pipe hangers and supports.

H. Unions, flanges, mechanical couplings, and dielectric connections.

I. Valves:
   1. Globe or angle valves.
   2. Ball valves.
   3. Butterfly valves.
   4. Check valves.

J. Flow controls.

1.02 RELATED REQUIREMENTS

A. Section 083100 - Access Doors and Panels.

B. Section 230548 - Vibration and Seismic Controls for HVAC.

C. Section 230553 - Identification for HVAC Piping and Equipment.

D. Section 230719 - HVAC Piping Insulation.

E. Section 232114 - Hydronic Specialties.

F. Section 232500 - HVAC Water Treatment: Pipe cleaning.

1.03 REFERENCE STANDARDS

A. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300.

B. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.

C. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.

D. ASME B31.9 - Building Services Piping.

E. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators.

F. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

G. ASTM A106/A106M - Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service.

H. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

I. ASTM A183 - Standard Specification for Carbon Steel Track Bolts and Nuts.

J. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.

K. ASTM A536 - Standard Specification for Ductile Iron Castings.

L. ASTM B32 - Standard Specification for Solder Metal.

M. ASTM B88 - Standard Specification for Seamless Copper Water Tube.

N. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric).

O. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.

P. ASTM D2000 - Standard Classification System for Rubber Products in Automotive Applications.

Q. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).

R. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.

S. ASTM D2467 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.

T. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets.

U. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.

V. ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications.

W. AWS D1.1/D1.1M - Structural Welding Code - Steel.

X. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems.

Y. AWWA C606 - Grooved and Shouldered Joints.

Z. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data:
   1. Include data on pipe materials, pipe fittings, valves, and accessories.
   2. Show grooved joint couplings, fittings, valves, and specialties on drawings and product submittals, specifically identified with the manufacturer's style or series designation.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.06 FIELD CONDITIONS

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

PART 2 PRODUCTS

2.01 HYDRONIC SYSTEM REQUIREMENTS

A. Comply with ASME B31.9 and applicable federal, state, and local regulations.

B. Piping: Provide piping, fittings, hangers, and supports as required, as indicated, and as follows:
   1. Where more than one piping system material is specified, provide joining fittings that are compatible with piping materials and ensure that the integrity of the system is not jeopardized.

2. Use non-conducting dielectric connections whenever jointing dissimilar metals.
3. Grooved mechanical joints may be used in accessible locations only.
    a. Accessible locations include those exposed on interior of building, in mechanical rooms, and above ground outdoors.
    b. Grooved mechanical connections and joints comply with AWWA C606.
        1) Ductile Iron: Comply with ASTM A536, Grade 65-45-12.
        2) Steel: Comply with ASTM A106/A106M, Grade B or ASTM A53/A53M.
    c. Use rigid joints unless otherwise indicated.
    d. Use flexible joints at pump connections.
        1) Depending on pipe size, three or four flexible joints may be used in lieu of a flexible connector.
            (a) Piping size 3" and under: three flexible joints
            (b) Piping size 4" and over: four flexible joints
    e. Use gaskets of molded synthetic rubber with central cavity, pressure responsive configuration and complying with ASTM D2000, Grade 2CA615A15B44F17Z for circulating medium up to maximum 250 degrees F or Grade M3BA610A15B44Z for circulating medium up to maximum 200 degrees F.
    f. Provide steel coupling nuts and bolts complying with ASTM A183.
4. Provide pipe hangers and supports in accordance with ASME B31.9 or MSS SP-58 unless indicated otherwise.

C. Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges, unions, or grooved couplings to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.

D. Valves: Provide valves where indicated on drawings:
1. Provide drain valves where indicated, and if not indicated provide at least at main shut-off, low points of piping, bases of vertical risers, and at equipment. Use 3/4 inch ball valves with hose end and cap, or pipe to nearest floor drain as indicated on drawing.
2. On discharge of hydronic pumps, use spring loaded check valves.
3. Isolate equipment:
    a. Piping 2" or under: using ball valves with union or grooved mechanical couplings
    b. Piping 2-1/2": using butterfly valves with lug end flanges or grooved mechanical couplings
4. For throttling, bypass, or manual flow control services, use the following valves.
    a. 2" and under: Ball valve.
    b. 2-1/2" and over: Globe or butterfly valve.
5. For throttling and isolation service in chilled and condenser water systems, use only butterfly valves.
6. In heating water, chilled water, or condenser water systems, butterfly valves may be used interchangeably with globe valves.
7. For shut-off and to isolate parts of systems or vertical risers, use the following valves.
    a. 2" and under: Ball valve.
    b. 2-1/2" and over: Globe or butterfly valve.

E. Welding Materials and Procedures: Comply with ASME BPVC-IX.
    a. Do not use in inaccessible concealed area.
    b. Do not use in inaccessible concealed area.
    c. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
    d. Do not use in inaccessible concealed area.

2.02 CHILLED WATER PIPING WITH OR WITHOUT GLYCOL, BURIED

A. Steel Pipe: ASTM A53/A53M, Schedule 40, black with AWWA C105/A21.5 polyethylene jacket, or double layer, half-lapped polyethylene tape.
1. Fittings: ASTM A234/A234M, wrought steel welding type with double layer, half-lapped polyethylene tape.

2. Joints: Welded in accordance with AWS D1.1/D1.1M.
3. Casing: Closed glass cell insulation.

B. Copper Tube: ASTM B88 (ASTM B88M), Type K (A) annealed.
1. Joints: Braze, AWS A5.8 BCuP silver/phosphorus/copper alloy.

2.03 CHILLED WATER PIPING WITH OR WITHOUT GLYCOL, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M, Schedule 40, black; using one of the following joint types:
1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings; AWS D1.1/D1.1M welded.
2. Threaded Joints: ASME B16.3, malleable iron fittings.
a. Do not use in inaccessible concealed area.
3. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.
a. Do not use in inaccessible concealed area.

2.04 CONDENSER WATER PIPING WITH OR WITHOUT GLYCOL, BURIED

A. PVC Pipe: ASTM D1785, Schedule 40, or ASTM D2241, SDR 21 or 26.
1. Fittings: ASTM D2466 or ASTM D2467, PVC.
2. Joints: Solvent welded in accordance with ASTM 2855.

2.05 CONDENSER WATER PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M, Schedule 40, black.
1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings with finish matching piping; AWS D1.1/D1.1M welded.
2. Threaded Joints: ASME B16.3, malleable iron fittings with finish matching piping.
a. Do not use in inaccessible concealed area.
3. Threaded Joints: ASTM A536 ductile iron fittings.
4. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.
a. Do not use in inaccessible concealed area.

2.06 EQUIPMENT DRAINS AND OVERFLOWS

A. Steel Pipe: ASTM A53/A53M, Schedule 40 galvanized; using one of the following joint types:
1. Threaded Joints: Galvanized cast iron, or ASME B16.3 malleable iron fittings.

B. Copper Tube: ASTM B88 (ASTM B88M), Type M (C), drawn; using one of the following joint types:
1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings; ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.

C. PVC Pipe: ASTM D1785, Schedule 40, or ASTM D2241, SDR 21 or 26.
1. Fittings: ASTM D2466 or D2467, PVC.
2. Joints: Solvent welded in accordance with ASTM D2855.
3. Application: For outdoor on roof only, unless indicated on drawings otherwise.
a. Do not install in plenum area whether it is return air plenum or non-return air plenum! Do not install in rated wall!

D. PVC Pipe Sizes 8 Inches and Greater: ASTM D1785, Schedule 80, or ASTM D2241, SDR 21 or 26.
1. Fittings: ASTM D2466 or D2467, PVC.
2. Joints: Solvent welded in accordance with ASTM D2855.

2.07 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58.
1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
2. Hangers for Cold Pipe Sizes 2 Inches and Greater: Carbon steel, adjustable, clevis.

3. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
4. Hangers for Hot Pipe Sizes 6 Inches and Greater: Adjustable steel yoke, cast iron roll, double hanger.
5. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
6. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Greater: Steel channels with welded spacers and hanger rods, cast iron roll.
7. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
8. Wall Support for Pipe Sizes 4 Inches and Greater: Welded steel bracket and wrought steel clamp.
9. Wall Support for Hot Pipe Sizes 6 Inches and Greater: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
10. Vertical Support: Steel riser clamp.
11. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
12. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
13. Floor Support for Hot Pipe Sizes 6 Inches and Greater: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
14. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
15. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
16. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

B. In grooved installations, use rigid couplings with offsetting angle-pattern bolt pads or with wedge-shaped grooves in header piping to permit support and hanging in accordance with ASME B31.9.

C. Rooftop Supports for Low-Slope Roofs: Steel pedestals with bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified; and as follows:
1. Bases: High-density polypropylene.
2. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
3. Steel Components: Stainless steel or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
4. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports; corrosion-resistant material.
5. Manufacturers:
   a. PHP Systems/Design: www.phpsd.com.
   b. Miro Industruies : http://www.miroind.com/.
   c. Substitutions: See Section 016000 - Product Requirements.

2.08 UNIONS, FLANGES, MECHANICAL COUPLINGS, AND DIELECTRIC CONNECTIONS

A. Unions for Pipe of 2 Inches and Less:
1. Ferrous Piping: 150 psi brass or malleable iron, threaded.
2. Copper Pipe: Bronze, soldered joints.

B. Flanges for Pipe 2 Inches and Greater:
1. Ferrous Piping: 150 psig forged steel, slip-on.
2. Copper Piping: Bronze.

C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, offsetting angled bolt-pad requiring visual verification only for correct installation, circular C-profile gasket, and bolts to secure and compress gasket.
1. Rigid Coupling description:

a. Two curved housing segments with offsetting angled bolt-pad and continuous key to engage pipe groove.
    1) Designed for visual verification of correct installation only; minimum bolt torque setting will not be allowed.
    2) Couplings 14 inch and greater designed for an advance groove system for large diameter pipe based upon an extended "A" dimension (pipe end to groove) for wider gasket seat area and a wedge shaped groove for ease of coupling installation and alignment.
b. Circular C-profile gasket shall be manufactured in-house by coupling manufacturer and shall be designed and tested for the entire life of the piping system.
    1) Gaskets 2 inch through 12 inch shall feature an integrated pipe-stop to insure coupling alignment over the pipe groove.
    2) Gaskets 14 inch and greater shall be designed specifically for large diameter pipe and feature an extended gasket seat area.
c. Bolts to secure and compress gasket.
d. Installation-ready with no loose parts or requirement to be disassembled for installation.

2. Dimensions and Testing: In accordance with AWWA C606.
3. Mechanical Couplings: Comply with ASME B31.9 and ASTM F1476.
4. Housing Material: Ductile iron complying with ASTM A536.
5. Gasket Material: EPDM suitable for operating temperature range from -30 degrees F to 250 degrees F.
6. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
7. When pipe is field grooved, provide coupling manufacturer's grooving tools.
8. Manufacturers:
    a. Victaulic Company: www.victaulic.com.
        1) Model Series 107N Rigid Coupling for sizes 2 inch through 12 inch.
    b. Substitutions: See Section 016000 - Product Requirements.

D. Dielectric Connections:
1. Waterways:
    a. Water impervious insulation barrier capable of limiting galvanic current to 1 percent of short circuit current in a corresponding bimetallic joint.
    b. Dry insulation barrier able to withstand 600-volt breakdown test.
    c. Construct of galvanized steel with threaded end connections to match connecting piping.
    d. Suitable for the required operating pressures and temperatures.
2. Flanges:
    a. Dielectric flanges with same pressure ratings as standard flanges.
    b. Water impervious insulation barrier capable of limiting galvanic current to 1 percent of short circuit current in a corresponding bimetallic joint.
    c. Dry insulation barrier able to withstand 600-volt breakdown test.
    d. Construct of galvanized steel with threaded end connections to match connecting piping.
    e. Suitable for the required operating pressures and temperatures.
3. Unions:
    a. 1/2 to 1 Inches: Brass solder to galvanized FPT.
    b. 1/2 to 2 Inches: Brass solder to galvanized FPT.
    c. 1/2 to 1 Inches: Brass to galvanized FPT or FIP (Female Iron Pipe).
    d. 3/4 to 1/2 Inch Reducer: Brass solder to galvanized FPT.
    e. Service: 250 psi, minus 20 to 180 deg F.

2.09 GLOBE OR ANGLE VALVES

A. Manufacturers:

1. Conbraco Industries: www.apollovalves.com.
2. Milwaukee Valve Company: www.milwaukeevalve.com.
3. Nibco, Inc: www.nibco.com.
4. Tour Andersson, a Victaulic company: www.imi-hydronic.com.
5. Substitutions: See Section 016000 - Product Requirements.

B. Up To and Including 2 Inches:
1. Bronze body, bronze trim, screwed bonnet, rising stem and handwheel, inside screw with backseating stem, renewable composition disc and bronze seat, solder ends.

C. Over 2 Inches:
1. Iron body, bronze trim, bolted bonnet, rising stem, handwheel, outside screw and yoke, rotating plug-type disc with renewable seat ring and disc, flanged ends.

2.10 BALL VALVES

A. Manufacturers:
1. Conbraco Industries: www.apollovalves.com.
2. Grinnell Products, a Tyco Business: www.grinnell.com.
3. Milwaukee Valve Company: www.milwaukeevalve.com.
4. Nibco, Inc: www.nibco.com.
5. Victaulic Company; _____: www.victaulic.com/#sle.
6. Substitutions: See Section 016000 - Product Requirements.

B. Up To and Including 2 Inches:
1. Bronze one piece body, chrome plated brass ball, teflon seats and stuffing box ring, lever handle with balancing stops, solder ends with union.

C. Over 2 Inches:
1. Ductile iron body, chrome platedstainless steel ball, teflon or Virgin TFE seat and stuffing box seals, lever handle or gear operated, flanged ends, rated to 800 psi.

2.11 PLUG VALVES

A. Manufacturers:
1. Conbraco Industries: www.apollovalves.com.
2. Milwaukee Valve Company: www.milwaukeevalve.com.
3. Nibco, Inc: www.nibco.com.
4. Substitutions: See Section 016000 - Product Requirements.

B. Up To and Including 2 Inches:
1. Bronze body, bronze tapered plug, 40 percent port opening, non-lubricated, teflon packing, threaded ends.
2. Operator: One plug valve wrench for every ten plug valves minimum of one.

C. Over 2 Inches:
1. Cast iron body and plug, 40 percent port opening, pressure lubricated, teflon packing, flanged ends.
2. Operator: Each plug valve with a wrench with set screw.

2.12 BUTTERFLY VALVES

A. Manufacturers:
1. Crane Co.: www.craneco.com.
2. Grinnell Products, a Tyco Business: www.grinnell.com.
3. Shurjoint Piping Products, Inc., a Tyco Business: www.shurjoint.com.
4. Hammond Valve: www.hammondvalve.com.
5. Milwaukee Valve Company: www.milwaukeevalve.com.
6. Victaulic Company: www.victaulic.com.
7. Substitutions: See Section 016000 - Product Requirements.

B. Body: Cast or ductile iron with resilient replaceable EPDM seat, wafer, lug, or grooved ends, extended neck.

C. Disc: Construct of aluminum bronze, chrome plated ductile iron, stainless steel, ductile iron with EPDM enscapsulation, or Buna-N enscapsulation.

D. Operator: 10 position lever handle.

2.13 SWING CHECK VALVES

A. Manufacturers:
   1. Grinnell Products, a Tyco Business: www.grinnell.com.
   2. Hammond Valve: www.hammondvalve.com.
   3. Milwaukee Valve Company: www.milwaukeevalve.com.
   4. Nibco, Inc: www.nibco.com.
   5. Victaulic Company: www.victaulic.com.
   6. Substitutions: See Section 016000 - Product Requirements.

B. Up To and Including 2 Inches:
   1. Bronze body, bronze trim, bronze rotating swing disc, with composition disc, solder ends.

C. Over 2 Inches:
   1. Iron body, bronze trim, stainless steel, bronze, or bronze faced rotating swing disc, renewable disc and seat, flanged or grooved ends.

2.14 SPRING LOADED CHECK VALVES

A. Manufacturers:
   1. Crane Co.: www.craneco.com.
   2. Hammond Valve: www.hammondvalve.com.
   3. Milwaukee Valve Company: www.milwaukeevalve.com.
   4. Victaulic Company; _____: www.victaulic.com/#sle.
   5. Substitutions: See Section 016000 - Product Requirements.

B. Iron body, bronze trim, split plate, hinged with stainless steel spring, resilient seal bonded to body, wafer, or threaded lug ends.

2.15 FLOW CONTROLS

A. Manufacturers:
   1. Griswold Controls: www.griswoldcontrols.com.
   2. ITT Bell & Gossett: www.bellgossett.com.
   3. Taco, Inc: www.taco-hvac.com.
   4. Tour Andersson, a Victaulic company: www.imi-hyronic.com.
   5. Substitutions: See Section 016000 - Product Requirements.

B. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.

C. Calibration: Control flow within 10 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, minimum pressure 2 psi.

PART 3 EXECUTION

A. Prepare pipe for grooved mechanical joints as required by coupling manufacturer.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install condenser water piping to ASME B31.9 requirements.

C. Install chilled water, glycol piping to ASME B31.5 requirements

D. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.

E. Route piping in orderly manner, parallel to building structure, and maintain gradient.

F. Install piping to conserve building space and to avoid interference with use of space.

G. Group piping whenever practical at common elevations.

H. Sleeve pipe passing through partitions, walls, floors, and structural housekeeping pads.

I. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified _____.

J. Slope piping and arrange to drain at low points.

K. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. See Section 230516.

L. Grooved Joints:
   1. Install in accordance with the manufacturer's latest published installation instructions.
   2. Gaskets to be suitable for the intended service, molded, and produced by the coupling manufacturer.

M. Inserts:
   1. Provide inserts for placement in concrete formwork.
   2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
   3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
   4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
   5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.

N. Pipe Hangers and Supports:
   1. Install in accordance with ASME B31.9, ASTM F708, or MSS SP-58.
   2. Support horizontal piping as scheduled.
   3. Install hangers to provide minimum 1/2-inch space between finished covering and adjacent work.
   4. Place hangers within 12 inches of each horizontal elbow.
   5. Use hangers with 1-1/2 inches minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   6. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
   7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
   8. Provide copper plated hangers and supports for copper piping.

O. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. See Section 230719.

P. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Section 083100 .

Q. Use eccentric reducers to maintain top of pipe level.

R. Install valves with stems upright or horizontal, not inverted.

3.03 SCHEDULES

A. Hanger Spacing for Copper Tubing.

B. Hanger Spacing for Steel Piping.

C. Hanger Spacing for Plastic Piping.

END OF SECTION 232113

SECTION 232114
HYDRONIC SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air vents.

B. Air separators.

C. Strainers.

D. Suction diffusers.

E. Combination pump discharge valves.

F. Pressure-temperature test plugs.

G. Balancing valves.

H. Automatic flow control valves.

I. Flow meters.

J. Radiator valves.

K. Relief valves.

L. Pressure reducing valves.

1.02 RELATED REQUIREMENTS

A. Section 232113 - Hydronic Piping.

1.03 REFERENCE STANDARDS

A. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide product data for manufactured products and assemblies required for this project. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description and model.

C. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 BLADDER EXPANSION TANKS

A. Manufacturers:
   1. Amtrol Inc: www.amtrol.com.
   2. ITT Bell & Gossett: www.bellgossett.com.
   3. Taco, Inc: www.taco-hvac.com.
   4. Substitutions: See Section 016000 - Product Requirements.

2.02 AIR VENTS

A. Manufacturers:
   1. Armstrong International, Inc: www.armstronginternational.com.
   2. ITT Bell & Gossett: www.bellgossett.com.
   3. Taco, Inc: www.taco-hvac.com.
   4. Substitutions: See Section 016000 - Product Requirements.

B. Manual Air Vent: Short vertical sections of 2-inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.

C. Float Air Vent:

D. Maximum Fluid Pressure: 150 psi.

E. Maximum Fluid Temperature: 250 degrees F.

2.03 AIR SEPARATORS

A. Coalescing Air/Dirt Separators:
   1. Manufacturers:
      a. Armstrong International, Inc: www.armstronginternational.com.
      b. ITT Bell & Gossett: www.bellgossett.com.
      c. Spirotherm, Inc: www.spirotherm.com.
      d. Substitutions: See Section 016000 - Product Requirements.
   2. Tank: Fabricated steel tank; tested and stamped in accordance with ASME BPVC-VIII-1 for maximum fluid service subject to application requirements and manufacturer's standard maximum operating conditions.
   3. Air Vent: Integral float actuated air vent at top fitting of tank rated at 150 psi, threaded to top of separator.
   4. End Connections: Class 150 flanged for 2-1/2 inch and larger otherwise threaded.
   5. Blowdown Connection: Threaded.
   6. Size: Match system flow capacity.
   7. Maximum Fluid Service Pressure: 150 psi.
   8. Maximum Fluid Service Temperature: 250 degrees F.

2.04 STRAINERS

A. Manufacturers:
   1. Armstrong International, Inc: www.armstronginternational.com.
   2. Flexicraft Industries: www.flexicraft.com.
   3. Grinnell Products, a Tyco Business: www.grinnell.com.
   4. Shurjoint Piping Products, Inc., a Tyco Business: www.shurjoint.com.
   5. The Metraflex Company: www.metraflex.com.
   6. Substitutions: See Section 016000 - Product Requirements.

B. Size 2 inch and Under:
   1. Screwed brass or iron body for 175 psi working pressure, Y pattern with stainless steel perforated screen.

C. Size 2-1/2 inch to 4 inch:
   1. Body Material by Fluid Service:
      a. Cast Iron:
         1) Steam: Up to 125 psi at 350 degrees F.
         2) Liquids: Up to 200 psi at 150 degrees F.
      b. Stainless Steel:
         1) Liquids: Up to 285 psi at 100 degrees F.
   2. Provide flanged or grooved iron body for 175 psi working pressure, Y pattern with stainless steel perforated screen.

