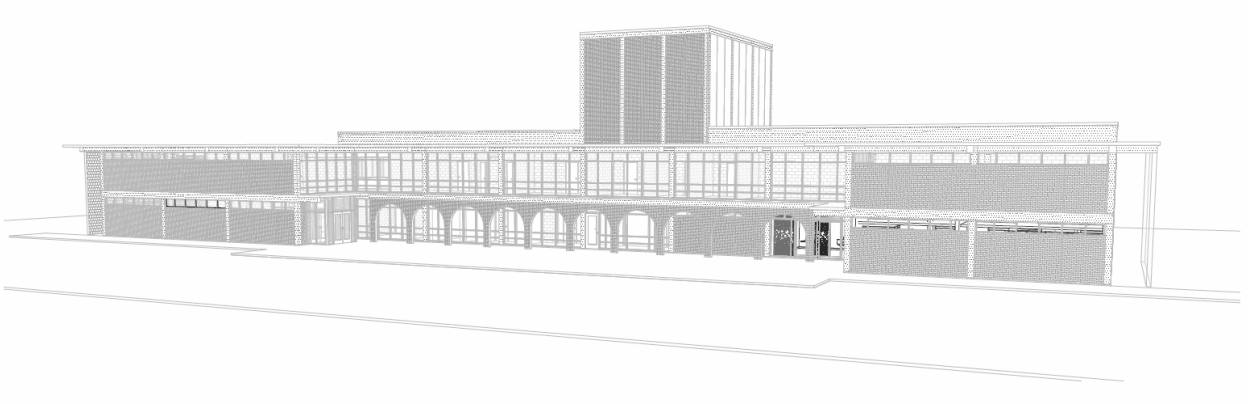
PROJECT MANUAL

PHILANDER SMITH UNIVERSITY
ML HARRIS AUDITORIUM RENOVATION



Little Rock, Arkansas

Economic Development Administration
Award Number: **08-79-05533**
A/E Project Number: **2024-060**

CONSTRUCTION DOCUMENTS

Issue Date: **September 10, 2026**

CROMWELL

1300 East 6th Street | Little Rock, AR 72202 | 501.372.2900 | cromwell.com

This page was intentionally left blank for duplex printing.

SECTION 00 01 05

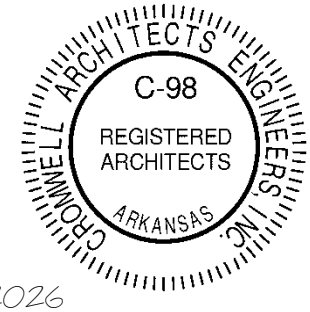
CERTIFICATIONS

I hereby certify that the architectural portions of work included in these plans and specifications, except as otherwise indicated by other registered professionals, have been prepared by me or under my direct supervision, and that I have coordinated the architectural portions with those portions sealed by other registered professionals.

Christopher R. East, AIA, Architect
Principal

CROMWELL ARCHITECTS
ENGINEERS, INC.
Architects Engineers
1300 East 6th Street
Little Rock, Arkansas 72202





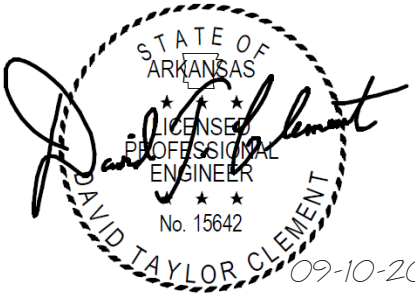
09-10-2026

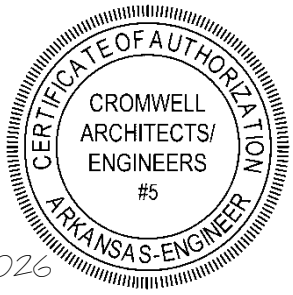
September 10, 2026
Date

I hereby certify that the structural portions of work included in these plans and specifications, except as otherwise indicated, have been prepared by me, or under my direct supervision. I further certify that to the best of my knowledge this portion of the plans and specifications are as required by law and in compliance with the Arkansas Fire Prevention Code for the State of Arkansas. I further certify that to the best of my knowledge the structural elements are designed as required by law and in compliance with the requirements of Arkansas Earthquake Resistant Design for Public Structures (ASA 12-80-101 et seq.) for and the latest edition of the International Building Code with revisions.