D. Size 5 inch and Larger:

1. Liquid Fluid Service: Up to 285 psi at 100 degrees F.
2. Provide flanged or grooved iron body for 175 psi working pressure, basket pattern with stainless steel perforated screen.

E. Accessories: Provide air vent, hanging tag, outlet ball valve, and PT test plug extension.

F. Perforated Mesh Size (verify with applicable equipment manufactuer):
1. Chilled Water Evaporator inlet: Minimum Mesh number 40 (0.0165")
2. Water cooled Condenser Inlet; Minimum Mesh number 30 (0.0232")
3. Condensing Boiler Inlet: Minimum Mesh number 30 (0.0232")
4. Pump Sunction: Minimum Mesh number 30 (0.0232")

2.05 SUCTION DIFFUSERS

A. Manufacturers:
1. Anvil International, Inc: www.anvilintl.com.
2. Grinnell Products, a Tyco Business: www.grinnell.com.
3. Victaulic Company of America: www.victaulic.com.
4. Substitutions: See Section 016000 - Product Requirements.

B. Accessories: Adjustable foot support, blowdown tapping in bottom, gauge tapping in side.

2.06 COMBINATION PUMP DISCHARGE VALVES

A. Manufacturers:
1. Crane Co.: www.craneco.com.
2. Taco, Inc: www.taco-hvac.com.
3. Victaulic Company of America: www.victaulic.com.
4. Substitutions: See Section 016000 - Product Requirements.

B. Quarter-Turn Plug Type: Flanged cast-iron body with bolt-on bonnet, position indicator, stainless steel stem, backflow preventer, memory stop, metering connectors, bubble-tight shutoff, and wrench-adjustable plug flow regulator.

2.07 PRESSURE-TEMPERATURE TEST PLUGS

A. Manufacturers:
1. Ferguson Enterprises Inc: www.fnw.com.
2. Peterson Equipment Company Inc: www.petesplug.com.
3. Sisco Manufacturing Company Inc: www.sisco.com
4. Substitutions: See Section 016000 - Product Requirements.

B. Construction: Brass body designed to receive temperature or pressure probe with removable protective cap, and Neoprene rated for minimum 200 degrees F.

C. Application: Use extended length plugs to clear insulated piping.

2.08 BALANCING VALVES

A. Manufacturers:
1. Armstrong International, Inc: www.armstronginternational.com.
2. Taco, Inc: www.taco-hvac.com.
3. Substitutions: See Section 016000 - Product Requirements.

B. Size 2 inch and Smaller:
1. Provide ball or globe style with flow balancing, shut-off capabilities, memory stops, and minimum of two metering ports and female sweat, NPT threaded, press, or soldered connections.
2. Metal construction materials consist of bronze or brass.
3. Non-metal construction materials consist of Teflon, EPDM, or engineered resin.

C. Size 2-1/2 inch and Larger:
1. Provide ball, globe, or butterfly style with flow balancing, shut-off capabilities, memory stops, and minimum of two metering ports and flanged, grooved, or weld-end connections.

2. Valve body construction materials consist of cast iron, carbon steel, or ductile iron.
3. Internal components construction materials consist of brass, aluminum bronze, bronze, Teflon, EPDM, NORYL, or engineered resin.

2.09 AUTOMATIC FLOW CONTROL VALVES

A. Manufacturers:
1. Armstrong International: www.armstronginternational.com
2. Taco Inc: www.taco-hvac.com.
3. Substitutions: See Section 016000 - Product Requirements.

B. Construction:
1. Brass, bronze, or iron body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet with blowdown/backflush drain.
2. Built-in lug-type outlet butterfly valve with 2-position handle.

C. Calibration: Control flow within 10 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, minimum pressure 2 psi.

D. Control Mechanism: Provide stainless steel or nickel-plated, brass piston or regulator cup, operating against stainless steel helical or wave formed spring or elastomeric diaphragm and polyphenylsulfone orifice plate.

2.10 FLOW METERS

A. Manufacturers:
1. Dwyer Instruments, Inc: www.dwyer-inst.com.
2. EMCO Flow Systems: www.emcocontrols.com.
3. Substitutions: See Section 016000 - Product Requirements.

B. Orifice principle by-pass circuit with direct reading gauge, soldered or flanged piping connections for 125 psi working pressure, with shut off valves, and drain and vent connections.

C. Direct reading with insert pitot tube, threaded coupling, for 150 psi working pressure, maximum 240 degrees F, 5 percent accuracy.

D. Cast iron, wafer type, orifice insert flow meter for 250 psi working pressure, with read-out valves equipped with integral check valves with gasketed caps.

2.11 RADIATOR VALVES

A. Manufacturers:
1. Armstrong International, Inc: www.armstronginternational.com.
2. ITT Bell & Gossett: www.bellgossett.com.
3. Myson, Inc: www.mysoninc.com.
4. Substitutions: See Section 016000 - Product Requirements.

B. Angle or straight pattern, rising stem, inside screw globe valve for 125 psi working pressure, with bronze body and integral union for screwed connections, renewable composition disc, plastic wheel handle for shut-off service, and lockshield key cap and set screw memory bonnet for balancing service.

2.12 RELIEF VALVES

A. Manufacturers:
1. Armstrong International, Inc: www.armstronginternational.com.
2. ITT Bell & Gossett: www.bellgossett.com.
3. Substitutions: See Section 016000 - Product Requirements.

B. Bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labelled.

2.13 PRESSURE REDUCING VALVES

A. Manufacturers:
1. Armstrong International, Inc: www.armstronginternational.com.

2. ITT Bell & Gossett: www.bellgossett.com.
3. Taco, Inc: www.taco-hvac.com.
4. Substitutions: See Section 016000 - Product Requirements.

B. Operation: Automatically feeds make-up water to the hydronic system whenever pressure in the system drops below the pressure setting of the valve. Refer to Section 232113.

C. Materials of Construction:
1. Valve Body: Constructed of bronze, cast iron, brass, or iron.
2. Internal Components: Construct of stainless steel or brass and engineered plastics or composition material.

D. Connections:

E. Provide integral check valve and strainer.

F. Maximum Inlet Pressure: 400 psi.

G. Maximum Fluid Temperature: 180 degrees F.

H. Adjustable Pressure Range: From 10 to 45 psi, set to 25 psi.

PART 3 EXECUTION

3.01 INSTALLATION

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

B. Where large air quantities can accumulate, provide enlarged air collection standpipes.

C. Provide manual air vents at system high points and as indicated.

D. For automatic air vents in ceiling spaces or other concealed locations, provide vent tubing to nearest drain.

E. Provide valved drain and hose connection on strainer blowdown connection.

F. Provide pump suction fitting on suction side of base-mounted centrifugal pumps. Remove temporary strainers after cleaning systems.

G. Support pump fittings with floor-mounted pipe and flange supports.

H. Select system relief valve capacity so that it is greater than make-up pressure reducing valve capacity. Select equipment relief valve capacity to exceed rating of connected equipment.

I. Pipe relief valve outlet to nearest floor drain.

J. Where one line vents several relief valves, make cross-sectional area equal to sum of individual vent areas.

K. Provide strainer at inlet of chiller evaporator, water cooled chiller condenser, boiler, pump, etc. HVAC equipment as applicable.

END OF SECTION 232114

SECTION 232123
HYDRONIC PUMPS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. In-line pumps.

B. End-suction pumps.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete.

B. Section 230548 - Vibration and Seismic Controls for HVAC.

C. Section 230716 - HVAC Equipment Insulation.

D. Section 230719 - HVAC Piping Insulation.

E. Section 230923 - Direct-Digital Control System for HVAC.

F. Section 230934 - Variable-Frequency Motor Controllers for HVAC.

G. Section 232113 - Hydronic Piping.

H. Section 232114 - Hydronic Specialties.

I. Section 260583 - Wiring Connections.

1.03 REFERENCE STANDARDS

A. NEMA MG 00001 - Motors and Generators.

B. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

C. NFPA 70 - National Electrical Code.

D. UL 778 - Standard for Motor-Operated Water Pumps.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide certified pump curves showing performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable. Include electrical characteristics and connection requirements.

C. Manufacturer's Installation Instructions: Indicate hanging and support requirements and recommendations.

D. Operation and Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Armstrong Fluid Technology: https://armstrongfluidtechnology.com

B. Bell & Gossett, a Xylem Inc. brand: www.bellgossett.com.

C. Substitutions: See Section 016000 - Product Requirements.

2.02 GENERAL

A. Provide pumps that operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

B. Minimum Quality Standard: UL 778.

C. Base Mounted Pumps: Aligned by qualified millwright.

D. Electrical Requirements:

1. Listed and classified by UL or testing agency acceptable to authority having jurisdiction as suitable for the purpose specified and indicated.
2. Variable Frequency Drives (VFDs): Provide in accordance with Section 230934, except for integral-VFDs.
3. Enclosures: Provide unspecified product(s) required to fit motor:

2.03 IN-LINE PUMPS

A. Closed-Coupled, Single-Stage Pump: Vertical pump with radially- or horizontally-split casing; rated for discharge pressures up to 175 psi.

B. Casing: Cast iron with seal flush connection, threaded suction, and discharge ports with gauge port and drain plug.

C. Impeller: Bronze, fully enclosed, keyed directly to motor shaft or extension.

D. Shaft: Carbon steel with stainless steel impeller cap screw or nut and bronze sleeve.

E. Seal: Packing gland with minimum four rings graphite impregnated packing and bronze lantern rings, 250 degrees F maximum continuous duty temperature.

F. Performance: Refer to schedule on drawing.

G. Electrical Characteristics: Refer to schedule on drawing.
   1. Motor:
      a. Constant Speed: open drip proof, built-in overload protection, NEMA F.
      b. VFD: Inverter Duty.
         1) VFD Controller: support direct communication with the building management system (BMS) with built-in support for protocol of BACnet™ MS/TP.
   2. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.

2.04 END-SUCTION PUMPS

A. Split-Coupled Pump: Base-mounted, single-stage pump with horizontal shaft and radially- or horizontally-split casing rated for discharge pressures up to 175 psi.

B. Casing: Cast iron or ductile iron with renewable bronze casing wearing rings, seal flush connection, drain plug, flanged suction, and discharge flanged connections with gauge ports.

C. Impeller: Stainless steel, balanced, fully enclosed, keyed to shaft.

D. Bearings: Oil lubricated roller or ball bearings.

E. Shaft: Alloy steel with copper, bronze, or stainless steel shaft sleeve.

F. Seal: Mechanical, 225 degrees F maximum continuous duty temperature.

G. Seal: Packing gland with minimum four rings graphite impregnated packing and bronze lantern rings, 250 degrees F maximum continuous duty temperature.

H. Drive: Flexible coupling with coupling guard.

I. Baseplate: Cast iron or fabricated steel with integral drain rim.

J. Performance: Refer to schedule on drawing.

K. Electrical Characteristics: Refer to schedule on drawing.
   1. Motor:
      a. VFD: Inverter Duty.
         1) VFD Controller: support direct communication with the building management system (BMS) with built-in support for protocol of BACnet™ MS/TP.
   2. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.

PART 3 EXECUTION

3.01 PREPARATION

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

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide access space around pumps for service. Provide no less than minimum space recommended by manufacturer.

C. Decrease from line size with long radius reducing elbows or reducers. Support piping adjacent to pump such that no weight is carried on pump casings. For close-coupled or base-mounted pumps, provide supports under elbows on pump suction and discharge line sizes 4 inches and over.
   1. See Section 230548.

D. Provide air cock and drain connection on horizontal pump casings.

E. Provide drains for bases and seals, piped to and discharging into floor drains.

F. Check, align, and certify alignment of base-mounted pumps prior to start-up.

G. Controls Human-Machine Interface (HMI): HVAC control system; see Section 230923.

END OF SECTION 232123

SECTION 232500
HVAC WATER TREATMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Materials.
   1. System cleaner.
   2. Closed system treatment (water).
   3. Condenser water system treatment (cooling towers).
   4. Open system treatment (humidifiers, air washers, evaporative condensers, small cooling towers, liquid coolers).

B. By-pass (pot) feeder.

C. Solution metering pump.

D. Solution tanks.

E. Liquid level switch.

F. Conductivity controller.

G. Water meter.

H. Solenoid valves.

I. Timers.

J. Test equipment.

K. Side-stream filtration equipment.

1.02 RELATED REQUIREMENTS

A. Section 232113 - Hydronic Piping.

B. Section 232114 - Hydronic Specialties.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide chemical treatment materials, chemicals, and equipment including electrical characteristics and connection requirements.

C. Shop Drawings: Indicate system schematic, equipment locations, and controls schematics, electrical characteristics and connection requirements.

D. Manufacturer's Installation Instructions: Indicate placement of equipment in systems, piping configuration, and connection requirements.

E. Manufacturer's Field Reports: Indicate start-up of treatment systems when completed and operating properly. Indicate analysis of system water after cleaning and after treatment.

F. Operation and Maintenance Data: Include data on chemical feed pumps, agitators, and other equipment including spare parts lists, procedures, and treatment programs. Include step by step instructions on test procedures including target concentrations.

1.04 REGULATORY REQUIREMENTS

A. Conform to applicable code for addition of non-potable chemicals to building mechanical systems and to public sewage systems.

B. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 BY-PASS (POT) FEEDER

A. Manufacturers:

1. Griswold Controls: www.griswoldcontrols.com.
2. J. L. Wingert Company: www.jlwingert.com.
3. Neptune, a brand of the Dover Company: www.neptune1.com.
4. Substitutions: See Section 016000 - Product Requirements.

B. Quick opening cap for working pressure of 175 psi.

2.02 SOLUTION METERING PUMP

A. Manufacturers:
1. J. L. Wingert Company: www.jlwingert.com.
2. Dover Corporation: www.neptune1.com.
3. Pulsafeeder Engineered Products: https://pulsafeeder.com
4. Substitutions: See Section 016000 - Product Requirements.

B. Positive displacement, diaphragm pump with adjustable flow rate, thermoplastic construction, continuous-duty fully enclosed electric motor and drive, and built-in relief valve.

C. Electrical Characteristics:
1. Cord and Plug: Provide unit with 6 foot cord and plug for connection to electric wiring system including grounding connector.

2.03 SOLUTION TANKS

A. 30 gallon capacity, polyethylene, self-supporting, 1 gallon graduated markings; molded fiberglass cover with recess for mounting pump, agitator, and liquid level switch.

2.04 LIQUID LEVEL SWITCH

A. Polypropylene housing with integrally mounted PVC air trap, receptacles for connection to metering pump, and low level alarm.

2.05 CONDUCTIVITY CONTROLLER

A. Manufacturers:
1. Envirocare International: www.envirocare.com.
2. JENCO Instruments Incorporated: www.jencoi.com.
3. Omega Engineering, Inc: www.omega.com.
4. Substitutions: See Section 016000 - Product Requirements.

B. Packaged monitor controller with solid state circuiting, five percent accuracy, linear dial adjustment, built-in calibration switch, on-off switch and light, control function light, output to control circuit and recorder.

2.06 WATER METER

A. Displacement type cold water meter with sealed, tamper-proof magnetic drive, impulse contact register, single pole, double throw dry contact switch.

2.07 SOLENOID VALVES

A. Forged brass body globe pattern, normally open or closed as required, explosion-proof and watertight solenoid enclosure, and continuous duty coil.

2.08 TIMERS

A. Electronic timers, infinitely adjustable over full range, 150 second and five minute range, mounted together in cabinet with hands-off-automatic switches and status lights.

2.09 TEST EQUIPMENT

A. Provide white enamel test cabinet with local and fluorescent light, capable of accommodating 4 - 10 ml zeroing titrating burettes and associated reagents.

B. Provide the following test kits:
1. Alkalinity titration test kit.
2. Chloride titration test kit.
3. Sulphite titration test kit.

4. Total hardness titration test kit.
5. Low phosphate test kit.
6. Conductivity bridge, range 0 - 10,000 micro-ohms.
7. Creosol red pH slide complete with reagent.
8. Portable electronic conductivity meter.
9. High nitrite test kit.

2.10 SIDE-STREAM FILTRATION SYSTEM

A. Manufacturers:

B. System: Flow indicator, filter housing with cartridge filter, shut-off valves, and flow control valve.

C. Hot Water and Glycol Filter Housing: Glass reinforced nylon plastic suitable for 220 degrees F and 200 psi operating conditions.

D. Chilled Water Filter Housing: Reinforced polypropylene plastic housing suitable for 125 degrees F and 125 psi operating conditions.

E. Cartridges: 30 micron for start-up and 5 micron for system operation.

PART 3 EXECUTION

3.01 PREPARATION

A. Systems shall be operational, filled, started, and vented prior to cleaning. Use water meter to record capacity in each system.

B. Place terminal control valves in open position during cleaning.

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

3.02 CLEANING SEQUENCE

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.04 CLOSED SYSTEM TREATMENT

A. Provide one bypass feeder on each system. Install isolating and drain valves and necessary piping. Install around balancing valve downstream of circulating pumps unless indicated otherwise.

B. Introduce closed system treatment through bypass feeder when required or indicated by test.

C. Provide 3/4 inch water coupon rack around circulating pumps with space for 4 test specimens.

3.05 CONDENSER WATER SYSTEMS (COOLING TOWERS)

A. Provide solution pumps to feed sequestering agent and corrosion inhibitor from solution tank into condenser water supply to tower. Provide agitator as required.

B. Provide conductivity controller to sample condenser water and operate 1 inch solenoid bleed valve and solution pumps. Provide 1/4 inch solenoid valve and piping to blowdown controller sampler wired to open when condensing water pump is operating.

C. Provide solution pump to feed diluted acid from solution tank into condenser water supply to tower.

D. Introduce algicide to tower by intermittent slug feed.

E. Provide water meter in make-up water line to tower, to activate solution pumps for preset time when condenser water pumps are running.

F. Provide liquid level switch in each solution tank to deactivate solution pump and agitator and sound local alarm bell.

G. Provide 3/4 inch water coupon rack around circulating pumps with space for 4 test specimens.

3.06 CLOSEOUT ACTIVITIES

A. Training: Train Owner's personnel on operation and maintenance of chemical treatment system.
   1. Provide minimum of two hours of instruction for two people.
   2. Have operation and maintenance data prepared and available for review during training.
   3. Conduct training using actual equipment after treated system has been put into full operation.

3.07 MAINTENANCE

A. Perform maintenance work using competent and qualified personnel under the supervision and in the direct employ of the equipment manufacturer or original installer.

B. Provide service and maintenance of treatment systems for one year from Date of Substantial Completion.

C. Provide monthly technical service visits to perform field inspections and make water analysis on-site. Detail findings in writing on proper practices, chemical treating requirements, and corrective actions needed. Submit two copies of field service report after each visit.

D. Provide laboratory and technical assistance services during this maintenance period.

E. Provide on-site inspections of equipment during scheduled or emergency shutdown to properly evaluate success of water treatment program, and make recommendations in writing based upon these inspections.

END OF SECTION 232500

SECTION 233100
HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air plenums and casings.

B. Metal ducts.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

E. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements.

F. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry.

G. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements.

H. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements.

I. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems.

J. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for duct materials.

C. Shop Drawings: Indicate duct fitting types, gauges, sizes, welds, and configuration.

1.05 REGULATORY REQUIREMENTS

A. Construct ductwork to NFPA 90A standards.

1.06 FIELD CONDITIONS

A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.

1.07 WARRANTY

A. Maintain temperatures within acceptable range during and after installation of duct sealants.

B. See Section 017800 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION

A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, NFPA 255, or UL 723.

B. Provide UL Class 1 ductwork, fittings, hangers, supports, and appurtenances in accordance with NFPA 90A and SMACNA (DCS) guidelines unless stated otherwise.

C. Duct Shape and Material in accordance with Allowed Static Pressure Range:

D. Duct Sealing and Leakage in accordance with Static Pressure Class:
   a. Leakage:
   b. Seal: Class B, apply sealing of transverse joints and longitudinal seams.

2. Duct and Fitting Fabrication and Support: SMACNA (DCS) including specifics for continuously welded round and oval duct fittings.
3. Use reinforced and sealed sheet-metal materials at recommended gauges for indicated operating pressures or pressure class.
4. Provide turning vanes of perforated metal with glass fiber insulation when acoustical lining is indicated.
5. Provide turning vanes of perforated metal with glass fiber insulation when an acoustical lining is required.
    1) Round: Class 6 or 6 cfm/100 sq ft.
    2) Rectangular: Class 24 or 24 cfm/100 sq ft.
6. Low Pressure Service: From 2 in-wc to 3 in-wc:
    a. Leakage:
        1) Round: Class 3 or 3 cfm/100 sq ft.
7. Medium and High Pressure Service: Above 3 in-wc:
    1) Rectangular: Class 12 or 12 cfm/100 sq ft.
    2) Round: Class 12 or 12 cfm/100 sq ft.
8. Low Pressure Service: Up to 2 in-wc:
    a. Seal: Class A, apply sealing of transverse joints, longitudinal seams, and duct wall penetrations.

E. Duct Fabrication Requirements:

F. Provide metal duct unless otherwise indicated. Fibrous glass duct can be substituted at the Contractor's option.
    a. Seal: Class C, apply to seal off transverse joints.
    b. Leakage:
2. Construct tees, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide airfoil turning vanes of perforated metal with glass fiber insulation.
3. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
4. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

2.02 GENERAL REQUIREMENTS

1. Galvanized Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
    1) Carlisle HVAC Products; Nexus Flange Connectors with Sealant Pocket: www.carlislehvac.com/#sle.
    2) Elgen Manufacturing Company, Inc: www.elgenmfg.com/#sle.
    3) L&L Fabrication; www.lnlfab.com.

2.03 METAL DUCTS

A. Connectors, Fittings, Sealants, and Miscellaneous:
1. Transverse Duct Connection System: SMACNA "E" rated rigid class connection, interlocking angle and duct edge connection system with sealant, gasket, cleats, and corner clips in accordance with SMACNA (DCS).
    a. Manufacturers:
        1) Substitutions: See Section 016000 - Product Requirements.
    b. Insulation:
        1) Material: Air.
2. Rectangular Double Wall Insulated: Rectangular spiral lock seam duct with galvanized steel outer wall, perforated galvanized steel inner wall; fitting with the solid inner wall.
    1) Thickness: 1 inch.

B. Rectangular Metal Duct:
   1. Fittings: Manufacture with solid inner wall of perforated galvanized steel.

C. Material Requirements:

2.04 AIR PLENUMS AND CASINGS

A. Minimum Fabrication Requirements:
   1. Provide 16-gauge, 0.059-inch sheet steel back facing and 22-gauge, 0.029-inch perforated sheet steel front facing with 3/32 inch diameter holes on 5/32 inch centers.
   2. Mount floor-mounted plenum or casings on 4-inch high concrete curbs. At floor, rivet panels on 8-inch centers to angles. Where floors are acoustically insulated, provide liner of galvanized 18-gauge, 0.052-inch expanded metal mesh supported at 12-inch centers, turned up 12 inches at sides with sheet metal shields.
   3. Install hinged access doors where indicated or required for access to equipment for cleaning and inspection.
   4. Provide clear wire glass observation ports, minimum 6 by 6 inch size.
   5. Fabricate acoustic plenum or casing with reinforcing turned inward.
   6. Construct panels 3 inches thick, packed with 4.5 pcf minimum glass fiber insulation media, on inverted channel of 16-gauge, 0.059-inch sheet steel.

B. Access Doors:
   1. Reinforce door frames with steel angles tied to horizontal and vertical plenum supporting angles.

C. Fabricate in accordance with SMACNA (DCS) for indicated operating pressures indicated.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install, support, and seal ducts in accordance with SMACNA (DCS).

B. Install products following the manufacturer's instructions.

C. During construction, provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering the ductwork system.

D. Flexible Ducts: Connect to metal ducts with adhesive.

E. Duct sizes indicated are precise inside dimensions. For lined ducts, maintain sizes inside lining.

F. Provide openings in ductwork as indicated to accommodate thermometers and controllers. Provide pilot tube openings as indicated for testing of systems, complete with metal can with spring device or screw to insure against air leakage. For openings, insulate ductwork and install insulation material inside a metal ring.

G. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

H. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with a crimp in the direction of airflow.

I. Use double nuts and lock washers on threaded rod supports.

J. Connect terminal units to supply ducts directly or with one foot maximum length of flexible duct. Do not use flexible duct to change direction.

K. Connect diffusers or light troffer boots to low-pressure ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp.

L. Set plenum doors at 6 to 12 inches above floor. Arrange door swings so that fan static pressure holds door in closed position.

M. At exterior wall louvers, seal duct to louver frame.

END OF SECTION 233100

SECTION 236426
ROTARY-SCREW WATER CHILLERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water-cooled rotary-screw chiller.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Concrete housekeeping pads.

B. Section 230548 - Vibration and Seismic Controls for HVAC.

C. Section 230553 - Identification for HVAC Piping and Equipment.

D. Section 230593 - Testing, Adjusting, and Balancing for HVAC.

E. Section 230923 - Direct-Digital Control System for HVAC.

F. Section 230993 - Sequence of Operations for HVAC Controls.

G. Section 232113 - Hydronic Piping.

H. Section 232114 - Hydronic Specialties.

I. Section 260583 - Wiring Connections.

1.03 REFERENCE STANDARDS

A. AHRI 550/590 (I-P) - Standard for Performance Rating of Water-Chilling and Heat Pump Water-Heating Packages Using the Vapor Compression Cycle.

B. ASHRAE Std 15 - Safety Standard for Refrigeration Systems.

C. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings.

D. ASHRAE Std 135 - BACnet - A Data Communication Protocol for Building Automation and Control Networks.

E. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels.

F. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.

G. UL 984 - Hermetic Refrigerant Motor-Compressors.

H. UL 1995 - Heating and Cooling Equipment.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

1.05 QUALITY ASSURANCE

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Trane Technologies, PLC: www.trane.com/#sle.

2.02 ROTARY-SCREW WATER CHILLER PERFORMANCE REQUIREMENTS

A. Packaged Water-Cooled Chiller:
   1. Refrigerant: R-454B or Code Compliant Factory-Standard Refrigerant, use only refrigerants that have ozone depletion potential (ODP) of zero and global warming potential (GWP) no greater than that allowed by federal code.
   2. Evaporator:
      a. Fouling Factor: 0.00010 sq ft-hr-degrees F/Btu.
   3. Water-Cooled Condenser:
      a. Fouling Factor: 0.00025 sq ft-hr-degrees F/Btu.

2.03 WATER-COOLED, ROTARY-SCREW, WATER CHILLER CONSTRUCTION REQUIREMENTS

A. Factory assembled and tested chiller consisting of compressor(s), compressor motor(s), motor starter(s) or variable frequency drives as indicated, evaporator, condenser, enclosure, refrigeration circuits(s) and specialties, interconnecting piping, microprocessor-based controls, readouts, and diagnostics.
   1. Rating: AHRI 550/590 (I-P).
   2. Safety: ASHRAE Std 15 and UL 1995.
   3. Construction and Testing: ASME BPVC-VIII-1.
   4. Energy Efficiency: ASHRAE Std 90.1.
   5. Enclosures:
      a. Structural Framing: Mount structural steel on welded steel base with hot-dip galvanized finish.
      b. Steel Cabinet:
         1) Factory apply baked on powder paint or corrosion resistant paint prior to assembly.
         2) Provide gasketing and weatherproofing to panels with fully opening doors containing starters or variable frequency drives, terminal blocks, through-the-door type disconnects and circuit breaker with lockable handles indicating "power-on" or "power-off".
         3) Provide door stays.
      c. Perform 500-hour salt spray test in accordance with ASTM B117 for outdoor applications.

B. Rotary-Screw Compressors:
   1. Unit: Semi-hermetic type with two, direct drive compressors with multiple independent refrigeration circuit(s), internal muffler, discharge, check, and suction service valves.
   2. Oil Lubrication System: Positive pressure system, oil heater, oil separator, check valves, solenoid valves, and filtration devices.
   3. Valves: Check valves in compressor discharge.
   4. Capacity Reduction System: Load/unload valve control down to 20 percent of full load without the activation of hot gas bypass.
   5. Motors: UL 984, 3,600 rpm, suction gas-cooled, hermetically sealed, squirrel cage induction with starter.

C. Evaporator, Shell and Tube Type:
   1. ASME BPVC-VIII-1, three pass type, with three independent refrigeration circuits.
   2. Shell, Removable Heads and Tube Support Sheets: Carbon steel.
   3. Tubes: Mechanically treated copper tubes fixed and aligned into intermediate tube support sheets across the shell to maintain consistent spacing between tubes with the capability of being cleanable.
   4. Working Pressure Rating, Refrigerant-Side: 200 psi.
   5. Working Pressure Rating, Water-Side: 150 psi.
   6. Cold Surface Insulation:
      a. Factory install on shell and all other cold surfaces.
      b. 0.75-inch minimum thickness, closed cell, expanded polyvinyl chloride flexible foam insulation with a maximum K factor of 0.28.

D. Provide vents and water drain connections.

E. Provide fittings for temperature control sensors.

F. Freeze Protection: Provide evaporator heater with thermostat to protect from freezing at ambient temperatures down to minus 20 degrees F.

G. Water-Cooled Condenser, Three-Pass Shell and Tube Type:
   1. ASME BPVC-VIII-1, shell, Removable Heads and Tube Sheets Material: Carbon steel.

2. Tubes: Mechanically treated copper tubes fixed and aligned into intermediate tube support sheets across the shell to maintain consistent spacing between tubes with the capability of being cleanable.
3. Working Pressure Rating, Water Side: 150 psi.
4. End Connections: Provide with flanged or grooved connections.
5. Provide vent and water drain connections.
6. Provide fittings for temperature control sensors.
7. Hot Surface Insulation:
    a. Factory install on condenser shell, condenser flow switch and leaving water temperature sensor.
    b. Factory install on compressor discharge piping and water box heads.
    c. Material: Minimum 3-inch thick flexible mineral fiber insulation suitable for applications up to 200 degrees F.

H. Refrigeration Circuits:
1. Provide two independent refrigeration circuit(s) with two compressor(s) per circuit.
2. Minimum Refrigerant Specialties per Circuit:
    a. Isolation and service valves for refrigerant removal and charging.
    b. Removable-core filter driers.
    c. ASHRAE Std 15 compliant relief valves.
    d. Liquid line sight glass with moisture indicator.
    e. Refrigerant expansion valves or metering devices.
    f. Complete operating charge of both refrigerant and oil.

I. Starters and Drives:
1. Starters: Design unit mounted, across-the-line starter to operate in temperatures up to 104 degrees F.
    a. Provide incoming line provisions for aluminum, mechanical type incoming line lugs based on the number and cable sizes shown on drawings.
    b. Provide properly sized, double break main contacts with weld resistant silver cadmium faces and low resistance auxiliary interlocks with palladium silver contacts for interlocks that interface with control panel.
    c. Provide control power transformer with fused primary, secondary, and current transformers of the proper size, ratio, and burden capacity.
    d. Provide control relays to interface with control panel.
    e. Wiring:
        1) Power and Control: Type MTW copper stranded 194 degrees F.
        2) 14 gauge, 0.0641 inch, minimum, for control wiring.
    f. Motor Protection System Attributes:
        1) Three phase overload protection.
        2) Startup overload protection.
        3) Phase imbalance, loss, and reversal.
        4) Low voltage.
        5) Distribution fault protection.

J. Controls Package:
1. Unit Controls: Factory-supplied DDC:
    a. Control-panel mounted with required input-output expansions, power supply, fused disconnect, hand switches, knobs, and accessories required to control chiller unit to manufacturer required sequences to meet intended use with listed performance.
    b. Factory configured to interface prewired sensors, switches, and safeties with allowance to add up to four chiller valves and flow sensors.
    c. Graphic-based touchscreen to include unit operation controls and user filter based interface for faults, alarms, performance, unit diagnostics, and data recording up to 12 months.

d. BAS, SCADA, or other Integrated Automation Link: ASHRAE Std 135 BACnet MS/TP.
e. External Point Mapping: Provide mapping table for each parameter included in the local visual interface with software-toggle flag to allow reduced mapping of available points.
f. Isolation Valves: Field-installed, 2-position, butterfly type with position tracking; _____.

2. Control Components for Preventing Shutdown:
   a. Provide high pressure limit with indicating light for each compressor, set lower than factory pressure switch to automatically unload compressor and prevent nuisance high pressure condenser control trip.
   b. Provide one protector with indicating light for each compressor, with current limit setpoint of 120 percent of compressor running load amperage to automatically unload compressor preventing over-current trip.
   c. Provide low refrigerant limit to automatically unload each compressor preventing a low evaporator temperature trip.
3. Chiller Operation in Abnormal Operating Conditions:
   a. Unloaded Running: Adequate chilled water production.
   b. Trip-out Limit Reached: Chiller goes off-line and manual reset is required for continued operation.
4. Control Panel Display:
   a. Evaporator pressure.
   b. Condenser refrigerant pressure.
   c. Entering and leaving evaporator water temperature.
5. Points for Remote Monitoring and Control:
   a. Entering and leaving condenser water temperature as applicable.
   b. Chilled water setpoint.
   c. Electrical 3 phase current limit and percent RLA setpoint.
   d. Electrical 3 phase amp draw.
   e. Chiller operating mode.
   f. Condenser refrigerant temperature.
   g. Elapsed time and number of starts counter.
   h. Chiller compressor run status relay.
   i. Minimum of 20 diagnostics with time and date stamp.
   j. Identification of the fault, date, time and operating mode at time of occurrence, type of reset required, and help message.
   k. Relay output energized upon detecting a fault requiring manual reset.
   l. Relay output energized whenever unit is operating in a limit mode for an extended period of time.
   m. Analog input to control leaving chilled water temperature setpoint based upon a 4-20ma or 0-10 VDC signal from the building automation system.
   n. Programmable soft during pull-down period via ramped current limit or fully adjustable, temperature pull-down rate.
   o. Leaving chilled water reset based upon return water temperature.
   p. Provide RS-232 for printer interface.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Align chiller package on steel or concrete foundations.

C. Install units on vibration isolators.

D. Connect to electrical service.

E. Connect to chilled water piping.

F. Connect to condenser water piping.

G. Arrange piping for easy dismantling to permit tube cleaning and removal.

3.02 MANUFACTURER'S FIELD SERVICES

A. Perform factory startup of the chiller by factory trained and authorized servicing technicians confirming equipment has been correctly installed prior to equipment becoming operational and covered under the manufacturer's warranty.

B. Supply initial charge of refrigerant and oil if not completely factory charged.

C. Demonstrate system operations and verify specified performance.

3.03 CLOSEOUT ACTIVITIES

A. See Section 017800 - Closeout Submittals for closeout submittals.

B. See Section 017900 - Demonstration and Training for additional requirements.

3.04 MAINTENANCE

A. See Section 017000 - Execution and Closeout Requirements for additional requirements.

END OF SECTION 236426

SECTION 236514
INDUCED-DRAFT COOLING TOWERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Induced-draft cooling towers.

B. Controls.

1.02 REFERENCE STANDARDS

A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings.

B. ABMA STD 11 - Load Ratings and Fatigue Life for Roller Bearings.

C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

F. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

G. UL (DIR) - Online Certifications Directory.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

1.04 QUALITY ASSURANCE

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. EVAPCO, Inc: www.evapco.com/#sle.

2.02 INDUCED-DRAFT COOLING TOWERS

A. General Requirements:
   1. Provide units for outdoor use, factory assembled, sectional, counterflow, vertical discharge, blow-through design, with fan assemblies built into pan and casing.
   2. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for purpose specified and indicated.

B. Induced-Draft Cooling Tower:
   1. Fans: Multiblade, cast aluminum, axial type, with belt drive, bearings with ABMA STD 9 or ABMA STD 11 L-10 life at 30,000 hours, with extended grease fittings.
   2. Fan Guard: Welded steel rod and wire guard, hot-dipped-galvanized after fabrication.
   3. Safety: Safety railings, and ladder with safety cage from grade to fan deck.
   4. Distribution Section: Polyvinyl chloride piping header and branches with ABS plastic spray nozzles.
   5. Fill:
      a. Self-supporting, fluted polyvinyl chloride plastic with flame spread index of 5 or less, when tested in accordance with ASTM E84.
      b. Fungal Resistance: No growth when tested in accordance with ASTM G21.
   6. Float Valves: Brass or bronze, balanced-piston type make-up valve with plastic or copper float.
   7. Hardware: Galvanized steel nuts, bolts, washers, and nails; assembled with phenolic-epoxy-coated, corrosion-resistant washer head fasteners.
   8. Galvanized Steel Sheet Components: Hot-dipped-galvanized steel, ASTM A653/A653M, with G210/Z600 coating, and finished with zinc-chromatized-aluminum paint.

9. Steel Angles, Plates, Bars, and Shapes: Galvanized after fabrication to comply with ASTM A123/A123M, Coating Thickness Grade 100.

2.03 CONTROLS

A. Electric Temperature Controller: In pan, with sensor to cycle fans.

B. Time Delay Relay: Limits fan motor starts to not more than six per hour.

2.04 ACCESSORIES

A. Electric Immersion Heaters: In pan, suitable to maintain temperature of water in pan at 42 degrees F when outside temperature is 0 degrees F and wind velocity is 15 mph; immersion thermostat and float control operate heaters on low temperature when pan is filled.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.02 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements for additional requirements.

3.03 SYSTEM STARTUP

A. Start-up tower in presence of and instruct Owner's operating personnel.

END OF SECTION 236514

SECTION 260519
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single conductor building wire.

B. Metal-clad cable.

C. Wiring connectors.

D. Electrical tape.

E. Heat shrink tubing.

F. Oxide inhibiting compound.

G. Wire pulling lubricant.

H. Cable ties.

I. 120V power connections to fire alarm components.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.

B. Section 260526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.

C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire.

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes.

D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation.

E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape.

F. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes.

G. NECA 1 - Standard for Good Workmanship in Electrical Construction.

H. NECA 120 - Standard for Installing Armored Cable (AC) and Type Metal-Clad (MC) Cable.

I. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy.

J. NETA ATS - Standard for Acceptance Testing Specifications for Electrical Power Equipment And Systems.

K. NFPA 70 - National Electrical Code.

L. UL 44 - Thermoset-Insulated Wires and Cables.

M. UL 83 - Thermoplastic-Insulated Wires and Cables.

N. UL 267 - Outline of Investigation for Wire-Pulling Compounds.

O. UL 486A-486B - Wire Connectors.

P. UL 486C - Splicing Wire Connectors.

Q. UL 486D - Sealed Wire Connector Systems.

R. UL 493 - Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables.

S. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape.

T. UL 1569 - Metal-Clad Cables.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
   3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. No submittals required.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated.

C. Nonmetallic-sheathed cable is not permitted.

D. Service entrance cable is not permitted.

E. Armored cable is not permitted.

F. Metal-clad cable is permitted only as follows:
   1. At indoor, dry locations.
   2. Where not exposed to damage or corrosive atmospheres.
   3. Where not exposed to view.
   4. Where concealed above accessible ceilings for connections to luminaires.
   5. Where concealed in hollow stud walls and above accessible ceilings for branch circuits up to 20 A.
   6. Provide single conductor building wire in raceway for circuit homerun to panelboards.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Provide new conductors and cables manufactured not more than one year prior to installation.

D. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

E. Comply with NEMA WC 70.

F. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

G. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

H. Conductors for Grounding and Bonding: Also comply with Section 260526.

I. Conductors and Cables Installed in Cable Tray: Listed and labeled as suitable for cable tray use.

J. Conductors and Cables Installed Where Exposed to Direct Rays of Sun: Listed and labeled as sunlight resistant.

K. Conductors and Cables Installed Exposed in Spaces Used for Environmental Air (only where specifically permitted): Plenum rated, listed and labeled as suitable for use in return air plenums.

L. Conductor Material:
   1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
   2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
   3. Tinned Copper Conductors: Comply with ASTM B33.

M. Minimum Conductor Size:
   1. Branch Circuits: 12 AWG.
      a. Exceptions:
         1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
         2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.
         3) 20 A, 277 V circuits longer than 150 feet: 10 AWG, for voltage drop.
   2. Control Circuits: 16 AWG.

N. Conductor Color Coding:
   1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
   2. Color Coding Method: Integrally colored insulation.
      a. Conductors size 6 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
   3. Color Code (Power and Lighting):
      a. 480Y/277 V, 3 Phase, 4 Wire System:
         1) Phase A: Brown.
         2) Phase B: Orange.
         3) Phase C: Yellow.
         4) Neutral/Grounded: Gray.
      b. 208Y/120 V, 3 Phase, 4 Wire System:
         1) Phase A: Black.
         2) Phase B: Red.
         3) Phase C: Blue.
         4) Neutral/Grounded: White.

c. Equipment Ground, All Systems: Green.
d. Travelers for 3-Way and 4-Way Switching: Purple or purple electrical tape wrapped around jacket of conductor utilized.
e. For modifications or additions to existing wiring systems, comply with existing color code when existing code complies with NFPA 70 and is approved by the authority having jurisdiction.
f. For control circuits, comply with manufacturer's recommended color code.

4. Color Code (Systems): The following colors apply to overall outside jacket when conductors are not in color marked conduit. All system wiring not in conduit must be plenum rated.
a. Fire Alarm System: Red.
b. Telephone System: White.
c. HVAC Control System: Green.
d. PA System: Grey.
e. Cat5e Data System: Blue.
f. Cat6 Data System: Violet.
g. Security System: White.
h. CCTV System: Yellow

2.03 SINGLE CONDUCTOR BUILDING WIRE

A. Manufacturers:
1. Copper Building Wire:
a. Cerro Wire LLC: www.cerrowire.com/#sle.
b. Encore Wire Corporation: www.encorewire.com/#sle.
c. Southwire Company: www.southwire.com/#sle.
d. Houston Wire and Cable Company: www.houwire.com
e. Coleman Cable, Inc: www.colemancables.com
f. Substitutions: See Section 016000 - Product Requirements.

B. Description: Single conductor insulated wire.

C. Conductor Stranding:
1. Feeders and Branch Circuits:
a. Size 10 AWG and Smaller: Solid.
b. Size 8 AWG and Larger: Stranded.
2. Control Circuits: Stranded.

D. Insulation Voltage Rating: 600 V.

E. Insulation:
1. Copper Building Wire: Type THHN/THWN, THHN/THWN-2, or XHHW-2.
2. Any Copper Wire Installed Underground: Type XHHW-2.

2.04 METAL-CLAD CABLE

A. Manufacturers:
1. Cerro Wire LLC[<>]: www.cerrowire.com.
2. AFC Cable Systems Inc: www.afcweb.com/#sle.
3. Encore Wire Corporation: www.encorewire.com/#sle.
4. Southwire Company: www.southwire.com/#sle.
5. Coleman Cable, Inc: www.colemancables.com
6. Substitutions: See Section 016000 - Product Requirements.

B. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.

C. Conductor Stranding:
1. Size 10 AWG and Smaller: Solid.

2. Size 8 AWG and Larger: Stranded.

D. Insulation Voltage Rating: 600 V.

E. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.

F. Provide dedicated neutral conductor for each single circuit (120/277V) when utilizing multi-conductor MC cable.

G. Grounding: Full-size integral equipment grounding conductor.

H. Armor: Aluminum or steel interlocked tape.

2.05 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Connectors for Grounding and Bonding: Comply with Section 260526.

C. Wiring Connectors for Splices and Taps:
1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.

D. Wiring Connectors for Terminations:
1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
4. Provide motor pigtail connectors for connecting motor leads in order to facilitate disconnection.
5. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
6. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.
7. Conductors for Control Circuits: Use crimped terminals for all connections.

E. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.

F. Do not use push-in wire connectors.

G. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
1. Manufacturers:
a. 3M: www.3m.com/#sle.
b. Ideal Industries, Inc: www.idealindustries.com/#sle.
c. NSI Industries LLC: www.nsiindustries.com/#sle.
d. Substitutions: See Section 016000 - Product Requirements.