David Taylor Clement, PE
Structural Engineer

CROMWELL ARCHITECTS
ENGINEERS, INC.
Architects Engineers
1300 East 6th Street
Little Rock, Arkansas 72202





09-10-2026

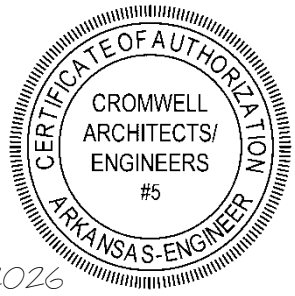
September 10, 2026
Date

I hereby certify that fire protection portions of work included in these plans and specifications, except as otherwise indicated, have been prepared by me, or under my direct supervision.

John Worsham, PE
Fire Protection Engineer

CROMWELL ARCHITECTS
ENGINEERS, INC.
Architects Engineers
1300 East 6th Street
Little Rock, Arkansas 72202





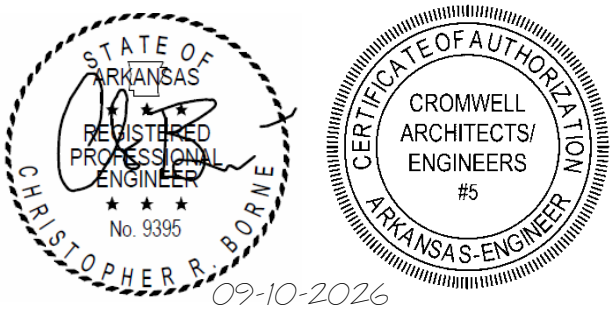
09-10-2026

September 10, 2026
Date

I hereby certify that the mechanical portions of work included in these plans and specifications, except as otherwise indicated, have been prepared by me, or under my direct supervision.

Christopher R. Borné, PE
Mechanical Engineer

CROMWELL ARCHITECTS
ENGINEERS, INC.
Architects Engineers
1300 East 6th Street
Little Rock, Arkansas 72202

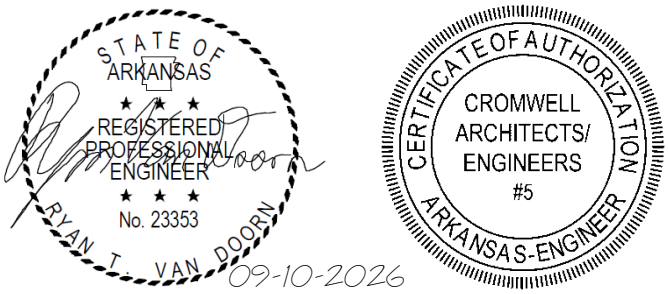


September 10, 2026
Date

I hereby certify that the plumbing portions of work included in these plans and specifications, except as otherwise indicated, have been prepared by me, or under my direct supervision.

Ryan T. Van Doorn, PE
Plumbing Engineer

CROMWELL ARCHITECTS
ENGINEERS, INC.
Architects Engineers
1300 East 6th Street
Little Rock, Arkansas 72202

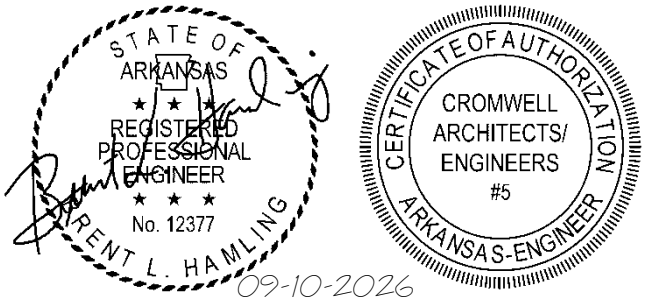


September 10, 2026
Date

I hereby certify that the electrical portions of work included in these plans and specifications, except as otherwise indicated, have been prepared by me, or under my direct supervision.