H. Mechanical Connectors: Provide bolted type or set-screw type.
1. Manufacturers:
a. Burndy LLC: www.burndy.com/#sle.
b. Ilsco: www.ilsco.com/#sle.
c. ABB Global: www.abb.com
d. Substitutions: See Section 016000 - Product Requirements.

I. Compression Connectors: Provide circumferential type or hex type crimp configuration.
   1. Manufacturers:
      a. Burndy LLC: www.burndy.com/#sle.
      b. Ilsco: www.ilsco.com/#sle.
      c. ABB Global: www.abb.com
      d. Substitutions: See Section 016000 - Product Requirements.

J. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.
   1. Manufacturers:
      a. Burndy LLC: www.burndy.com/#sle.
      b. Ilsco: www.ilsco.com/#sle.
      c. ABB Global: www.abb.com
      d. 3M: www.3m.com.
      e. Substitutions: See Section 016000 - Product Requirements.

2.06 ACCESSORIES

A. Electrical Tape:
   1. Manufacturers:
      a. 3M: www.3m.com/#sle.
      b. Plymouth Rubber Europa: www.plymouthrubber.com/#sle.
      c. Substitutions: See Section 016000 - Product Requirements.
   2. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
   3. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
   4. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil; suitable for continuous temperature environment up to 194 degrees F and short-term 266 degrees F overload service.
   5. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil; suitable for continuous temperature environment up to 176 degrees F.
   6. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil.

B. Wire Pulling Lubricant:
   1. Manufacturers:
      a. 3M: www.3m.com/#sle.
      b. American Polywater Corporation: www.polywater.com/#sle.
      c. Ideal Industries, Inc: www.idealindustries.com/#sle.
      d. Substitutions: See Section 016000 - Product Requirements.
   2. Listed and labeled as complying with UL 267.
   3. Suitable for use with conductors/cables and associated insulation/jackets to be installed.
   4. Suitable for use at installation temperature.

C. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that field measurements are as indicated.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

A. Circuiting Requirements:
   1. Arrange circuiting to minimize splices.
   2. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
   3. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
   4. Common Neutrals: Sharing of neutral/grounded conductors among single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.
   5. Provide oversized neutral/grounded conductors where indicated and as specified below.
      a. Provide 200 percent rated neutral for feeders fed from K-rated transformers.
      b. Provide 200 percent rated neutral for feeders serving panelboards with 200 percent rated neutral bus.

B. Install products in accordance with manufacturer's instructions.

C. Perform work in accordance with NECA 1 (general workmanship).

D. Install metal-clad cable (Type MC) in accordance with NECA 120.

E. Installation in Raceway:
   1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   2. Pull all conductors and cables together into raceway at same time.
   3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
   4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

F. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

G. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.

H. Terminate cables using suitable fittings.
   1. Metal-Clad Cable (Type MC):
      a. Use listed fittings.
      b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
      c. Do not use direct-bearing set-screw type fittings for cables with aluminum armor.

I. Install conductors with a minimum of 12 inches of slack at each outlet.

J. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

K. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

L. Make wiring connections using specified wiring connectors.
   1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
   2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
   3. Do not remove conductor strands to facilitate insertion into connector.
   4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
   5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
   6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

M. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.

N. Insulate ends of spare conductors using vinyl insulating electrical tape.

O. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.

P. Identify conductors and cables in accordance with Section 260553.

Q. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.

R. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Perform continuity test on all branch circuit conductors.

C. Verify proper phasing of connections and correct, if necessary.

D. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION 260519

SECTION 260526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

1.02 RELATED REQUIREMENTS

A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
   1. Includes oxide inhibiting compound.

B. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction.

B. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings.

C. NETA ATS - Standard for Acceptance Testing Specifications for Electrical Power Equipment And Systems.

D. NFPA 70 - National Electrical Code.

E. UL 467 - Grounding and Bonding Equipment.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
   2. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:

1.05 SUBMITTALS

A. No submittals required.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.

B. Do not use products for applications other than as permitted by NFPA 70 and product listing.

C. Provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

E. Bonding and Equipment Grounding:
   1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
   2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
   3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
   4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
   5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
   6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.

2.02 GROUNDING AND BONDING COMPONENTS

A. General Requirements:
   1. Provide products listed, classified, and labeled as suitable for the purpose intended.
   2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 260526:
   1. Use insulated copper conductors:
      a. Exceptions:
         1) Use bare tinned copper conductors where installed underground in direct contact with earth.
         2) Use bare tinned copper conductors where directly encased in concrete (not in raceway).

C. Connectors for Grounding and Bonding:
   1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
   2. Use exothermic welded connections for underground, concealed and other inaccessible connections.
   3. Use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
      a. Exceptions:
         1) Use exothermic welded connections for connections to metal building frame.
   4. Manufacturers - Mechanical and Compression Connectors:
      a. allG Fabrication, Ltd. www.allgfab.com
      b. Burndy LLC: www.burndy.com/#sle.
      c. nVent www.nvent.com/en-us/erico
      d. ILSCO: www.ilsco.com
      e. Harger Lightning & Grounding: www.harger.com/#sle.
      f. ABB Global: www.abb.com
      g. Substitutions: See Section 016000 - Product Requirements.
   5. Manufacturers - Exothermic Welded Connections:
      a. Burndy LLC: www.burndy.com/#sle.
      b. Harger Lightning & Grounding: www.harger.com.
      c. ThermOweld: www.thermoweld.com.
      d. Substitutions: See Section 016000 - Product Requirements.

D. Oxide Inhibiting Compound: Comply with Section 260519.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that work likely to damage grounding and bonding system components has been completed.

B. Verify that field measurements are as indicated.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

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

B. Perform work in accordance with NECA 1 (general workmanship).

C. Make grounding and bonding connections using specified connectors.
   1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
   2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
   3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
   4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
   5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

D. Identify grounding and bonding system components in accordance with Section 260553.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect and test in accordance with NETA ATS except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.13.

D. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.

E. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

F. Submit detailed reports indicating inspection and testing results and corrective actions taken.

END OF SECTION 260526

SECTION 260529
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Concrete equipment pads.

B. Section 055000 - Metal Fabrications: Materials and requirements for fabricated metal supports.

C. Section 260533.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.

D. Section 260533.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.

D. MFMA-4 - Metal Framing Standards Publication.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction.

F. NFPA 70 - National Electrical Code.

G. UL 5B - Strut-Type Channel Raceways and Fittings.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with actual equipment and components to be installed.
   2. Coordinate work to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at installed locations.
   4. Coordinate arrangement of supports with ductwork, piping, equipment and other potential conflicts.
   5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has cured; see Section 033000.

1.05 SUBMITTALS

A. No submittals required.

1.06 QUALITY ASSURANCE

A. Products: Listed and classified by a Nationally Recognized Testing Laboratory as suitable for the purpose specified and indicated.

B. Product Listing Organization Qualifications: Organization recognized by OSHA as Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Comply with the following. Where requirements differ, comply with most stringent.
      a. NFPA 70.
      b. Requirements of authorities having jurisdiction.
   2. Provide required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for complete installation of electrical work.
   3. Provide products listed, classified, and labeled as suitable for purpose intended, where applicable.
   4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
   5. Steel Components: Use corrosion-resistant materials suitable for environment where installed.
      a. Indoor Dry Locations: Use zinc-plated steel.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel or stainless steel.
      c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
      d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit and Cable Supports: Straps and clamps suitable for conduit or cable to be supported.
   1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
   2. Conduit Clamps: Bolted type.

C. Outlet Box Supports: Hangers and brackets suitable for boxes to be supported.
   1. Manufacturers:
      a. Substitutions: See Section 016000 - Product Requirements.

D. Metal Channel/Strut Framing Systems:
   1. Description: Factory-fabricated, continuous-slot, metal channel/strut and associated fittings, accessories, and hardware required for field assembly of supports.
   2. Comply with MFMA-4.
   3. Channel Material:
      a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
   4. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch.
   5. Minimum Channel Dimensions: 1-5/8 inch wide by 13/16 inch high.

E. Anchors and Fasteners:
   1. Concrete: Use preset concrete inserts or expansion anchors.
      a. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
         1) Comply with MFMA-4.
         2) Channel Material: Use galvanized steel.
   2. Solid or Grout-Filled Masonry: Use expansion anchors.
   3. Hollow Masonry: Use toggle bolts.
   4. Hollow Stud Walls: Use toggle bolts.
   5. Steel: Use beam clamps.
   6. Sheet Metal: Use sheet metal screws.
   7. Plastic and lead anchors are not permitted.
   8. Powder-actuated fasteners are not permitted.
   9. Hammer-driven anchors and fasteners are not permitted.

10. Preset Concrete Inserts: Continuous metal channel/strut and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
    a. Comply with MFMA-4.
    b. Channel Material: Use galvanized steel.
    c. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch minimum base metal thickness.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive support and attachment components.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

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

B. Install hangers and supports in accordance with NECA 1.

C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

G. Field Welding, Where Approved by Architect: See Section 055000.

H. Equipment Support and Attachment:
    1. Use metal, fabricated supports or supports assembled from metal channel/strut to support equipment as required.
    2. Use metal channel/strut secured to studs to support equipment surface mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
    3. Use metal channel/strut to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
    4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

I. Conduit Support and Attachment: See Section 260533.13 for additional requirements.

J. Box Support and Attachment: See Section 260533.16 for additional requirements.

K. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.

L. Secure fasteners in accordance with manufacturer's recommended torque settings.

M. Remove temporary supports.

N. Identify independent electrical component support wires above accessible ceilings, where permitted, with color distinguishable from ceiling support wires in accordance with NFPA 70.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements for additional requirements.

B. Inspect support and attachment components for damage and defects.

C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

D. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION 260529

SECTION 260533.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).
B. Stainless steel rigid metal conduit (RMC).
C. Stainless steel intermediate metal conduit (IMC).
D. PVC-coated galvanized steel rigid metal conduit (RMC).
E. Flexible metal conduit (FMC).
F. Liquidtight flexible metal conduit (LFMC).
G. Galvanized steel electrical metallic tubing (EMT).
H. Stainless steel electrical metallic tubing (EMT).
I. Rigid polyvinyl chloride (PVC) conduit.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.
B. Section 260526 - Grounding and Bonding for Electrical Systems.
   1. Includes additional requirements for fittings for grounding and bonding.
C. Section 260529 - Hangers and Supports for Electrical Systems.
D. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
E. Section 312316 - Excavation.
F. Section 312316.13 - Trenching: Excavating, bedding, and backfilling.

1.03 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC).
B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S).
C. NECA 1 - Standard for Good Workmanship in Electrical Construction.
D. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT).
E. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC).
F. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.
G. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Metal Conduit and Intermediate Metal Conduit.
H. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit.
I. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing.
J. NFPA 70 - National Electrical Code.
K. UL 1 - Flexible Metal Conduit.
L. UL 6 - Electrical Rigid Metal Conduit-Steel.
M. UL 360 - Liquid-Tight Flexible Metal Conduit.
N. UL 514A - Metallic Outlet Boxes.
O. UL 514B - Conduit, Tubing, and Cable Fittings.
P. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings.
Q. UL 797 - Electrical Metallic Tubing-Steel.

R. UL 797A - Electrical Metallic Tubing - Aluminum and Stainless Steel.

S. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations.

T. UL 2419 - Outline of Investigation for Electrically Conductive Corrosion Resistant Compounds.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate minimum sizes of conduits with actual type and quantity of conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate arrangement of conduits with structural members, ductwork, piping, equipment, and other potential conflicts.
   3. Verify exact conduit termination locations required for boxes, enclosures, and equipment.
   4. Coordinate work to provide roof penetrations that preserve integrity of roofing system and do not void roof warranty.
   5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not begin installation of conductors and cables until installation of conduit between termination points is complete.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittals procedures.

1.06 QUALITY ASSURANCE

A. Products: Listed and classified by a Nationally Recognized Testing Laboratory as suitable for the purpose specified and indicated.

B. Product Listing Organization Qualifications: Organization recognized by OSHA as Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

A. Use the conduit types indicated for the specified applications. Where conduit type for a particular application is not specified, consult Architect.

B. Underground:
   1. Exterior, Direct-Buried: Use rigid PVC conduit.
   2. Where rigid polyvinyl chloride (PVC) conduit is provided, transition to galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), or schedule 80 rigid PVC conduit where emerging from underground.
   3. Where rigid polyvinyl (PVC) conduit larger than 2-inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit (RMC) elbows, stainless steel rigid metal conduit (RMC) elbows, galvanized steel intermediate metal conduit (IMC) elbows, stainless steel intermediate metal conduit (IMC) elbows, PVC-coated galvanized steel rigid metal conduit (RMC) elbows, or concrete-encased PVC elbows for bends.

C. Embedded Within Concrete:
   1. Within Slab on Grade: Not permitted.
   2. Within Slab Above Ground: Not permitted.

D. Concealed Above Accessible Ceilings: Use electrical metallic tubing (EMT) or MC cable as allowed in Section 260519.

E. Exposed, Interior, Not Subject to Physical Damage: Use electrical metallic tubing (EMT).

F. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit.

G. Exposed, Interior, Subject to Severe Physical Damage: Use galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or stainless steel intermediate metal conduit (IMC).

H. Exposed, Exterior: Use galvanized steel rigid metal conduit.

I. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit.

J. Hazardous/Classified Locations: Use galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), or PVC-coated galvanized steel rigid metal conduit (RMC).

K. Flexible Connections to Vibrating Equipment:
   1. Dry Locations: Use flexible metal conduit (FMC).
   2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit (LFMC).
   3. Maximum Length: 6 feet unless otherwise indicated.

L. Fished in Existing Walls, Where Necessary: Use flexible metal conduit (FMC), galvanized steel electrical metallic tubing (EMT), or stainless steel electrical metallic tubing (EMT).

2.02 CONDUIT - GENERAL REQUIREMENTS

A. Comply with NFPA 70.

B. Existing Work: Where existing conduits are indicated to be reused, they may be reused only where they comply with specified requirements, are free from corrosion, and integrity is verified by pulling mandrel through them.

C. Fittings for Grounding and Bonding: See Section 260526 for additional requirements.

D. Provide conduit, fittings, supports, and accessories required for complete raceway system.

E. Provide products listed, classified, and labeled by testing firm acceptable to authority having jurisdiction as suitable for the purpose indicated.

F. Minimum Conduit Size:
   1. Interior: 3/4 inch (21 mm) trade size.
   2. Exterior: 1 inch (27 mm) trade size.

G. Where conduit size is not indicated, size to comply with NFPA 70.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Manufacturers:
   1. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com/#sle.
   2. Nucor Tubular Products: www.nucortubular.com/#sle.
   3. Western Tube, a division of Zekelman Industries: www.westerntube.com/#sle.
   4. Wheatland Tube, a division of Zekelman Industries: www.wheatland.com/#sle.
   5. Substitutions: See Section 016000 - Product Requirements.

B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

C. Fittings:
   1. Manufacturers:
      a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
      b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
      c. Substitutions: See Section 016000 - Product Requirements.
   2. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6.

3. Hazardous/Classified Locations: Use fittings listed and labeled as complying with UL 1203 for classification of installed location.
4. Material: Use steel or malleable iron.
   a. Do not use die cast zinc fittings.
5. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.04 STAINLESS STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC stainless steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6A.

B. Fittings:
1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6A.
2. Material: Use stainless steel with corrosion resistance equivalent to conduit.
3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.05 STAINLESS STEEL INTERMEDIATE METAL CONDUIT (IMC)

A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.

B. Fittings:
1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 1242.

2.06 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Manufacturers:
1. ABB Global: www.abb.com.
2. Robroy Industries: www.robroy.com.
3. Substitutions: Not permitted.

B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.

C. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil, 0.040 inch.

D. Interior Coating: Urethane, minimum thickness of 2 mil, 0.002 inch.

E. PVC-Coated Boxes and Fittings:
1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
2. Nonhazardous Locations: Use boxes and fittings listed and labeled as complying with UL 514A, UL 514B, or UL 6.
3. Hazardous/Classified Locations: Use fittings listed and labeled as complying with UL 1203 for classification of installed location.
4. Material: Use steel or malleable iron.
5. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil, 0.040 inch.
6. Interior Coating: Urethane, minimum thickness of 2 mil, 0.002 inch.

F. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil, 0.015 inch.

2.07 FLEXIBLE METAL CONDUIT (FMC)

A. Manufacturers:
1. AFC Cable Systems, Inc: www.afcweb.com.
2. Electri-Flex Company: www.electriflex.com.
3. International Metal Hose: www.metalhose.com.
4. Substitutions: See Section 016000 - Product Requirements.

B. Description: NFPA 70, Type FMC standard-wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems.

C. Fittings:
   1. Manufacturers:
      a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
      b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
      c. Substitutions: See Section 016000 - Product Requirements.
   2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   3. Material: Use steel or malleable iron.
      a. Do not use die cast zinc fittings.

2.08 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Manufacturers:
   1. AFC Cable Systems, Inc: www.afcweb.com.
   2. Electri-Flex Company: www.electriflex.com.
   3. International Metal Hose: www.metalhose.com.
   4. Substitutions: See Section 016000 - Product Requirements.

B. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.

C. Fittings:
   1. Manufacturers:
      a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
      b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
      c. Substitutions: See Section 016000 - Product Requirements.
   2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   3. Material: Use steel or malleable iron.
      a. Do not use die cast zinc fittings.

2.09 GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers:
   1. Allied Tube & Conduit: www.alliedeg.com.
   2. Nucor Tubular Products: www.nucortubular/#sle.
   3. Wheatland Tube Company: www.wheatland.com.
   4. Substitutions: See Section 016000 - Product Requirements.

B. Description: NFPA 70, Type EMT galvanized steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

C. Fittings:
   1. Manufacturers:
      a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
      b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
      c. Substitutions: See Section 016000 - Product Requirements.
   2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   3. Material: Use steel or malleable iron.
      a. Do not use die cast zinc fittings.
   4. Connectors and Couplings: Use compression/gland or set-screw type.
      a. Do not use indenter type connectors and couplings.

2.10 STAINLESS STEEL ELECTRICAL METALLIC TUBING (EMT)

A. Description: NFPA 70, Type EMT stainless steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797A.

B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Connectors and Couplings: Use compression/gland or set-screw type.

2.11 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. Manufacturers:
   1. Cantex Inc: www.cantexinc.com/#sle.
   2. JM Eagle: www.jmeagle.com/#sle.
   3. Substitutions: See Section 016000 - Product Requirements.

B. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.

C. Fittings:
   1. Manufacturer: Same as manufacturer of conduit to be connected.
   2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.12 ACCESSORIES

A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil, 0.020 inch.

B. Conduit Joint Compound: Corrosion-resistant, electrically conductive compound listed as complying with UL 2419; suitable for use with conduit to be installed.

C. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.

D. Pull Strings: Use nylon or polyester tape with average breaking strength of not less than 1,250 lbf.

E. Sealing Compound for Hazardous/Classified Location Sealing Fittings: Listed for use with particular fittings to be installed.

F. Sealing Systems for Concrete Penetrations:
   1. Sleeves: Provide water stop ring or cement coating that bonds to concrete to prevent water infiltration.
   2. Rate for minimum of 40 psig; suitable for sealing around conduits to be installed.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive conduits.

C. Verify that conditions are satisfactory for installation prior to starting work.

D. Verify routing and termination locations of conduit prior to rough-in.

3.02 INSTALLATION

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

B. Install conduit in accordance with NECA 1.

C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.

D. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by manufacturer.

E. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.

F. Conduit Routing:
   1. Unless dimensioned, conduit routing indicated is diagrammatic.
   2. When conduit destination is indicated without specific routing, determine exact routing required.
   3. Conceal conduits unless specifically indicated to be exposed.
   4. Conduits in the following areas may be exposed, unless otherwise indicated:
      a. Electrical rooms.
      b. Mechanical equipment rooms.
      c. Within joists in areas with no ceiling.
   5. Unless otherwise approved, do not route exposed conduits:
      a. Across floors.
      b. Across top of parapet walls.
      c. Across building exterior surfaces.
   6. Arrange conduit to maintain adequate headroom, clearances, and access.
   7. Arrange conduit to provide no more than equivalent of four 90-degree bends between pull points.
   8. Arrange conduit to provide no more than 150 feet between pull points.
   9. Route conduits above water and drain piping where possible.
   10. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
   11. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
   12. Maintain minimum clearance of 12 inches between conduits and hot surfaces. This includes, but is not limited to:
      a. Heaters.
      b. Hot water piping.
      c. Flues.
   13. Group parallel conduits in same area on common rack.

G. Conduit Support:
   1. Secure and support conduits in accordance with NFPA 70 using suitable supports and methods approved by authorities having jurisdiction; see Section 260529.
   2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
   3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
   4. Use conduit strap to support single surface-mounted conduit.
      a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
   5. Use metal channel/strut with accessory conduit clamps to support multiple parallel surface-mounted conduits.
   6. Use conduit clamp to support single conduit from beam clamp or threaded rod.
   7. Use trapeze hangers assembled from threaded rods and metal channel/strut with accessory conduit clamps to support multiple parallel suspended conduits.
   8. Use nonpenetrating rooftop supports to support conduits routed across rooftops, where approved.
   9. Use of spring steel conduit clips for support of conduits is not permitted.
   10. Use of wire for support of conduits is not permitted.
   11. Where conduit support intervals specified in NFPA 70 and NECA standards differ, comply with most stringent requirements.

H. Connections and Terminations:
   1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.

2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
3. Use suitable adapters where required to transition from one type of conduit to another.
4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
6. Where spare conduits stub up through concrete floors and are not terminated in box or enclosure, provide threaded couplings equipped with threaded plugs set flush with finished floor.
7. Provide insulating bushings, insulated throats, or listed metal fittings with smooth, rounded edges at conduit terminations to protect conductors.
8. Secure joints and connections to provide mechanical strength and electrical continuity.

I. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
2. Make penetrations perpendicular to surfaces.
3. Provide sleeves for penetrations as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
4. Conceal bends for conduit risers emerging above ground.
5. Provide suitable sealing system where conduits penetrate exterior wall below grade.
6. Where conduits penetrate waterproof membrane, seal to maintain integrity of membrane.
7. Provide decorative metal escutcheon plates for conduit penetrations exposed to public view.
8. Install firestopping to preserve fire resistance rating of partitions and other elements; see Section 078400.

J. Underground Installation:
1. Provide trenching and backfilling; see Section 312316.13.
2. Backfill with red flowable-fill to a minimum of 4 inches above underground conduits.
   a. Anchor underground conduits at 10 foot intervals to trench bottom to avoid floating after flowable fill is poured.
3. Minimum Conduit Depth:
   a. Underground, Exterior: 18 inches.
   b. Under Slab on Grade: 12 inches to bottom of slab.

K. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
3. Where conduits are subject to earth movement by settlement or frost.

L. Conduit Sealing:
1. Use foam conduit sealant to prevent entry of moisture and gases. This includes, but is not limited to:
   a. Where conduits enter building from outside.
   b. Where service conduits enter building from underground distribution system.
   c. Where conduits enter building from underground.
   d. Where conduits may transport moisture to contact live parts.
2. Where conduits cross barriers between areas of potential substantial temperature differential, use foam conduit sealant at accessible point near penetration to prevent condensation. This includes, but is not limited to:
   a. Where conduits pass from outdoors into conditioned interior spaces.

b. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

M. Provide pull string in each empty conduit and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.

N. Provide grounding and bonding; see Section 260526.

O. Identify conduits; see Section 260553.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements for additional requirements.

B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

C. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer's instructions.

D. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

A. Clean interior of conduits to remove moisture and foreign matter.

3.05 PROTECTION

A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION 260533.13

SECTION 260533.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.

B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.

C. Underground boxes/enclosures.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete.

B. Section 078400 - Firestopping.

C. Section 083100 - Access Doors and Panels: Panels for maintaining access to concealed boxes.

D. Section 260526 - Grounding and Bonding for Electrical Systems.

E. Section 260529 - Hangers and Supports for Electrical Systems.

F. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

G. Section 262726 - Wiring Devices:
   1. Wall plates.
   2. Additional requirements for locating boxes for wiring devices.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices.

C. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

D. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.

E. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

F. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports.

G. NFPA 70 - National Electrical Code.

H. SCTE 77 - Specifications for Underground Enclosure Integrity.

I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations.

J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations.

K. UL 508A - Industrial Control Panels.

L. UL 514A - Metallic Outlet Boxes.

M. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers.

N. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
   2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.

3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
6. Coordinate the work with other trades to preserve insulation integrity.
7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
8. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for boxes for hazardous (classified) locations, floor boxes, underground boxes/enclosures, and boxes/cabinets/enclosures over 100 cubic inches.
   1. Outlet and device box submittals are not required.

C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Keys for Lockable Enclosures: Two of each different key.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Comply with NEMA 250 for electrical cabinets and enclosures larger than 100 cubic inches (1,650 cu cm).

C. Comply with SCTE 77 for Polymer Concrete Underground Boxes/Enclosures.

D. Products: Listed and classified by a Nationally Recognized Testing Laboratory as suitable for the purpose specified and indicated.

E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 BOXES

A. General Requirements:
   1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
   2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
   3. Provide products listed, classified, and labeled as suitable for the purpose intended.
   4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
   5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
   1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
   2. Use cast iron boxes for damp or wet locations; furnish with compatible weatherproof gasketed covers.

3. Use cast iron boxes where exposed galvanized steel rigid metal conduit is used.
4. Use suitable concrete type boxes where flush-mounted in concrete.
5. Use suitable masonry type boxes where flush-mounted in masonry walls.
6. Use raised covers suitable for the type of wall construction and device configuration where required.
7. Use shallow boxes where required by the type of wall construction.
8. Do not use "through-wall" boxes designed for access from both sides of wall.
9. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
10. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
12. Wall Plates: Comply with Section 262726.
13. Manufacturers:
    a. Cooper Crouse-Hinds, a division of Eaton Corporation: www.eaton.com
    b. Hubbell Incorporated; Bell Products: www.hubbell-rtb.com/#sle.
    c. Hubbell Incorporated; RACO Products: www.hubbell-rtb.com/#sle.
    d. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
    e. ABB Global: www.abb.com.
    f. Substitutions: See Section 016000 - Product Requirements.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
1. Comply with NEMA EN 10250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
2. NEMA EN 10250 Environment Type, Unless Otherwise Indicated:
    a. Indoor Clean, Dry Locations: Type 1, painted steel.
    b. Outdoor Locations: Type 3R, painted steel.
    c. Wet, Damp, or Corrosive Locations: Type 4X, stainless steel or fiberglass.
3. Junction and Pull Boxes Larger Than 100 cubic inches:
    a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
    b. Boxes 6 square feet and Larger: Provide sectionalized screw-cover or hinged-cover enclosures.
4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:
    a. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.
    b. Back Panels: Painted steel, removable.
    c. Terminal Blocks: Provide voltage/current ratings and terminal quantity suitable for purpose indicated, with 25 percent spare terminal capacity.
5. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
6. Manufacturers:
    a. Cooper B-Line, a division of Eaton Corporation: www.eaton.com.
    b. Hoffman, a brand of Pentair Technical Products: www.hoffmanonline.com/#sle.
    c. Hubbell Incorporated; Wiegmann Products: www.hubbell-wiegmann.com/#sle.
    d. Substitutions: See Section 016000 - Product Requirements.

D. In-ground Boxes/Enclosures:
1. Description: In-ground, open bottom boxes furnished with flush, non-skid covers with legend indicating type of service and stainless steel tamper resistant cover bolts.
2. Size: As indicated on drawings.
3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 12 inches.
4. Provide logo on cover to indicate type of service.
5. Applications:

a. Sidewalks and Landscaped Areas Subject Only to Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures with minimum SCTE 77 Tier 5 load rating.
b. Do not use polymer concrete enclosures in areas subject to deliberate vehicular traffic.

6. Polymer Concrete Underground Boxes/Enclosures: Comply with SCTE 77.
   a. Manufacturers:
      1) Hubbell Incorporated; Quazite Products: www.hubbellpowersystems.com/#sle.
      2) MacLean Power Systems: www.macleanpower.com
      3) Oldcastle Infrastructure: www.oldcastleinfrastructure.com
      4) Substitutions: See Section 016000 - Product Requirements.
   b. Combination fiberglass/polymer concrete boxes/enclosures are acceptable.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive boxes.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

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

B. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide separate boxes for emergency power and normal power systems.

E. Provide separate boxes for line voltage and low voltage systems.

F. Flush-mount boxes in finished areas.

G. Boxes may be surface-mounted where exposed conduits are permitted.

H. Box Locations:
   1. Locate boxes to be accessible. Provide access panels in accordance with Section 083100.
   2. Unless dimensioned, box locations indicated are approximate.
      a. Owner must approve any adjustment to box locations for wall devices.
   3. Locate boxes for devices installed under other sections:
      a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 262726.
   4. Locate boxes so that wall plates do not span different building finishes.
   5. Locate boxes so that wall plates do not cross masonry joints.
   6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
   7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
   8. Acoustic-Rated Walls: Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches horizontal separation.
   9. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
      a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.

b. Do not install flush-mounted boxes with area larger than 16 square inches or such that the total aggregate area of openings exceeds 100 square inches for any 100 square feet of wall area.

10. Locate junction and pull boxes to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points.
11. Locate junction and pull boxes in the following areas:
    a. Concealed above accessible suspended ceilings.
    b. Within joists in areas with no ceiling.
    c. Electrical rooms.
    d. Mechanical equipment rooms.

I. Box Supports:
1. Secure and support boxes in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
4. Use far-side support to secure flush-mounted boxes supported from single stud in hollow stud walls. Replace supports for boxes that permit excessive movement.

J. Install boxes plumb and level.

K. Flush-Mounted Boxes:
1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.

L. Floor-Mounted Cabinets: Mount on properly sized 4 inch high concrete pad constructed in accordance with Section 033000.

M. Install boxes as required to preserve insulation integrity.

N. In-ground Boxes/Enclosures:
1. Install enclosure on gravel base, minimum 6 inches deep.
2. Flush-mount enclosures located in concrete or paved areas.
3. Mount enclosures located in landscaped areas with top at 1 inch above finished grade.
4. Install additional bracing inside enclosures in accordance with manufacturer's instructions to minimize box sidewall deflections during backfilling. Backfill with cover bolted in place.

O. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

P. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.

Q. Close unused box openings.

R. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

S. Provide grounding and bonding in accordance with Section 260526.

T. Identify boxes in accordance with Section 260553.

3.03 CLEANING

A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.04 PROTECTION

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION 260533.16

SECTION 260548
VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Seismic control requirements.
   1. Includes requirements for seismic qualification of equipment not specified in this section.

B. Vibration isolators.

C. External seismic snubber assemblies.

D. Seismic restraint systems.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete.

B. Section 260529 - Hangers and Supports for Electrical Systems.

1.03 DEFINITIONS

A. Electrical Component: Where referenced in this section in regards to seismic controls, applies to any portion of the electrical system subject to seismic evaluation in accordance with applicable codes, including distributed systems (e.g., conduit, cable tray).

B. Seismic Restraint: Structural members or assemblies of members or manufactured elements specifically designed and applied for transmitting seismic forces between components and the seismic force-resisting system of the structure.

1.04 REFERENCE STANDARDS

A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures.

B. ASCE 19 - Structural Applications of Steel Cables for Buildings.

C. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications.

D. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.

E. FEMA 413 - Installing Seismic Restraints for Electrical Equipment.

F. FEMA E-74 - Reducing the Risks of Nonstructural Earthquake Damage.

G. ICC (IBC) - International Building Code.

H. MFMA-4 - Metal Framing Standards Publication.

I. NECA 1 - Standard for Good Workmanship in Electrical Construction.

J. NFPA 70 - National Electrical Code.

K. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate selection and arrangement of vibration isolation and/or seismic control components with the actual equipment to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Seismic Controls:
      a. Coordinate the arrangement of seismic restraints with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.

b. Coordinate the work with other trades to accommodate relative positioning of essential and nonessential components in consideration of seismic interaction.

5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:

1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 033000.

1.06 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Design Documents: Prepare and submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, details, and calculations.

C. Product Data: Provide manufacturer's standard catalog pages and data sheets for products, including materials, fabrication details, dimensions, and finishes.

1. Seismic Controls: Include seismic load capacities.

D. Shop Drawings - Seismic Controls:

1. Include dimensioned plan views and sections indicating proposed electrical component locations and distributed system routing, with locations and details of gravity supports and seismic restraints and associated attachments.
2. Identify anchor manufacturer, type, minimum embedment, minimum spacing, minimum member thickness, and minimum edge distance requirements.
3. Indicate proposed arrangement of distributed system trapeze support groupings.
4. Indicate proposed locations for distributed system flexible fittings and/or connections.
5. Indicate locations of seismic separations where applicable.

E. Seismic Design Data:

1. Compile information on project-specific characteristics of actual installed electrical components necessary for determining seismic design forces required to design appropriate seismic controls, including but not limited to the following.
   a. Component operating weight and center of gravity.
   b. Component elevation in the building in relation to the roof elevation (z/h).
   c. Component importance factor (Ip).
   d. For distributed systems, component materials and connection methods.
   e. Component amplification factor (ap) and component response modification factor (Rp), determined in accordance with ASCE 7 tables.
2. Include structural calculations, stamped or sealed by seismic controls designer, demonstrating suitability of seismic controls for seismic design forces.

F. Certification for seismically qualified equipment; identify basis for certification.

G. Evidence of qualifications for seismic controls designer.

H. Evidence of qualifications for manufacturer.

1.07 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with applicable building code.

C. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

D. Seismic Controls Designer Qualifications: Registered professional engineer licensed in the State of Missouri and with minimum five years experience designing seismic restraints for nonstructural components.

1. Designer may be employed by the manufacturer of the seismic restraint products.

E. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SEISMIC CONTROL REQUIREMENTS

A. Design and provide electrical component restraints, supports, and attachments suitable for seismic loads determined in accordance with applicable codes, as well as gravity and operating loads and other structural design considerations of the installed location. Consider wind loads for outdoor electrical components.

B. Seismic Design Criteria: ICC (IBC).
   1. Seismic Design Category: D.
   2. Risk Category: III.

C. Seismic Restraints:
   1. Provide seismic restraints for electrical components except where exempt according to applicable codes and specified seismic design criteria, as approved by authorities having jurisdiction.
   2. Seismic Restraint Exemptions:
      a. Exemptions for Seismic Design Category D, E, and F:
         1) Electrical components with component importance factor (Ip) of 1.0 where all of the following apply:
            (a) The component is positively attached to the structure.
            (b) Flexible connections are provided between the component and associated ductwork, piping, and conduit.
            (c) Either:
               (1) The component weighs 400 pounds or less and has a center of mass located 4 feet or less above the adjacent floor level.
               (2) The component weighs 20 pounds or less or, in the case of a distributed system, 5 pounds per foot or less.
      b. Raceway Exemptions, All Seismic Design Categories:
         1) Conduits less than 2-1/2 inch trade size.
         2) Trapeze supported raceways weighing less than 10 pounds per foot.
         3) Hanger supported raceways where each hanger in the raceway run is 12 inches or less in length from the raceway support to the supporting structure; rod hangers, where used, to be equipped with swivels.
      c. Lighting Exemptions, All Seismic Design Categories:
         1) Suspended luminaires where attachments are designed to accommodate 1.4 times the operating weight acting in both the vertical and horizontal directions and connections to structure allow for 360 degree range of motion in the horizontal plane; arrange to prevent impact between luminaires and the structure or other nonstructural components.
         2) Lay-in luminaires weighing less than 56 pounds secured to ceiling grid and provided with safety wires in accordance with ASTM E580/E580M.
   3. Comply with applicable general recommendations of the following, where not in conflict with applicable codes, seismic design criteria, or other specified requirements:
      a. ASHRAE (HVACA).
      b. FEMA 413.
      c. FEMA E-74.
      d. SMACNA (SRM).

4. Seismic restraint capacities to be verified by a Nationally Recognized Testing Laboratory (NRTL) or certified by an independent third-party registered professional engineer acceptable to authorities having jurisdiction.
5. Seismic Restraint Systems:
    a. Except where otherwise restricted, use of either cable or rigid restraints is permitted.
    b. Use only cable restraints to restrain vibration-isolated electrical components, including distributed systems.
    c. Use only one restraint system type for a given electrical component or distributed system (e.g., conduit, cable tray) run; mixing of cable and rigid restraints on a given component/run is not permitted.
    d. Size restraint elements, including anchorage, to resist seismic loads as necessary to restrain electrical component in all lateral directions; consider bracket geometry in anchor load calculations.
    e. Use rod stiffener clips to attach bracing to hanger rods as required to prevent rod buckling from vertical (upward) compressive load introduced by cable or rigid restraints loaded in tension, in excess of downward tensile load due to supported electrical component weight.
    f. Select hanger rods and associated anchorage as required to accommodate vertical (downward) tensile load introduced by rigid restraints loaded in compression, in addition to downward tensile load due to supported electrical component weight.
    g. Clevis hangers may only be used for attachment of transverse restraints; do not use for attachment of longitudinal restraints.
    h. Where seismic restraints are attached to clevis hangers, provide clevis bolt reinforcement accessory to prevent clevis hanger deformation.
    i. Do not introduce lateral loads on open bar joist chords or the weak axis of beams, or loads in any direction at other than panel points unless approved by project Structural Engineer of Record.
    j. Manufacturer's certified seismic restraint design may be submitted as an alternative to project-specific design and documentation, subject to approval of authorities having jurisdiction.

D. Seismic Attachments:
1. Attachments to be bolted, welded, or otherwise positively fastened without consideration of frictional resistance produced by the effects of gravity.
2. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) or qualified evaluation service acceptable to authorities having jurisdiction for compliance with applicable building code, and qualified for seismic applications; concrete anchors to be qualified for installation in both cracked and uncracked concrete.
3. Do not use power-actuated fasteners.
4. Do not use friction clips (devices that rely on mechanically applied friction to resist loads). Beam clamps may be used for supporting sustained loads where provided with restraining straps.
5. Comply with anchor minimum embedment, minimum spacing, minimum member thickness, and minimum edge distance requirements.
6. Concrete Housekeeping Pads:
    a. Increase size of pad as required to comply with anchor requirements.
    b. Provide pad reinforcement and doweling to ensure integrity of pad and connection and to provide adequate load path from pad to supporting structure.

E. Seismic Interactions:
1. Include provisions to prevent seismic impact between electrical components and other structural or nonstructural components.

2. Include provisions such that failure of a component, either essential or nonessential, does not cause the failure of an essential component.

F. Seismic Relative Displacement Provisions:
1. Use suitable fittings or flexible connections to accommodate:
a. Relative displacements at connections between components, including distributed systems (e.g., conduit, cable tray); do not exceed load limits for equipment utility connections.
b. Relative displacements between component supports attached to dissimilar parts of structure that may move differently during an earthquake.
c. Design displacements at seismic separations.
d. Anticipated drifts between floors.

2.02 SEISMIC RESTRAINT SYSTEMS

A. Manufacturers:
1. Seismic Restraint Systems:
2. Substitutions: See Section 016000 - Product Requirements.

B. Description: System components and accessories specifically designed for field assembly and attachment of seismic restraints.

C. Cable Restraints:
1. Comply with ASCE 19.
2. Cables: Pre-stretched, galvanized steel wire rope with certified break strength.
3. Cable Connections: Use only swaged end fittings. Cable clips and wedge type end fittings are not permitted in accordance with ASCE 19.
4. Use protective thimbles for cable loops where potential for cable damage exists.

D. Rigid Restraints: Use MFMA-4 steel channel (strut), steel angle, or steel pipe for structural element; suitable for both compressive and tensile design loads.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that mounting surfaces are ready to receive vibration isolation and/or seismic control components and associated attachments.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

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

B. Install products in accordance with applicable requirements of NECA 1 (general workmanship).

C. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

D. Secure fasteners according to manufacturer's recommended torque settings.

E. Install flexible conduit and cable connections to provide sufficient slack for vibration isolation and/or seismic relative displacements as indicated or as required.

F. Seismic Controls:
1. Provide specified snubbing element air gap; remove any factory-installed spacers, debris or other obstructions.
2. Use only specified components, anchorage, and hardware evaluated by seismic design. Comply with conditions of seismic certification where applicable.
3. Where mounting hole diameter exceeds bolt diameter by more than 0.125 inch, use epoxy grout, elastomeric grommet, or welded washer to reduce clearance to 0.125 inch or less.
4. Equipment with Sheet Metal Housings:

a. Use Belleville washers to distribute stress over a larger surface area of the sheet metal connection interface as approved by manufacturer.
b. Attach additional steel as approved by manufacturer where required to transfer loads to structure.
c. Where mounting surface is irregular, do not shim housing; reinforce housing with additional steel as approved by manufacturer.

5. Concrete Housekeeping Pads:
   a. Size in accordance with seismic design to meet anchor requirements.
   b. Install pad reinforcement and doweling in accordance with seismic design to ensure integrity of pad and associated connection to slab.
6. Seismic Restraint Systems:
   a. Do not attach seismic restraints and gravity supports to dissimilar parts of structure that may move differently during an earthquake.
   b. Install restraints within permissible angles in accordance with seismic design.
   c. Install cable restraints straight between component/run and structural attachment; do not bend around other nonstructural components or structural elements.
   d. Install cable restraints for vibration-isolated components slightly slack to prevent short-circuiting of isolation.
   e. Install hanger rod stiffeners where indicated using only specified clamps; do not weld stiffeners to hanger rod.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect vibration isolation and/or seismic control components for damage and defects.

C. Seismic Controls:
   1. Verify snubbing element air gaps.

D. Correct deficiencies and replace damaged or defective vibration isolation and/or seismic control components.

END OF SECTION 260548

SECTION 260553
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Wire and cable markers.

D. Voltage markers.

E. Underground warning tape.

F. Warning signs and labels.

1.02 RELATED REQUIREMENTS

A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

1.03 REFERENCE STANDARDS

A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs.

B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels.

C. NFPA 70 - National Electrical Code.

D. NFPA 70E - Standard for Electrical Safety in the Workplace.

E. UL 969 - Marking and Labeling Systems.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.

B. Sequencing:
   1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
   2. Do not install identification products until final surface finishes and painting are complete.

1.05 SUBMITTALS

A. No submittals required.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

1.07 FIELD CONDITIONS

A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

A. Identification for Equipment:
   1. Use lamicoid/phenolic identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
      a. Switchboards:
         1) Identify unique Owner asset code with equipment number.
         2) Identify ampere rating.
         3) Identify voltage and phase.

4) Identify power source and circuit number.
5) Use identification nameplate to identify main overcurrent protective device.
6) Use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.

b. Motor Control Centers:
1) Identify unique Owner asset code with equipment number.
2) Identify ampere rating.
3) Identify voltage and phase.
4) Identify power source and circuit number.
5) Use identification nameplate to identify main overcurrent protective device.
6) Use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.

c. Panelboards:
1) Identify unique Parkway School District asset code with equipment number.
2) Identify ampere rating.
3) Identify voltage and phase.
4) Identify power source and circuit number.
5) Identify main overcurrent protective device. Use identification label for panelboards with a door. For power distribution panelboards without a door, use identification nameplate.
6) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
7) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.

2. Use identification labels to identify each piece of electrical distribution and control equipment.
a. Enclosed remote located switches, circuit breakers, and motor controllers:
1) Identify voltage and phase.
2) Identify power source and circuit number.
3) Identify load(s) served.