Brent L. Hamling, PE
Electrical Engineer

CROMWELL ARCHITECTS
ENGINEERS, INC.
Architects Engineers
1300 East 6th Street
Little Rock, Arkansas 72202



September 10, 2026
Date

SECTION 00 01 10

TABLE OF CONTENTS

PROCUREMENT AND CONTRACTING REQUIREMENTS

DIVISION 00 -- PROCUREMENT AND CONTRACTING REQUIREMENTS

00 01 05 - Certifications Page
00 01 10 - Table of Contents
00 11 13 - Advertisement for Bids
00 21 13 - Instructions to Bidders
AIA Document A701-2018 Instruction to Bidders
00 31 00 - Available Project Information
Davis Bacon Wage Rate
EDA Contracting Provisions for Construction Projects
Notice of Requirements for Affirmative Action
Form CD-512 Certification Regarding Lobbying
EDA Site Sign Written Specifications
Appendix B Standard Buy America Specifications for Bid Package
Hazardous Materials Survey
Hazardous Material Abatement Proposal
00 41 00 - Bid Proposal Form
00 50 00 - Contracting Forms and Supplements
AIA Document A101-2017 Standard of Agreement Between Owner and Contractor
00 72 00 - General Conditions
AIA Document A201-2017 General Conditions of the Contract for Construction
00 73 00 - Supplementary Conditions

SPECIFICATIONS

DIVISION 01 -- GENERAL REQUIREMENTS

01 10 00 - Summary
01 20 00 - Price and Payment Procedures
01 21 00 - Allowances
01 22 00 - Unit Prices
01 23 00 - Alternates
01 30 00 - Administrative Requirements
01 32 16 - Construction Progress Schedule
01 35 53 - Security Procedures
01 40 00 - Quality Requirements
01 50 00 - Temporary Facilities and Controls
01 55 00 - Vehicular Access and Parking
01 58 13 - Temporary Project Signage
01 60 00 - Product Requirements
01 60 01 - Substitution Request Form
01 61 16 - Volatile Organic Compound (VOC) Content Restrictions
01 70 00 - Execution and Closeout Requirements
01 78 00 - Closeout Submittals

01 79 00 - Demonstration and Training

DIVISION 02 -- EXISTING CONDITIONS

02 41 00 - Demolition

DIVISION 04 -- MASONRY

04 26 13 - Masonry Veneer

DIVISION 05 -- METALS

05 12 00 - Structural Steel Framing
05 50 00 - Metal Fabrications
05 70 00 - Decorative Metal

DIVISION 06 -- WOOD, PLASTICS, AND COMPOSITES

06 10 00 - Rough Carpentry
06 20 00 - Finish Carpentry
06 41 00 - Architectural Wood Casework

DIVISION 07 -- THERMAL AND MOISTURE PROTECTION

07 21 00 - Thermal Insulation
07 25 00 - Weather Barriers
07 72 36 - Automatic Smoke Vents
07 92 00 - Joint Sealants

DIVISION 08 -- OPENINGS

08 11 13 - Hollow Metal Frames
08 14 16 - Flush Wood Doors
08 43 13 - Aluminum-Framed Storefronts
08 71 00 - Door Hardware
08 80 00 - Glazing

DIVISION 09 -- FINISHES

09 05 61 - Common Work Results for Flooring Preparation
09 21 16 - Gypsum Board Assemblies
09 22 36 - Lath
09 23 00 - Gypsum Plastering
09 30 00 - Tiling
09 51 00 - Acoustical Ceilings
09 65 00 - Resilient Flooring
09 68 13 - Tile Carpeting
09 72 00 - Wall Coverings
09 84 30 - Sound-Absorbing Wall and Ceiling Units
09 90 00 - Painting and Coating

DIVISION 10 -- SPECIALTIES

10 14 00 - Signage
10 21 13.17 - Phenolic Toilet Compartments
10 26 00 - Wall and Door Protection
10 28 00 - Toilet Accessories
10 44 00 - Fire Protection Specialties

DIVISION 11 -- EQUIPMENT

11 61 33 - Stage Rigging and Curtain Systems

11 61 53 - Stage Lighting Fixtures
11 61 63 - Stage Lighting Power and Control Systems