3. Use identification label to identify disconnect location for equipment with remote disconnecting means.
4. Use identification label on inside of door at each fused switch to identify required NEMA fuse class and size.
5. Use identification label on inside of door at each motor controller to identify nameplate horsepower, full load amperes, code letter, service factor, voltage, and phase of motor(s) controlled.
6. Use warning signs to identify electrical hazardsat electrical room or area entrances with the word message "DANGER; Electrical hazard; Authorized personnel only" or approved equivalent.

B. Identification for Conductors and Cables:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 260519.
2. Use identification label to identify color code for ungrounded and grounded power conductors at each piece of feeder or branch-circuit distribution equipment.
3. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
a. At each source and load connection.
b. Within boxes when more than one circuit is present.
c. Within equipment enclosures when conductors and cables enter or leave the enclosure.
4. Use underground warning tape to identify direct buried cables.

C. Identification for Raceways:

1. Use voltage markers to identify highest voltage present for accessible conduits at maximum intervals of 20 feet.
2. Use voltage markers, color-coded bands, or factory-painted conduits to identify systems other than normal power system for accessible conduits.
    a. Maximum Intervals: 20 feet.
    b. Color-Coded Bands: Use vinyl color coding electrical tape to mark bands 3 inches wide.
        1) Color Code:
            (a) Fire Alarm System: Red.
            (b) Telephone System: White.
            (c) HVAC Control System: Green.
            (d) PA System: Grey.
            (e) Cat5e Data System: Blue.
            (f) Cat6 Data System: Violet.
            (g) Security System: White.
            (h) CCTV System: Yellow
        2) Vinyl Color Coding Electrical Tape: Comply with Section 260519.
    c. Color Code:
3. Use toneable underground warning tape to identify underground raceways.
4. Use voltage markers to identify highest voltage present for wireways at maximum intervals of 20 feet.

D. Identification for Boxes and Enclosures larger than 100 cubic inches:
1. Use voltage markers to identify highest voltage present in power and lighting systems.
2. Use color coded vinyl labels with printed system name to identify specified systems.
    a. Vinyl Tape Color Code:
        1) Fire Alarm System: Red.
        2) Telephone System: White.
        3) HVAC Control System: Green.
        4) PA System: Grey.
        5) Data System: Blue.
        6) Security System: White.
        7) CCTV System: Yellow
3. Use warning labels to identify electrical hazards with the word message "DANGER; HIGH VOLTAGE; KEEP OUT".

E. Identification for Devices:
1. Use identification label to identify fire alarm system device number.
    a. For fire alarm devices concealed above suspended ceilings, provide identification labeling on a white, standard size, single-gang, LED indicator cover plate flush mounted to ceiling tile below device location. Install a standard, signle-gang switch box in the ceiling to attach blank cover plate.
2. Use identification label to identify serving branch circuit for all receptacles.
    a. For receptacles in public areas, provide identification on inside surface of wallplate.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:
1. Materials:
    a. Indoor Clean, Dry Locations: Use plastic nameplates.
    b. Outdoor Locations: Use plastic nameplates suitable for exterior use.
2. Plastic Nameplates: Two-layer or three-layer laminated electrically non-conductive phenolic with beveled edges; minimum thickness of 1/8 inch; engraved text.
    a. Minimum Text Size: 1/2 inch
3. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.

B. Identification Labels:
   1. Manufacturers:
      a. Brady Corporation: www.bradyid.com.
      b. Brother International Corporation: www.brother-usa.com/#sle.
      c. Panduit Corp: www.panduit.com/#sle.
      d. Substitutions: See Section 016000 - Product Requirements.
   2. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
      a. Use only for indoor locations.
   3. Text: Use machine-printed text. Do not use handwritten text.

C. Format for Receptacle Identification:
   1. Legend: Power source and circuit number or other designation indicated.
   2. Text: All capitalized.
   3. Minimum Text Height: 3/16 inch.
   4. Color: Black text on clear background.

D. Format for Fire Alarm Device Identification:
   1. Legend: Fire Alarm Device ID indicated on drawings.
   2. Text: All capitalized unless otherwise indicated.
   3. Minimum Text Height: 3/16 inch.
   4. Color: Red text on white background.

2.03 WIRE AND CABLE MARKERS

A. Manufacturers:
   1. Brady Corporation: www.bradyid.com.
   2. HellermannTyton: www.hellermanntyton.com/#sle.
   3. Panduit Corp: www.panduit.com/#sle.
   4. Substitutions: See Section 016000 - Product Requirements.

B. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl self-laminating type markers suitable for the conductor or cable to be identified.

C. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.

D. Legend: Power source and circuit number or other designation indicated.

E. Text: Use machine-printed text, all capitalized unless otherwise indicated.
   1. Do not use handwritten text.

F. Minimum Text Height: 1/8 inch.

G. Color: Black text on white background unless otherwise indicated.

2.04 VOLTAGE MARKERS

A. Manufacturers:
   1. Brady Corporation: www.bradyid.com.
   2. Substitutions: See Section 016000 - Product Requirements.

B. Markers for Conduits: Use factory pre-printed self-adhesive vinyl type markers.

C. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl type markers.

D. Minimum Size:
   1. Markers for Equipment: 1 1/8 by 4 1/2 inches.
   2. Markers for Conduits: As recommended by manufacturer for conduit size to be identified.
   3. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches.
   4. Markers for Junction Boxes: 1/2 by 2 1/4 inches.

E. Legend:

1. Markers for Voltage Identification: Highest voltage present.

F. Color: Black text on orange background.

2.05 UNDERGROUND WARNING TAPE

A. Manufacturers:
   1. Brady Corporation: www.bradyid.com/#sle.
   2. Substitutions: See Section 016000 - Product Requirements.

B. Materials: Use foil-backed detectable type polyethylene tape suitable for direct burial.

C. Foil-backed Detectable Type Tape: 3 inches wide, with minimum thickness of 5 mil, unless otherwise required for proper detection.

D. Legend: Type of service, continuously repeated over full length of tape.

E. Color:
   1. Tape for Buried Power Lines: Black text on red background.
   2. Tape for Buried Communication, Alarm, and Signal Lines: Black text on orange background.

2.06 WARNING SIGNS AND LABELS

A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

B. Warning Signs:
   1. Materials:
      a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.
      b. Outdoor Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.
   2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
   3. Minimum Size: 7 by 10 inches unless otherwise indicated.

C. Warning Labels:
   1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
      a. Do not use labels designed to be completed using handwritten text.
   2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
   3. Minimum Size: 2 by 4 inches.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.02 INSTALLATION

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

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Locate products as follows:
   1. Surface-Mounted Equipment: Enclosure front.
   2. Flush-Mounted Equipment: Enclosure front.
   3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
   4. Elevated Equipment: Legible from the floor or working platform.
   5. Interior Components: Legible from the point of access.
   6. Conduits: Legible from the floor.
   7. Conductors and Cables: Legible from the point of access.
   8. Devices: Outside face of cover.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws, rivets, self-adhesive backing, or epoxy cement and to interior surfaces using self-adhesive backing or epoxy cement.

E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

F. Install underground warning tape above buried lines with one tape per trench at 3 inches below finished grade.

G. Secure rigid signs using stainless steel screws.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION 260553

SECTION 260583
WIRING CONNECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical connections to equipment.

1.02 RELATED REQUIREMENTS

A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables.

B. Section 260533.13 - Conduit for Electrical Systems.

C. Section 260533.16 - Boxes for Electrical Systems.

D. Section 262726 - Wiring Devices.

E. Section 262816.16 - Enclosed Switches.

1.03 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
   2. Determine connection locations and requirements.

B. Sequencing:
   1. Install rough-in of electrical connections before installation of equipment is required.
   2. Make electrical connections before required start-up of equipment.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Products: Listed, classified, and labeled as suitable for the purpose intended.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 MATERIALS

A. Disconnect Switches: As specified in Section 262816.16 and in individual equipment sections.

B. Wiring Devices: As specified in Section 262726.

C. Flexible Conduit: As specified in Section 260533.13.

D. Wire and Cable: As specified in Section 260519.

E. Boxes: As specified in Section 260533.16.

2.02 EQUIPMENT CONNECTIONS

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 ELECTRICAL CONNECTIONS

A. Make electrical connections in accordance with equipment manufacturer's instructions.

B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.

C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.

D. Provide receptacle outlet to accommodate connection with attachment plug.

E. Provide cord and cap where field-supplied attachment plug is required.

F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.

H. Install terminal block jumpers to complete equipment wiring requirements.

I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

END OF SECTION 260583

SECTION 262726
WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Receptacles.

B. Wall plates.

1.02 RELATED REQUIREMENTS

A. Section 260526 - Grounding and Bonding for Electrical Systems.

B. Section 260533.16 - Boxes for Electrical Systems.

C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

D. Section 260583 - Wiring Connections: Cords and plugs for equipment.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices.

C. NEMA WD 1 - General Color Requirements for Wiring Devices.

D. NEMA WD 6 - Wiring Devices - Dimensional Specifications.

E. NFPA 70 - National Electrical Code.

F. UL 498 - Attachment Plugs and Receptacles.

G. UL 514D - Cover Plates for Flush-Mounted Wiring Devices.

H. UL 943 - Ground-Fault Circuit-Interrupters.

I. UL 1449 - Standard for Surge Protective Devices.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
   2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
   3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
   4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
   5. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

B. Sequencing:
   1. Do not install wiring devices until final surface finishes and painting are complete.

1.05 SUBMITTALS

A. No submittals required.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Products: Listed, classified, and labeled as suitable for the purpose intended.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND PROTECTION

A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 PRODUCTS

2.01 WIRING DEVICE FINISHES

A. Provide wiring device finishes as described below unless otherwise indicated.

B. Wiring Devices Installed in Finished Spaces: Ivory withivory nylon wall plate.

C. Wiring Devices Installed in Unfinished Spaces: Ivory withivory nylon wall plate.

D. Wiring Devices Installed in Wet or Damp Locations: Ivory with specified weatherproof cover.

E. Wiring Devices Connected to Emergency Power: Red with red nylon wall plate.

F. Wiring Devices Connected to TVSS Power Panels: Grey with grey nylon wall plate.

2.02 RECEPTACLES

A. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
   2. NEMA configurations specified are according to NEMA WD 6.

B. Convenience Receptacles:
   1. Standard Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
   2. Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.

C. GFCI Receptacles:
   1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
      a. Provide test and reset buttons of same color as device.
   2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
   3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations.

2.03 WALL PLATES

A. Wall Plates: Comply with UL 514D.
   1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
   2. Size: Standard.
   3. Screws: Metal with slotted heads finished to match wall plate finish.

B. Nylon Wall Plates: Smooth finish, high-impact thermoplastic.

C. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.

D. Weatherproof Covers for Wetor Damp Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.

C. Verify that wall openings are neatly cut and will be completely covered by wall plates.

D. Verify that final surface finishes are complete, including painting.

E. Verify that floor boxes are adjusted properly.

F. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

G. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of wiring devices provided under this section.
   1. Mounting Heights: As indicated on the drawings.
   2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
   3. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
   4. Locate wall switches on strike side of door with edge of wall plate 4 inches from edge of door frame. Where 4 inches is not possible due, notify Architect to obtain direction prior to proceeding with work.
   5. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.

C. Install wiring devices in accordance with manufacturer's instructions.

D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

E. Connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.

F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Do not use push-in pressure terminals that do not rely on screw-actuated binding.

G. Connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.

I. Where split-wired duplex receptacles are indicated, remove tabs connecting top and bottom receptacles.

J. Install wiring devices plumb and level with mounting yoke held rigidly in place.

K. Install wall switches with OFF position down.

L. Install vertically mounted receptacles with grounding pole on bottom and horizontally mounted receptacles with grounding pole on left.

M. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings.

N. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

O. Identify wiring devices in accordance with Section 260553.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect each wiring device for damage and defects.

C. Operate each wall switch with circuit energized to verify proper operation.

D. Test each receptacle to verify operation and proper polarity.

E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.

F. Inspect each surge protection receptacle to verify surge protection is active.

G. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.05 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

3.06 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION 262726

SECTION 262813
FUSES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fuses.

1.02 RELATED REQUIREMENTS

A. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

B. Section 262816.16 - Enclosed Switches: Fusible switches.

1.03 REFERENCE STANDARDS

A. NEMA FU 1 - Low Voltage Cartridge Fuses.

B. NFPA 70 - National Electrical Code.

C. UL 248-1 - Low-Voltage Fuses - Part 1: General Requirements.

D. UL 248-4 - Low-Voltage Fuses - Part 4: Class CC Fuses.

E. UL 248-8 - Low-Voltage Fuses - Part 8: Class J Fuses.

F. UL 248-10 - Low-Voltage Fuses - Part 10: Class L Fuses.

G. UL 248-12 - Low-Voltage Fuses - Part 12: Class R Fuses.

H. UL 248-15 - Low-Voltage Fuses - Part 15: Class T Fuses.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard data sheets including voltage and current ratings, interrupting ratings, time-current curves, and current limitation curves.

C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Extra Fuses: One set(s) of three for each type and size installed.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Bussmann, a division of Eaton Corporation: www.eaton.com.

B. Littelfuse, Inc: www.littelfuse.com.

C. Mersen: ep-us.mersen.com.

D. Substitutions: See Section 016000 - Product Requirements.

2.02 APPLICATIONS

A. Service Entrance:
   1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.
   2. Fusible Switches Larger Than 600 Amperes: Class L, time-delay.

B. Feeders:
   1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.
   2. Fusible Switches Larger Than 600 Amperes: Class L, time-delay.

C. General Purpose Branch Circuits: Class RK1, time-delay.

D. Individual Motor Branch Circuits: Class RK1, time-delay.

E. In-Line Protection for Pole-Mounted Luminaires: Class CC, time-delay.

F. Primary Protection for Control Transformers: Class CC, time-delay.

2.03 FUSES

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless specifically indicated to be excluded, provide fuses for all fusible equipment as required for a complete operating system.

C. Provide fuses of the same type, rating, and manufacturer within the same switch.

D. Comply with UL 248-1.

E. Unless otherwise indicated, provide cartridge type fuses complying with NEMA FU 1, Class and ratings as indicated.

F. Voltage Rating: Suitable for circuit voltage.

G. Class R Fuses: Comply with UL 248-12.

H. Class J Fuses: Comply with UL 248-8.

I. Class L Fuses: Comply with UL 248-10.

J. Class T Fuses: Comply with UL 248-15.

K. Class CC Fuses: Comply with UL 248-4.

L. Selectivity: Where the requirement for selectivity is indicated, furnish products as required to achieve selective coordination.

M. Provide the following accessories where indicated or where required to complete installation:
   1. Fuseholders: Compatible with indicated fuses.
   2. Fuse Reducers: For adapting indicated fuses to permit installation in switch designed for fuses with larger ampere ratings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that fuse ratings are consistent with circuit voltage and manufacturer's recommendations and nameplate data for equipment.

B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Do not install fuses until circuits are ready to be energized.

B. Install fuses with label oriented such that manufacturer, type, and size are easily read.

END OF SECTION 262813

SECTION 262816.16
ENCLOSED SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Enclosed safety switches.

1.02 RELATED REQUIREMENTS

A. Section 260526 - Grounding and Bonding for Electrical Systems.

B. Section 260529 - Hangers and Supports for Electrical Systems.

C. Section 260548 - Vibration and Seismic Controls for Electrical Systems.

D. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

E. Section 262813 - Fuses.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction.

B. NEMA BS 31047 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum).

C. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

D. NETA ATS - Standard for Acceptance Testing Specifications for Electrical Power Equipment And Systems.

E. NFPA 70 - National Electrical Code.

F. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations.

G. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations.

H. UL 98 - Enclosed and Dead-Front Switches.

I. UL 869A - Reference Standard for Service Equipment.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.
   2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
   4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.

C. Shop Drawings: Indicate outline and support point dimensions, voltage and current ratings, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
   1. Include dimensioned plan and elevation views of enclosed switches.
   2. Include wiring diagrams showing all factory and field connections.

D. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to enclosed switch internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. ABB/GE: www.abb.com.

B. Eaton Corporation: www.eaton.com.

C. Schneider Electric; Square D Products: www.schneider-electric.us.

D. Siemens Industry, Inc: www.usa.siemens.com.

E. Substitutions: Not permitted.

F. Source Limitations: Furnish enclosed switches and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project.

2.02 ENCLOSED SAFETY SWITCHES

A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy or general duty as indicated; ratings, configurations, and features as indicated on the drawings.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
   1. Altitude: Less than 6,600 feet.
   2. Ambient Temperature: Between -22 degrees F and 104 degrees F.

D. Horsepower Rating: Suitable for connected load.

E. Voltage Rating: Suitable for circuit voltage.

F. Short Circuit Current Rating:
   1. Provide enclosed safety switches, when protected by the fuses or supply side overcurrent protective devices to be installed, with listed short circuit current rating as indicated on the drawings.

G. Enclosed Safety Switches Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.

H. Provide with switch blade contact position that is visible when the cover is open.

I. Fuse Clips for Fusible Switches: As required to accept fuses indicated.
   1. Where NEMA Class R fuses are installed, provide rejection feature to prevent installation of fuses other than Class R.

J. Conductor Terminations: Suitable for use with the conductors to be installed.

K. Provide insulated, groundable fully rated solid neutral assembly, with a suitable lug for terminating each neutral conductor.

L. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.

M. Enclosures: Comply with NEMA EN 10250, and list and label as complying with UL 50 and UL 50E.
   1. Environment Type per NEMA EN 10250: Unless otherwise indicated, as specified for the following installation locations:
      a. Indoor Clean, Dry Locations: Type 1.
      b. Outdoor Locations: Type 4X stainless steel.
   2. Finish for Painted Steel Enclosures: Manufacturer's standard, factory applied grey unless otherwise indicated.

N. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.

O. Heavy Duty Switches:
   1. Comply with NEMA BS 31047.
   2. Conductor Terminations:
      a. Provide mechanical lugs.
      b. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
   3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.

P. General Duty Switches:
   1. Conductor Terminations:
      a. Provide mechanical lugs.
      b. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
   2. Provide externally operable handle with means for locking in the OFF position, capable of accepting two padlocks.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that the ratings of the enclosed switches are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive enclosed safety switches.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

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

B. Perform work in accordance with NECA 1 (general workmanship).

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide required support and attachment in accordance with Section 260529.

E. Provide required seismic controls in accordance with Section 260548.

F. Install enclosed switches plumb.

G. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.

H. Provide grounding and bonding in accordance with Section 260526.

I. Provide fuses complying with Section 262813 for fusible switches as indicated or as required by equipment manufacturer's recommendations.

J. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.

K. Identify enclosed switches in accordance with Section 260553.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.

D. Correct deficiencies and replace damaged or defective enclosed safety switches or associated components.

3.04 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.05 CLEANING

A. Clean dirt and debris from switch enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION 262816.16

SECTION 311000
SITE CLEARING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Clearing and protection of vegetation.

B. Removal of existing debris.

1.02 RELATED REQUIREMENTS

A. Section 011000 - Summary: Limitations on Contractor's use of site and premises.

B. Section 011000 - Summary: Sequencing and staging requirements.

C. Section 015000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

D. Section 017000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products.

E. Section 017419 - Construction Waste Management and Disposal: Limitations on disposal of removed materials; requirements for recycling.

F. Section 312200 - Grading: Topsoil removal.

G. Section 312200 - Grading: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

H. Section 312323 - Fill: Filling holes, pits, and excavations generated as a result of removal operations.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 PREPARATION

A. Call Missouri One Call System at 1-800-DIG-RITE (1-800-344-7483) not less than two working days before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas.

3.02 SITE CLEARING

A. Comply with other requirements specified in Section 017000.

B. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

3.03 EXISTING UTILITIES AND BUILT ELEMENTS

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Protect existing structures and other elements that are not to be removed.

3.04 VEGETATION

A. Scope: Remove trees, shrubs, brush, and stumps in areas to be covered by building structure, paving, playing fields, lawns, and planting beds.

B. Do not remove or damage vegetation beyond the limits indicated on drawings.

C. Install substantial, highly visible fences at least 3 feet high to prevent inadvertent damage to vegetation to remain:

1. At vegetation removal limits.
2. See Section 015000 for fence construction requirements.

D. In areas where vegetation must be removed but no construction will occur other than pervious paving, remove vegetation with minimum disturbance of the subsoil.

E. Vegetation Removed: Do not burn, bury, landfill, or leave on site.
1. Existing Stumps: Treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches.

F. Dead Wood: Remove all dead trees (standing or down), limbs, and dry brush as indicated on the drawings; treat as specified for vegetation removed.

G. Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction operations, replace at no cost to Owner.

3.05 DEBRIS

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION 311000

SECTION 312200
GRADING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Removal of topsoil.

B. Rough grading the site for pavements.

1.02 RELATED REQUIREMENTS

A. Section 311000 - Site Clearing.

B. Section 312316 - Excavation.

C. Section 312316.13 - Trenching: Trenching and backfilling for utilities.

D. Section 329223 - Sodding: Finish ground cover.

1.03 SUBMITTALS

A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

PART 2 PRODUCTS

2.01 MATERIALS

A. Topsoil- Soil Type S2: Topsoil excavated on-site.
   1. Graded.
   2. Acidity range (pH) of 5.5 to 7.5.
   3. Containing a minimum of 4 percent and a maximum of 30 percent inorganic matter.
   4. Conforming to ASTM D2487 Group Symbol OL, OH, and PT.
   5. Limit decaying matter to 10 percent of total content by volume.
   6. Free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds and foreign matter.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

B. Verify the absence of standing or ponding water.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Call Missouri One Call System at 1-800-DIG-RITE (1-800-344-7483) not less than two working days before performing Work.
   1. Request underground utilities to be located and marked within and surrounding construction areas.

C. Stake and flag locations of known private utilities.

D. Locate, identify, and protect from damage above- and below-grade utilities to remain.

E. Provide temporary means and methods to remove all standing or ponding water from areas prior to grading.

F. Protect site features to remain, including but not limited to bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs, from damage by grading equipment and vehicular traffic.

3.03 ROUGH GRADING

A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded.

B. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.

C. Do not remove wet subsoil , unless it is subsequently processed to obtain optimum moisture content.

D. When excavating through roots, perform work by hand and cut roots with sharp axe.

E. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

F. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack surface water control.

G. Level and contour surfaces to elevations and gradients indicated.

3.04 SOIL REMOVAL AND STOCKPILING

A. Remove excavated topsoil from site.

B. Stockpile subsoil to be re-used on site; remove remainder from site.

C. Stockpiles: Use areas designated on site; pile depth not to exceed 8 feet; protect from erosion.

3.05 FINISH GRADING

A. Before Finish Grading:
   1. Verify building and trench backfilling have been inspected.
   2. Verify subgrade has been contoured and compacted.

B. Remove debris, roots, branches, stones, in excess of 1 inch in size. Remove soil contaminated with petroleum products.

C. Where topsoil is to be placed, scarify surface to depth of 3 inches.

D. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 6 inches.

E. Place topsoil in areas where sodding and planting are indicated.

F. Place topsoil where required to level finish grade.

G. Place topsoil to the following compacted thicknesses:
   1. Areas to be Sodded: 6 inches.

H. Place topsoil during dry weather.

I. Remove roots, weeds, rocks, and foreign material while spreading.

J. Near plants and buildings spread topsoil manually to prevent damage.

K. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.

L. Roll placed topsoil.

M. Maintain stability of topsoil during inclement weather. Replace topsoil in areas where surface water has eroded thickness below specifications.

3.06 TOLERANCES

A. Top Surface of Subgrade: Plus or minus 0.10 foot (1-3/16 inches) from required elevation.

B. Top Surface of Finish Grade: Plus or minus 0.04 foot (1/2 inch).

C. Top Surface of Finish Grade at Curbs and Sidewalks: Top of curb or sidewalk elevation or greater.

D. Top Surface of Finish Grade at Pavement Edges: Top of pavement elevation.

3.07 REPAIR AND RESTORATION

A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition at no cost to Owner.

B. Trees to Remain: If damaged due to this work, trim broken branches and repair bark wounds; if root damage has occurred, obtain instructions from Architect as to remedy.

C. Other Existing Vegetation to Remain: If damaged due to this work, replace with vegetation of equivalent species and size.

3.08 FIELD QUALITY CONTROL

A. See Section 312323 - Fill for compaction density testing.

3.09 CLEANING

A. Remove unused stockpiled subsoil. Grade stockpile area to prevent standing water.

B. Leave site clean and raked, ready to receive landscaping.

END OF SECTION 312200

SECTION 312316.13
TRENCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Backfilling and compacting for utilities outside the building to utility main connections.

1.02 RELATED REQUIREMENTS

A. Section 312200 - Grading: Site grading.

B. Section 312316 - Excavation: Building and foundation excavating.

1.03 PRICE AND PAYMENT PROCEDURES

A. See Section 012200 - Unit Prices, for general requirements applicable to unit prices for earthwork.

B. Excavating Unsuitable Soil Materials:
   1. Measurement method: By the cubic yard.
   2. Includes: Excavating below required elevations, loading and removing from site.
   3. Does Not Include Over-Excavation: Payment will not be made for over-excavated work nor for replacement materials.

C. Granular Fill Replacing Unsuitable Soil:
   1. Measurement Method: By the cubic yard in place.
   2. Includes: Supplying fill, stockpiling, scarifying substrate surface, placing where required, and compacting.

D. Geotextile Stabilization Fabric: Applies to Unit Price C .
   1. Measurement Method: By the Square Yard in place.
   2. Includes: Cutting and placing where required.

1.04 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

B. Subgrade Elevations: Indicated on drawings and to meet requirements for topsoil placement specified in Section 312200 - Grading.

1.05 REFERENCE STANDARDS

A. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

B. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).

C. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method.

D. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

E. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).

F. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

G. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.06 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Samples: 10 lb sample of each type of imported fill; submit in air-tight containers to testing laboratory.

C. Materials Sources: Submit name of imported materials source.

D. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

E. Compaction Density Test Reports by Owner's Testing Agency.

1.07 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. When fill materials need to be stored on site, locate stockpiles where designated.
   1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
   2. Prevent contamination.
   3. Protect stockpiles from erosion and deterioration of materials.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. General Fill- Fill Type S1: Subsoil excavated on site or imported borrow material.
   1. Graded.
   2. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
   3. Complying with ASTM D2487 Group Symbol CL.

B. Concrete for Fill: Lean concrete. Minimum compressive strength of 2500 psi.

C. Granular Fill Under Pavements and Structures - Fill Type A1: Coarse aggregate, conforming to County of St. Louis Department of Highways and Traffic standard specification section 1007 - Aggregate Base Material, Type 5.
   1. Graded in accordance with ASTM C 136, within the following limits:
      a. 1 inch sieve: 100 percent passing.
      b. 1/2 inch sieve: 90 to 60 percent passing.
      c. No. 4 sieve: 60 to 35 percent passing.
      d. No. 30 sieve: 35 to 10 percent passing.
      e. No. 200 sieve: 15 to 0 percent passing.
      f. The fraction passing the No. 40 sieve shall have a maximum plasticity index of 6.

D. Granular Fill Replacing Unsuitable Soil - Fill Type A2: Coarse aggregate, conforming to ASTM D448 standard specification size number 357.
   1. Graded in accordance with ASTM C 136, within the following limits:
      a. 2-1/2 inch sieve: 100 percent passing.
      b. 2 inch sieve: 100 to 95 percent passing.
      c. 1 inch sieve: 70 to 35 percent passing.
      d. 1/2 inch sieve: 30 to 10 percent passing.
      e. No. 4 sieve: 5 to 0 percent passing.

E. Bedding for Sanitary and Storm Sewer Pipes - Fill Type A5: Coarse aggregate, conforming to Metropolitan St. Louis Sewer District standard specification section 2.K.2 - MSD-1 Bedding.
   1. Graded in accordance with ASTM C 136, within the following limits:
      a. 1 inch sieve: 100 percent passing.
      b. 3/4 inch sieve: 100 to 90 percent passing.
      c. 1/2 inch sieve: 60 to 35 percent passing.
      d. No. 100 sieve: 10 to 0 percent passing.

F. Topsoil: See Section 312200.

2.02 ACCESSORIES

A. Geotextile Stabilization Fabric: Non-biodegradable, woven; Mirafi-HP570 manufactured by TenCate. www.tencate.com

B. Substitutions: See Section 016000 - Product Requirements.

2.03 SOURCE QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for general requirements for testing and analysis of soil material.

B. Where fill materials are specified by reference to a specific standard, testing of samples for compliance will be provided before delivery to site.

C. If tests indicate materials do not meet specified requirements, change material and retest.

D. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench marks and intended elevations for the work are as indicated.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Call Missouri One Call System at 1-800-DIG-RITE (1-800-344-7483) not less than two working days before performing Work.
   1. Request underground utilities to be located and marked within and surrounding construction areas.

C. Locate, identify, and protect utilities that remain and protect from damage.

D. Notify utility company to remove and relocate utilities.

E. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

F. Protect plants, lawns, rock outcroppings, and other features to remain.

G. Grade top perimeter of trenching area to prevent surface water from draining into trench. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by the Architect.

3.03 LINES AND GRADES

A. Lay pipes to lines and grades indicated on Drawings.
   1. Architect reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.

B. Use laser-beam instrument with qualified operator to establish lines and grades.

3.04 TRENCHING

A. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

B. Slope banks of excavations deeper than 4 feet to angle of repose or less until sheeted or shored.

C. Do not interfere with 45 degree bearing splay of foundations.

D. Cut trenches 2 feet wider than outside diameter of pipe or conduit unless indicated otherwise on Drawings.

E. Hand trim excavations. Hand trim for bell and spigot pipe joints. Remove loose matter.

F. Provide uniform and continuous bearing and support for bedding material, pipes, and conduits.

G. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.

H. Remove water or materials from the trench that interfere with Work.

I. Remove lumped subsoil, boulders, and rock up to 1/3 cubic yard measured by volume. See Section 312316.26 for removal of larger material.

J. Remove excavated material that is unsuitable for re-use from site.

K. Stockpile excavated material to be re-used in area designated on site in accordance with Section 312200.

L. Remove excess excavated material from site.

M. Provide temporary means and methods, as required, to remove all water from trenching until directed by the Architect. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

N. Determine the prevailing groundwater level prior to trenching. If the proposed trench extends less than 1 foot into the prevailing groundwater, control groundwater intrusion with perimeter drains routed to sump pumps, or as directed by the Architect.

O. Do not advance open trench more than 200 feet ahead of installed pipe.

3.05 SHEETING AND SHORING

A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.

B. Support trenches more than 4 feet deep excavated through unstable, loose, or soft material.
   1. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.
   2. Design sheeting, shoring, bracing, or other protection to be removed at completion of excavation work.

C. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil at no cost to Owner.

D. Repair damage to new and existing Work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing at no cost to Owner.

3.06 PREPARATION FOR UTILITY PLACEMENT

A. Cut out soft areas of subgrade not capable of compaction in place to elevations directed by Architect. Line over excavated trench bottom and sides with Geotextile Stabilization Fabric. Backfill to original subgrade elevation with Fill Type A2.

B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

3.07 BACKFILLING

A. Backfill to contours and elevations indicated using unfrozen materials.

B. Fill up to subgrade elevations unless otherwise indicated.

C. Employ a placement method that does not disturb or damage other work.

D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Granular Fill: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.

G. Soil Fill: Place and compact material in equal continuous layers not exceeding 8 inches compacted depth.

H. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

I. Correct areas that are over-excavated.
   1. All areas except thrust bearing surfaces: Use Fill Type A1, flush to required elevation, compacted to minimum 95 percent of maximum dry density.

J. Compaction Density Unless Otherwise Specified or Indicated:

1. Under paving, slabs-on-grade, and similar construction: 95 percent of maximum dry density.
2. At other locations: 90 percent of maximum dry density.

K. Do not leave more than 50 feet of trench open at end of working day.

L. Protect open trench to prevent danger to Owner and the public.

M. Reshape and re-compact fills subjected to vehicular traffic.

3.08 BEDDING AND FILL AT SPECIFIC LOCATIONS

A. Sanitary and Storm Sewer Piping:
1. Bedding: Use Fill Type A5 or A6 as appropriate for pipe size and material.
2. Cover with Fill Type S1 under landscape areas.
3. Cover with Fill Type A1 under pavements and structures.

B. Subdrainage Piping at Foundation Perimeter, Under Slabs, and Behind Retaining Walls:
1. Cover filter aggregate with Fill Type A3.
2. Place geotextile fabric in trench to separate drainage fill from soil.

3.09 TOLERANCES

A. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

B. Top Surface of Backfilling Under Paved Areas: Plus or minus 1/2 inch from required elevations.

3.10 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for general requirements for field inspection and testing.

B. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167, or ASTM D6938.

C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D698 ("standard Proctor").

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

E. Frequency of Tests: 1 test for each lift for each 100 feet of trench length.

3.11 CLEANING

A. Leave unused materials in a neat, compact stockpile.

B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

C. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

END OF SECTION 312316.13

SECTION 312316.26
ROCK REMOVAL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Removal of identified and discovered rock during excavation.

1.02 PRICE AND PAYMENT PROCEDURES

A. See Section 012200 - Unit Prices, for additional unit price requirements.

B. Site Rock Removal: By the cubic yard measured after removal. Includes preparation of rock for removal, , removal from position, loading and removing from site. For over excavation, payment will not be made for over excavated work nor for replacement materials.

C. Trench Rock Removal: By the cubic yard measured after removal. Includes preparation of rock for removal, , removal from position, loading and removing from site. For over excavation, payment will not be made for over excavated work nor for replacement materials.

1.03 DEFINITIONS

A. Site Rock: Solid mineral material with a volume in excess of 3/4 cubic yard or solid material that cannot be removed with a 3/4 cubic yard capacity power shovel without drilling.

B. Trench Rock: Solid mineral material with a volume in excess of 3/4 cubic yard or solid material that cannot be removed with a 3/4 cubic yard capacity power shovel without drilling.

C. Rock: Solid mineral material of a size that cannot be removed with a 3/4 cubic yard capacity power shovel.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify site conditions and note subsurface irregularities affecting work of this section.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum.

3.03 ROCK REMOVAL

A. Excavate and remove rock by mechanical methods only; use of explosives is prohibited.

B. Mechanical Methods: Drill holes and utilize expansive tools, wedges, or mechanical disintegration compound to fracture rock.

C. If rock is uncovered requiring the explosives method for rock disintegration, notify the Owner.

D. Form level bearing at bottom of excavations.

E. Remove shaled layers to provide sound and unshattered base for footings.

F. In utility trenches, excavate to 6 inches below invert elevation of pipe and 24 inches wider than pipe diameter.

G. Remove excavated materials from site.

H. Correct unauthorized rock removal in accordance with backfilling and compacting requirements of Section 312323.

3.04 FIELD QUALITY CONTROL

A. Independent agency field inspection will be provided under provisions of Section 014000 - Quality Requirements.

B. Provide for visual inspection of foundation bearing surfaces and cavities formed by removed rock.

END OF SECTION 312316.26

SECTION 312316
EXCAVATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Excavating for slabs-on-grade and paving.

1.02 PRICE AND PAYMENT PROCEDURES

A. See Section 012200 - Unit Prices, for general requirements applicable to unit prices for excavation.

B. Excavating Unsuitable Soil Materials:
   1. Measurement method: By the cubic yard.
   2. Includes: Excavating below required elevations to remove unsuitable soil materials, loading and removing from site.
   3. Does Not Include Over-Excavation: Payment will not be made for over-excavated work nor for replacement materials.

C. See Section 312323 - Fill, for measurement and payment provisions related to fill.

PART 3 EXECUTION

2.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the work are as indicated.

2.02 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Call Missouri One Call System at 1-800-DIG-RITE (1-800-344-7483) not less than two working days before performing Work.
   1. Request underground utilities to be located and marked within and surrounding construction areas.

C. Locate, identify, and protect utilities that remain and protect from damage.

D. Grade top perimeter of excavation to prevent surface water from draining into excavation. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by Architect.

2.03 EXCAVATING

A. Underpin adjacent structures that could be damaged by excavating work.

B. Excavate to accommodate new structures and construction operations.

C. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

D. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.

E. Do not interfere with 45 degree bearing splay of foundations.

F. Cut utility trenches wide enough to allow inspection of installed utilities.

G. Hand trim excavations. Remove loose matter.

H. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section 312323.

I. Provide temporary means and methods, as required, to remove all water from excavations until directed by Architect. Remove and replace soils deemed suitable by classification and which are excessively moist due to lack of dewatering or surface water control.

J. Determine the prevailing groundwater level prior to excavation. If the proposed excavation extends less than 1 foot into the prevailing groundwater, control groundwater intrusion with perimeter drains routed to sump pumps, or as directed by the Architect. If the proposed excavation extends more than 1 foot into the excavation, control groundwater intrusion with a comprehensive dewatering procedures, or as directed by the Geotechnical Engineer.

K. Remove excavated material that is unsuitable for re-use from site.

L. Stockpile excavated material to be re-used in area designated on site in accordance with Section 312200.

M. Remove excess excavated material from site.

2.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for general requirements for field inspection and testing.

B. Provide for visual inspection of load-bearing excavated surfaces by Architect before placement of foundations.

2.05 PROTECTION

A. Divert surface flow from rains or water discharges from the excavation.

B. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.

C. Protect open excavations from rainfall, runoff, freezing groundwater, or excessive drying so as to maintain foundation subgrade in satisfactory, undisturbed condition.

D. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

E. Keep excavations free of standing water and completely free of water during concrete placement.

END OF SECTION 312316

SECTION 312323
FILL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Filling, backfilling, and compacting for building volume below grade, footings, slabs-on-grade, paving, and utilities within the building.

B. Backfilling and compacting for utilities outside the building to utility main connections.

C. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

1.02 RELATED REQUIREMENTS

A. Section 015713 - Temporary Erosion and Sediment Control: Slope protection and erosion control.

B. Section 033000 - Cast-in-Place Concrete.

C. Section 311000 - Site Clearing.

D. Section 312200 - Grading: Site grading.

E. Section 312316 - Excavation: Removal and handling of soil to be re-used.

F. Section 312316.13 - Trenching: Excavating for utility trenches outside the building to utility main connections.

G. Section 329119 - Landscape Grading.

1.03 PRICE AND PAYMENT PROCEDURES

A. See Section 012200 - Unit Prices, for general requirements applicable to unit prices for earthwork.

B. General Fill:
   1. Measurement Method: By the cubic yard.
   2. Includes: Excavating existing soil, stockpiling, scarifying substrate surface, placing where required, compacting, and dewatering.

1.04 REFERENCE STANDARDS

A. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).

B. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method.

C. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).

D. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Materials Sources: Submit name of imported materials source.

C. Compaction Density Test Reports.

1.06 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. When fill materials need to be stored on site, locate stockpiles where designated.
   1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
   2. Prevent contamination.
   3. Protect stockpiles from erosion and deterioration of materials.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. General Fill: Subsoil excavated on-site.
   1. Complying with ASTM D2487 Group Symbol CL.

B. Granular Fill : Angular crushed washed stone; free of shale, clay, friable material and debris.

C. Sand: Natural river or bank sand; free of silt, clay, loam, friable or soluble materials, and organic matter.
   1. Grade in accordance with ASTM D2487 Group Symbol SW.

D. Topsoil: See Section 329119.

2.02 ACCESSORIES

A. Geotextile: Non-biodegradable, nonwoven.

2.03 SOURCE QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for general requirements for testing and analysis of soil material.

B. If tests indicate materials do not meet specified requirements, change material and retest.

PART 3 EXECUTION

3.01 EXAMINATION

A. Identify required lines, levels, contours, and datum locations.

B. Verify areas to be filled are not compromised with surface or ground water.

3.02 PREPARATION

A. Scarify and proof roll subgrade surface to a depth of 6 inches to identify soft spots.

B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.

C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

3.03 FILLING

A. Fill to contours and elevations indicated using unfrozen materials.

B. Fill up to subgrade elevations unless otherwise indicated.

C. Employ a placement method that does not disturb or damage other work.

D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Granular Fill: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.

G. Soil Fill: Place and compact material in equal continuous layers not exceeding 8 inches compacted depth.

H. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

I. Correct areas that are over-excavated.
   1. Other areas: Use general fill, flush to required elevation, compacted to minimum 97 percent of maximum dry density.

J. Compaction Density Unless Otherwise Specified or Indicated:

K. Reshape and re-compact fills subjected to vehicular traffic.

L. Maintain temporary means and methods, as required, to remove all water while fill is being placed as required, or until directed by the Architect. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

3.04 FILL AT SPECIFIC LOCATIONS

A. Use general fill unless otherwise specified or indicated.

B. At Foundation Walls and Footings:
   1. Use granular drainage fill.
   2. Fill up to subgrade elevation.
   3. Do not backfill against unsupported foundation walls.

C. Over Subdrainage Piping at Foundation Perimeter and Under Slabs:
   1. Drainage fill :
   2. Cover drainage fill with general fill.
   3. Fill up to subgrade elevation.
   4. Compact to 95 percent of maximum dry density.

D. Over Buried Utility Piping, Conduits, and Duct Bank in Trenches and _____:
   1. Bedding: Use granular fill.
   2. Cover with general fill.
   3. Compact in maximum 8 inch lifts to 95 percent of maximum dry density.

E. At Lawn Areas:
   1. Use general fill.
   2. Fill up to 6 inches below finish grade elevations.
   3. Compact to 95 percent of maximum dry density.
   4. See Section 329119 for topsoil placement.

3.05 TOLERANCES

A. Top Surface of General Filling: Plus or minus 1 inch from required elevations.

B. Top Surface of Filling Under Paved Areas: Plus or minus 1 inch from required elevations.

3.06 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for general requirements for field inspection and testing.

3.07 CLEANING

A. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.

END OF SECTION 312323

SECTION 312500
EROSION AND SEDIMENTATION CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Permanent erosion and sediment control.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Concrete for permanent erosion control structures indicated on drawings.

B. Section 312323 - Fill: Filling and compaction.

C. Section 313700 - Riprap: Stabilization using riprap.

D. Section 321123 - Aggregate Base Courses: Aggregate base course.

E. Section 329223 - Sodding: Permanent turf for erosion control.

1.03 REFERENCE STANDARDS

A. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

B. ASTM D5338 - Standard Test Method for Determining Aerobic Biodegradation of Plastic Materials Under Controlled Composting Conditions, Incorporating Thermophilic Temperatures.

C. ASTM D7322/D7322M - Standard Test Method for Determination of Erosion Control Product (ECP) Ability to Encourage Seed Germination and Plant Growth Under Bench-Scale Conditions.

D. ASTM D7367 - Standard Test Method for Determining Water Holding Capacity of Fiber Mulches for Hydraulic Planting.

E. EPA (NPDES) - National Pollutant Discharge Elimination System (NPDES), Construction General Permit.

F. FHWA FLP-94-005 - Best Management Practices for Erosion and Sediment Control.

G. USDA TR-55 - Urban Hydrology for Small Watersheds; USDA Natural Resources Conservation Service.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Maintenance Instructions: Provide instructions covering inspection and maintenance for preventive measures that must remain after Substantial Completion.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Comply with requirements of EPA (NPDES) for erosion and sedimentation control, as specified by the NPDES, for Phases I and II, and in compliance with requirements of Construction General Permit (CGP), whether the project is required by law to comply or not.

B. Comply with more stringent requirements of St. Louis County Erosion and Sedimentation Control Manual.

C. Runoff Calculation Standard for Urban Areas: USDA TR-55.

2.02 ACCESSORY MATERIALS

A. Fill Material: See Section 312323.

B. Sod for Permanent Cover: Cultivated grass sod, type as indicated; with strong fibrous root system, free of stones, burned or bare spots.

C. Plants for Permanent Cover: Specie and sizes identified in plant schedule, grown in climatic conditions similar to those in locality of the work.