DIVISION 12 -- FURNISHINGS

12 36 00 - Countertops
12 61 00 - Fixed Audience Seating

DIVISION 22 -- PLUMBING

22 05 10 - Basic Plumbing Requirements
22 05 17 - Sleeves and Sleeve Seals for Plumbing Piping
22 05 19 - Meters and Gauges for Plumbing Piping
22 05 29 - Hangers and Supports for Plumbing Piping and Equipment
22 05 48 - Vibration and Seismic Controls for Plumbing Piping and Equipment
22 05 53 - Identification for Plumbing Piping and Equipment
22 07 19 - Plumbing Piping Insulation
22 10 05 - Plumbing Piping
22 10 06 - Plumbing Piping Specialties
22 30 00 - Plumbing Equipment
22 40 00 - Plumbing Fixtures

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

23 05 10 - Basic HVAC Requirements
23 05 13 - Common Motor Requirements for HVAC Equipment
23 05 19 - Meters and Gauges for HVAC Piping
23 05 29 - Hangers and Supports for HVAC Piping and Equipment
23 05 48 - Vibration and Seismic Controls for HVAC
23 05 53 - Identification for HVAC Piping and Equipment
23 05 93 - Testing, Adjusting, and Balancing for HVAC
23 07 13 - Duct Insulation
23 07 19 - HVAC Piping Insulation
23 23 00 - Refrigerant Piping
23 31 00 - HVAC Ducts and Casings
23 33 00 - Air Duct Accessories
23 34 23 - HVAC Power Ventilators
23 37 00 - Air Outlets and Inlets
23 62 13 - Packaged Roof Top Air Conditioning Units
23 81 28 - Ductless and Mini-Split Systems

DIVISION 26 -- ELECTRICAL

26 00 10 - Electrical General Provisions
26 05 01 - Theatrical Systems Electrical Installation
26 05 05 - Selective Demolition for Electrical
26 05 19 - Low-Voltage Electrical Power Conductors and Cables
26 05 26 - Grounding and Bonding for Electrical Systems
26 05 29 - Hangers and Supports for Electrical Systems
26 05 33.13 - Conduit for Electrical Systems
26 05 33.16 - Boxes for Electrical Systems
26 05 33.23 - Surface Raceways for Electrical Systems

26 05 48 - Vibration and Seismic Controls for Electrical Systems
26 05 53 - Identification for Electrical Systems
26 05 73 - Power System Studies
26 05 83 - Wiring Connections
26 09 23 - Lighting Control Devices
26 21 00 - Low-Voltage Electrical Service Entrance
26 22 00 - Low-Voltage Transformers
26 24 13 - Switchboards
26 24 16 - Panelboards
26 27 26 - Wiring Devices
26 28 16.13 - Enclosed Circuit Breakers
26 28 16.16 - Enclosed Switches
26 43 00 - Surge Protective Devices
26 51 00 - Interior Lighting
26 51 10 - Interior Lighting Fixtures, Lamps, and Drivers

DIVISION 27 -- COMMUNICATIONS

27 05 29 - Hangers and Supports for Communications Systems
27 05 33.13 - Conduit for Communications Systems
27 10 00 - Structured Cabling
27 41 00 - Performance Audio Video

DIVISION 28 -- ELECTRONIC SAFETY AND SECURITY

28 46 00 - Fire Detection and Alarm

SECTION 00 11 13

ADVERTISEMENT FOR BIDS

LEGAL NOTICE

TO: ARKANSAS DEMOCRAT GAZETTE

Legal Advertising
P.O. Box 1821
Little Rock, AR 72203
legalads@arkansasonline.com
(501) 378-3444

FROM: CROMWELL ARCHITECTS ENGINEERS

1300 East 6th Street
Little Rock, AR 72202
(501) 372-2900

FULL RUN

Please insert the following Notice to Bidders in the appropriate column of your paper with your issues dated Sunday, October 11, 2026; Wednesday, October 14, 2026; Sunday, October 18, 2026.