D. Crushed Stone and Gravel: See Section 321123 for aggregate.

E. Riprap: See Section 313700.

F. Concrete: See Section 033000.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible.

3.02 PREPARATION

A. Schedule work so that soil surfaces are left exposed for the minimum amount of time.

B. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained; furnish documentation required to obtain applicable permits.

1. Obtain and pay for permits and provide security required by authority having jurisdiction.

C. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.

3.03 FIELD QUALITY CONTROL

A. Provide analysis of topsoil fill; see Section 014000.

3.04 INSTALLATION

A. Hydroseeding: Apply seeded slurry with a hydraulic seeder at a rate of 275 lbs per acre evenly in two intersecting directions.

B. Do not seed areas in excess of that which can be mulched on same day.

C. Immediately following seeding, apply mulch to a thickness of 1/8 inch. Maintain clear of shrubs and trees.

D. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.

E. Following germination, immediately reseed areas without germinated seeds that are larger than 4 by 4 inches.

3.05 MAINTENANCE

A. Inspect preventive measures weekly, within 24 hours after the end of any storm that produces 0.5 inches or more rainfall at the project site, and daily during prolonged rainfall.

B. Repair deficiencies immediately.

3.06 CLEAN UP

A. Clean out sediment control structures that are to remain as permanent measures.

END OF SECTION 312500

SECTION 321123
AGGREGATE BASE COURSES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aggregate base course.

1.02 RELATED REQUIREMENTS

A. Section 312200 - Grading: Preparation of site for base course and topsoil fill at areas adjacent to aggregate base course.

B. Section 312316.13 - Trenching: Compacted fill over utility trenches under base course.

C. Section 312323 - Fill: Compacted fill under base course.

1.03 REFERENCE STANDARDS

A. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

B. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).

C. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method.

D. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

E. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

F. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Materials Sources: Submit name of imported materials source.

C. Aggregate Composition Test Reports: Results of laboratory tests on proposed materials.

D. Compaction Density Test Reports by Owner's Testing Agency.

1.05 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. When aggregate materials need to be stored on site, locate where directed by Owner.

C. Aggregate Storage, General:
   1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
   2. Prevent contamination.
   3. Protect stockpiles from erosion and deterioration of materials.

PART 2 PRODUCTS

2.01 MATERIALS

A. Aggregate Type A1: Coarse aggregate, conforming to County of St. Louis Department of Highways and Traffic standard specification section 1007 - Aggregate Base Material, Type 5.
   1. Graded in accordance with ASTM C 136, within the following limits:
      a. 1 inch sieve: 100 percent passing.
      b. 1/2 inch sieve: 90 to 60 percent passing.
      c. No. 4 sieve: 60 to 35 percent passing.
      d. No. 30 sieve: 35 to 10 percent passing.
      e. No. 200 sieve: 15 to 0 percent passing.

f. The fraction passing the No. 40 sieve shall have a maximum plasticity index of 6.

2.02 SOURCE QUALITY CONTROL

A. See Section 014000 - Quality Requirements for general requirements for testing and analysis of aggregate materials.

B. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench marks and intended elevations for the work are as indicated.

B. Verify substrate has been inspected, gradients and elevations are correct, and is dry.

3.02 PREPARATION

A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.

B. Do not place aggregate on soft, muddy, or frozen surfaces.

3.03 INSTALLATION

A. Place aggregate in maximum 6 inch layers and roller compact to specified density.

B. Level and contour surfaces to elevations and gradients indicated.

C. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.

D. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

E. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.04 TOLERANCES

A. Flatness: Maximum variation of 1/2 inch measured with 10 foot straight edge.

B. Scheduled Compacted Thickness: Within 1/4 inch.

C. Variation From Design Elevation: Within 1/2 inch.

3.05 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements for general requirements for field inspection and testing.

B. Compaction density testing will be performed on compacted aggregate base course in accordance with ASTM D1556, ASTM D2167, ASTM D3017, or ASTM D6938.

C. Results will be evaluated in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D698 ("standard Proctor").

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

E. Frequency of Tests: 1 test for each lift for each 5 000 s.f. of area.

F. Proof roll compacted aggregate at surfaces that will be under slabs-on-grade and paving.

3.06 CLEANING

A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION 321123

SECTION 321313
CONCRETE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete sidewalks, stair steps, ramps, vertical curbs, parking areas, and pads.

1.02 RELATED REQUIREMENTS

A. Section 312200 - Grading: Preparation of site for paving and base and preparation of subsoil at pavement perimeter for planting.

B. Section 321123: Aggregate base course.

1.03 REFERENCE STANDARDS

A. ACI 211.1 - Selecting Proportions for Normal-Density and High Density-Concrete - Guide.

B. ACI 301 - Specifications for Concrete Construction.

C. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete.

D. ACI 305R - Guide to Hot Weather Concreting.

E. ACI 306R - Guide to Cold Weather Concreting.

F. ASTM C33/C33M - Standard Specification for Concrete Aggregates.

G. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

H. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.

I. ASTM C150/C150M - Standard Specification for Portland Cement.

J. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

K. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete.

L. ASTM C618 - Standard Specification for Coal Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

M. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing.

N. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants.

O. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Asphalt Types).

1.04 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Submit proposed concrete mix design test reports.

C. Product Data: Provide data on joint filler, admixtures, and curing compound.

PART 2 PRODUCTS

2.01 FORM MATERIALS

A. Form Materials: Conform to ACI 301.

B. Joint Filler: Preformed; non-extruding bituminous type (ASTM D1751) or sponge rubber or cork (ASTM D1752).
   1. Thickness: 3/4 inch.

2.02 REINFORCEMENT

A. Steel Welded Wire Reinforcement: Plain type, ASTM A1064/A1064M; in flat sheets; galvanized.

2.03 CONCRETE MATERIALS

A. Obtain cementitious materials from same source throughout.

B. Cement: ASTM C150/C150M, Normal - Type I Portland cement, gray color.

C. Fine and Coarse Mix Aggregates: ASTM C33/C33M, Meramec sand only (lignite free).

D. Fly Ash: ASTM C618, Class C or F.

E. Calcined Pozzolan: ASTM C618, Class N.

F. Silica Fume: ACI 211.1.

G. Water: Clean, and not detrimental to concrete.

H. Air-Entraining Admixtures: ASTM C260/C260M.

2.04 ACCESSORIES

A. Joint Sealer: Self-leveling, one part polyurethane in accordance with ASTM C920, Type S, Grade P, Use T.
   1. Acceptable Product: Sonneborn Sonolastic SL1.
   2. Substitutions: See 016000 - Product Requirements.

B. Reinforcement Accessories:
   1. Chairs, Bolsters, Bar Supports, Sacers: Sized and shaped for adequate support of reinforcement during concrete placement.
   2. Provide stainless steel components for placement within 1-1/2 inches of weathering surfaces.

2.05 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Concrete Strength: Establish required average strength for concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
   1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.

C. Admixtures: Reducing and Accelerating admixtures will be allowed at the discretion of the Architect and only after review and approval of product information submittal by Contractor. Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.

D. Concrete Properties:
   1. Compressive strength, when tested in accordance with ASTM C39/C39M at 28 days; 4,000 psi.
   2. Total Air Content: minimum 5 percent, determined in accordance with ASTM C 173/C 173M.
   3. Maximum Slump: 4 inches.
   4. Maximum Aggregate Size: 1 inch.

2.06 MIXING

A. On Project Site: Mix in drum type batch mixer, complying with ASTM C685/C685M. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.

B. Transit Mixers: Comply with ASTM C94/C94M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify compacted granular base or existing asphalt surface is acceptable and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

3.02 SUBBASE

A. See Section 321123 - Aggregate Base Courses for construction of base course for work of this Section.

3.03 PREPARATION

A. Moisten base to minimize absorption of water from fresh concrete.

B. Coat surfaces of catch basin and handhole frames with oil to prevent bond with concrete pavement.

C. Notify Architect minimum 24 hours prior to commencement of concreting operations.

3.04 FORMING

A. Place and secure forms to correct location, dimension, profile, and gradient.

B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.05 REINFORCEMENT

A. Place reinforcement at midheight of slabs-on-grade. Utilize Chairs, Bolsters, Bar Suppirts, Spacers sized and shaped for adequate support of reinforcement during concrete placement.

B. Interrupt reinforcement at expansion joints.

3.06 COLD AND HOT WEATHER CONCRETING

A. Follow recommendations of ACI 305R when concreting during hot weather.

B. Follow recommendations of ACI 306R when concreting during cold weather.

C. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

3.07 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Do not place concrete when base surface is wet.

C. Ensure reinforcement, inserts, embedded parts, formed joints are not disturbed during concrete placement.

D. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

E. Place concrete to pattern indicated.

3.08 JOINTS

A. Align curb, gutter, and sidewalk joints.

B. Place 3/4 inch wide expansion joints at maximum of 20 foot intervals and to separate paving from vertical surfaces and other components and in pattern indicated.
   1. Form joints with joint filler extending from bottom of pavement to within 1/2 inch of finished surface.
   2. Secure to resist movement by wet concrete.

C. Provide scored joints.
   1. At maximum 5 feet intervals on sidewalks and in pattern indicated.

2. At pattern indicated on paved areas other than sidewalks.
3. Between sidewalks and curbs.
4. Between curbs and pavement.

D. Provide keyed joints as indicated.

E. Saw cut contraction joints 3/16 inch wide at an optimum time after finishing. Cut 1/3 into depth of slab.

3.09 FINISHING

A. Area Paving: Wood float.

B. Sidewalk Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius.

C. Curbs and Gutters: Light broom, texture parallel to pavement direction.

D. Inclined Ramps: Broomed perpendicular to slope.

3.10 JOINT SEALING

A. Place Joint Sealer after a minimum of 28 days or in accordance with manufacturer's instructions over all joints containing Joint Filler.

3.11 TOLERANCES

A. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.

B. Maximum Variation From True Position: 1/4 inch.

3.12 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.
1. Provide free access to concrete operations at project site and cooperate with appointed firm.
2. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.

B. Compressive Strength Tests: ASTM C39/C39M; for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cu yd or less of each class of concrete placed.
1. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
2. Perform one slump test for each set of test cylinders taken.

C. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.13 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

B. Do not permit pedestrian or vehicular traffic over pavement for 7 days minimum after finishing.

END OF SECTION 321313

SECTION 323113
CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Posts, rails, and frames.

B. Excavation for post bases; concrete foundation for posts.

C. Manual gates with related hardware.

D. Accessories.

1.02 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

C. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.

D. ASTM F567 - Standard Practice for Installation of Chain-Link Fence.

E. ASTM F1043 - Standard Specification for Strength and Protective Coatings on Steel Industrial Fence Framework.

F. CLFMI CLF-FIG0111 - Field Inspection Guide.

G. FS RR-F-191/1D - Fencing, Wire and Post Metal (Chain-Link Fence Fabric).

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on fabric, posts, accessories, fittings and hardware.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

PART 2 PRODUCTS

2.01 COMPONENTS

A. Line Posts: 1.9 inch diameter.

B. Corner and Terminal Posts: 2.38 inch diameter.

C. Gate Posts: 3-1/2 inch diameter.

D. Top and Brace Rail: 1.66 inch diameter, plain end, sleeve coupled.

E. Bottom Rail: 1.66 inch diameter, plain end, sleeve coupled.

F. Gate Frame: 1.66 inch diameter for welded fabrication.

G. Fabric: 2 inch diamond mesh interwoven wire, 9 gauge, 0.1483 inch thick, top selvage knuckle end closed, bottom selvage enclosed diamond.

H. Fabric with Pre-Inserted Slats: 2 inch diamond mesh interwoven wire, 6 gauge, 0.1920 inch thick, top selvage knuckle end closed, bottom selvage knuckle end closed.
   1. Privacy Slats: Vinyl, woven into fabric.

I. Tension Wire: 6 gauge, 0.1920 inch thick steel, single strand.

J. Tie Wire: Aluminum alloy steel wire.

2.02 MATERIALS

A. Posts, Rails, and Frames: ASTM F1083 Schedule 40 hot-dipped galvanized steel pipe, welded construction, minimum yield strength of 50 ksi for sizes NPS 5 and larger

B. Line Posts: Type I round in accordance with FS RR-F-191/1D.

C. Terminal, Corner, Rail, Brace, and Gate Posts: Type I round in accordance with FS RR-F-191/1D.

D. Wire Fabric: ASTM F 668 polymer-coated, class 2B fused and bonded steel chain link fabric.

E. Concrete: Ready-mixed, complying with ASTM C94/C94M; normal Portland cement; 3,000 psi strength at 28 days, 3 inch slump; 1 inch nominal size aggregate.

2.03 MANUAL GATES AND RELATED HARDWARE

A. Hardware for Single Swinging Gates: 180 degree hinges, 2 for gates up to 60 inches high, 3 for taller gates; fork latch with gravity drop and padlock hasp; keeper to hold gate in fully open position.

B. Hinges: Finished to match fence components.
   1. Brackets: Square.
   2. Mounting: Center.
   3. Closing: Manual.

C. Latches: Finished to match fence components.
   1. Brackets: Round.
   2. Locking: Mechanical.

2.04 ACCESSORIES

A. Caps: Molded rigid vinyl; sized to post diameter, set screw retainer.

B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; steel.

2.05 FINISHES

A. Components (Other than Fabric): Galvanized in accordance with ASTM A123/A123M, at 1.7 ounces per square foot.

B. Components and Fabric: Vinyl coated over coating of 1.8 ounces per square foot galvanizing.

C. Hardware: Hot-dip galvanized to weight required by ASTM A153/A153M.

D. Accessories: Same finish as framing, powder coat accessories which cannot receive vinyl coating.

E. Color(s): Black.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Verify that areas are clear of obstructions or debris.

3.02 INSTALLATION

A. Install framework, fabric, accessories and gates in accordance with ASTM F567.

B. Place fabric on outside of posts and rails.

C. Set intermediate, terminal, and gate posts plumb , in concrete footings with top of footing 2 inches above finish grade. Slope top of concrete for water runoff.

D. Line Post Footing Depth Below Finish Grade: ASTM F567.

E. Corner, Gate and Terminal Post Footing Depth Below Finish Grade: ASTM F567.

F. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail one bay from end and gate posts.

G. Provide top rail through line post tops and splice with 6 inch long rail sleeves.

H. Install center and bottom brace rail on corner gate leaves.

I. Do not stretch fabric until concrete foundation has cured 7 days.

J. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.

K. Position bottom of fabric 2 inches above finished grade.

L. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.

M. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.

N. Install bottom tension wire stretched taut between terminal posts.

O. Do not attach the hinged side of gate to building wall; provide gate posts.

3.03 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch.

B. Maximum Offset From True Position: 1 inch.

C. Do not infringe on adjacent property lines.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Layout: Verify that fence installation markings are accurate to design, paying attention to gate locations, underground utilities, and property lines.

C. Fence Height: Randomly measure fence height at three locations or at areas that appear out of compliance with design.

D. Gates: Inspect for level, plumb, and alignment.

E. Workmanship: Verify neat installation free of defects. See CLFMI CLF-FIG0111 for field inspection guidance.

3.05 CLEANING

A. Clean jobsite of excess materials; scatter excess material from post hole excavations uniformly away from posts. Remove excess material if required.

B. Clean fence with mild household detergent and clean water rinse well.

3.06 CLOSEOUT ACTIVITIES

END OF SECTION 323113

SECTION 329119
LANDSCAPE GRADING

PART 3 EXECUTION

1.01 FINISH GRADING

A. Maintain profiles and contour of subgrade.

B. Remove roots, weeds, rocks, and foreign material while spreading.

C. Maintain uniform topsoil thickness.

D. Lightly compact placed topsoil.

END OF SECTION 329119

SECTION 329223
SODDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preparation of subsoil.

B. Placing topsoil.

C. Fertilizing.

D. Sod installation.

E. Maintenance.

1.02 RELATED REQUIREMENTS

A. Section 312200 - Grading: Topsoil material.

B. Section 312200 - Grading: Preparation of subsoil and placement of topsoil in preparation for the work of this section.

1.03 DEFINITIONS

A. Weeds: Includes Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.04 REFERENCE STANDARDS

A. TPI (SPEC) - Guideline Specifications to Turfgrass Sodding.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Certificate: Certify grass species and location of sod source.

1.06 QUALITY ASSURANCE

A. Sod Producer: Company specializing in sod production and harvesting with minimum five years experience in hardiness zone 5 through 7.

1.07 REGULATORY REQUIREMENTS

A. Comply with regulatory agencies for fertilizer and herbicide composition.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver sod in rolls. Protect exposed roots from dehydration.

B. Do not deliver more sod than can be laid within 24 hours.

PART 2 PRODUCTS

2.01 MATERIALS

A. Sod: TPI (SPEC), Certified Turfgrass Sod quality; cultivated grass sod; type indicated below; with strong fibrous root system, free of stones, burned or bare spots; containing no more than 5 weeds per 1000 sq ft. Minimum age of 18 months, with root development that will support its own weight without tearing, when suspended vertically by holding the upper two corners.
   1. Tall Fescue Grass Type: 100 percent.
   2. Thickness: "Thin" sod, minimum 1/2 inch and maximum 1 inch topsoil base.
   3. Cut sod in area not exceeding 1 sq yd.
   4. Machine cut sod and load on pallets in accordance with TPI (SPEC) Guidelines.

B. Topsoil: Type S2 as specified in Section 312200 - Grading.

C. Fertilizer: recommended for grass, with fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil, to the following proportions:
   1. Nitrogen: 12 percent.
   2. Phosphoric Acid: 12 percent.
   3. Soluble Potash: 12 percent.

D. Water: Clean, fresh and free of substances or matter that could inhibit vigorous growth of grass.

2.02 ACCESSORIES

A. Wood Pegs: Softwood, sufficient size and length to ensure anchorage of sod on slope.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that prepared soil base is ready to receive the work of this section.

3.02 PREPARATION

A. Prepare subgrade in accordance with Section 312200 - Grading.

B. Place topsoil in accordance with Section 312200 - Grading.

3.03 FERTILIZING

A. Apply fertilizer at a rate of 2.5 lbs per 1 000 sf.

B. Apply after smooth raking of topsoil and prior to installation of sod.

C. Apply fertilizer no more than 48 hours before laying sod.

D. Lightly water to aid the dissipation of fertilizer.

3.04 LAYING SOD

A. Planting Season: March 15 through October 15.
   1. Sodding must be completed within planting season.

B. Moisten prepared surface immediately prior to laying sod.

C. Lay sod within 24 hours after harvesting to prevent deterioration.

D. Lay sod smooth and tight with no open joints visible, and no overlapping; stagger end joints 12 inches minimum. Do not stretch or overlap sod pieces.

E. Where new sod adjoins existing grass areas, align top surfaces.

F. Where sod is placed adjacent to hard surfaces, such as curbs, pavements, etc., place top elevation of sod 1/2 inch below top of hard surface.

G. On slopes 4 inches per foot and steeper, lay sod perpendicular to slope and secure every row with wooden pegs at maximum 2 feet on center. Drive pegs flush with soil portion of sod.

H. Water sodded areas immediately after installation. Saturate sod to 4 inches of soil.

I. After sod and soil have dried, roll sodded areas to ensure good bond between sod and soil and to remove minor depressions and irregularities.

3.05 MAINTENANCE

A. Provide maintenance at no extra cost to Owner; Owner will pay for water used from existing water system on site.

B. Provide maintenance of sodded areas for two months from date of sod installation or until sod has taken root. Notify Owner one-week prior to end of watering period.

C. Mow grass at regular intervals to maintain at a maximum height of 2-1/2 inches. Do not cut more than 1/3 of grass blade at any one mowing.

D. Neatly trim edges and hand clip where necessary.

E. Immediately remove clippings after mowing and trimming.

F. Water to prevent grass and soil from drying out.

G. Roll surface to remove irregularities.

H. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.

I. Immediately replace sod to areas that show deterioration or bare spots.

J. If Contractor chooses to delay planting due to weather conditions, Contractor assumes responsibility for erosion control and repair to landscape grading per requirements of Section 312200 - Grading.

END OF SECTION 329223

SECTION 334211
STORMWATER GRAVITY PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Stormwater drainage piping.

B. Stormwater pipe accessories.

1.02 RELATED REQUIREMENTS

A. Section 312316.13 - Trenching: Excavating, bedding, and backfilling.

1.03 REFERENCE STANDARDS

A. ASTM A48/A48M - Standard Specification for Gray Iron Castings.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating pipe, pipe accessories.

C. Field Quality Control Submittals: Document results of field quality control testing.

D. Project Record Documents:
   1. Record location of pipe runs, connections, and invert elevations.
   2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.06 REGULATORY REQUIREMENTS

PART 2 PRODUCTS

2.01 STORMWATER PIPE MATERIALS

A. Provide products that comply with Metropolitan St. Louis Sewer District standards.

2.02 PIPE ACCESSORIES

A. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

B. Substitutions: See Section 016000 - Product requirements.

2.03 CONCRETE:

A. Compressive strength: Minimum 3,000 psi at 28 days.

B. Air entrainment: Minimum 5%.

C. Slump: Maximum 4 inches.

D. Finish: Broom finish.

2.04 BEDDING AND COVER MATERIALS

A. Bedding: As specified in Section 312316.13 - Trenching.

B. Cover: As specified in Section 312316.13 - Trenching.

PART 3 EXECUTION

3.01 TRENCHING

A. See Section 312316.13 - Trenching for additional requirements.

B. Hand trim excavation for accurate placement of pipe to elevations indicated.

C. Backfill around sides and to top of pipe with bedding Fill Type A5 or A6 as appropriate for pipe size, tamp in place and compact, then complete backfilling.

3.02 INSTALLATION

A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.

B. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.

C. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch in 10 feet.

D. Install continuous trace wire 6 inches below finish grade, above pipe line; coordinate with Section 312316.13 - Trenching.

3.03 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 014000 - Quality Requirements.

B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.
   1. Infiltration Test: Test in accordance with Metropolitan St. Louis Sewer District standards.
   2. Deflection Test: Test in accordance with Metropolitan St. Louis Sewer District standards.

3.04 PROTECTION

A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

END OF SECTION 334211