INVOICES ARE TO BE SUBMITTED TO:

Cromwell Architects Engineers
Attn: Chris East ceast@cromwell.com
1300 East 6th Street
Little Rock, AR 72202

REFERENCE PO NUMBER: 2026-060

NOTICE TO BIDDERS

Philander Smith University is requesting Sealed Bids from qualified licensed contractors to execute the scope of work to include a partial renovation to the M.L. Harris Fine Arts Building which will include the Auditorium, Lobby, and utility improvements. The Auditorium will replace all the theater components including seating, audio-visual, rigging, curtains, ADA improvements, and other interior finishes. The Lobby will include replacing the existing non-ADA compliant bathrooms with ADA compliant bathrooms, divide the lobby to create a computer classroom, and replace the existing finishes and systems. The utility upgrades will include a new service, utility transformer, main distribution panel, and downstream distribution. Asbestos remediation will be included, and the building will be partially occupied during construction.

A mandatory pre-bid meeting for this project will be held **Tuesday, October 20, 2026,** at **10:00 AM CST**, in the M.L. Harris Auditorium Lobby. This meeting will begin promptly at 10:00 AM local time. All potential bidders must attend this meeting to be eligible to submit a bid.

Bidder questions will be received and responded to until **10:00 AM CST** on **Thursday, October 22, 2026**.

Sealed bids will be received on until **2:00 PM CST** on **Thursday, October 29, 2026,** at the Philander Smith University in the D.W. Reynolds Library and Technology Center Conference Room located on the campus at 905 W Daisy L Gaston Bates Drive, Little Rock, Arkansas 72202. Once the time to receive bids has passed, bids will be publicly opened and read aloud. Bids offered after the time to receive bids will not be accepted.

BID DOCUMENTS: The official version of the complete set of the Contract documents should be examined and are obtainable from the Cromwell Architects Engineers. Bidders may access complete electronic documents through the Cromwell Virtual Plan Room / Print Shop website. Contact: ThePRINTSHOP at www.theprintshoplr.com; 1304 East 6th Street, Little Rock, Arkansas 72202; Telephone (501) 400-1006. The plan room is completely FREE to access and view Drawings and Specifications. Hard copies of the Project Manual and Drawings may also be purchased for a non-refundable fee at the PRINTSHOP.

Bidders, subcontractor, suppliers, and others who obtain plans directly from any other source are fully responsible for obtaining all necessary documents for a complete bid. This includes the verification and incorporation of addenda or revision bulletins, prior to bidding the project.

Interested bidders who wish to receive email notifications of pre-bid conferences, addenda, and other information should contact Cromwell Architects Engineers at printshop@cromwell.com. All Bid Proposals must be submitted on an unaltered or modified copy of the Bid Forms provided in the project manual. Bidders may photocopy these forms. The entire manual does not need to be submitted with the bids. Faxed Bid Proposals, Phone Quotes, and Email Quotes will not be accepted.

A 5% Bid Bond or Cashier's Check is required.

Bids must include the cost of Performance Bond and Payment Bond.

Bidders shall conform to the requirements of the Arkansas licensing laws and regulations for contractors and shall be licensed before a bid is submitted.

Owner reserves the right to reject any and all bids, and to waive any formalities.

END of SECTION

SECTION 00 21 13
INSTRUCTIONS TO BIDDERS

SUMMARY

1.01 SEE AIA A701, INSTRUCTIONS TO BIDDERS BOUND IN THE PROJECT MANUAL.

END OF SECTION

This page was intentionally left blank for duplex printing.

AIA® Document A701® – 2018

Instructions to Bidders

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

Philander Smith University ML Harris Auditorium
A/E Project No. 2024-060
EDA Award No. 08-79-05533

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

Philander Smith University
900 W. Daisy L. Gatson Bates Dr.
Little Rock, Arkansas 72202

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

Cromwell Architects Engineers, Inc.
1300 East 6th Street
Little Rock, Arkansas 72202

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 may have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes 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 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 16:04:26 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa31b493b0a9b9f2da74c98)

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 16:04:26 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa31b493b0a9b9f2da74c98)

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.
- **.7** This project will be partially funded with Federal funds from the United States Department of Commerce, Economic Development Administration and therefore is subject to the Federal Laws and regulations associated with that program.

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 16:04:26 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa31b493b0a9b9f2da74c98)

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.)

§ 3.1.2 Bidders may access complete electronic documents through the Cromwell Virtual Plan Room / Print Shop web site. (contact: thePRINTSHOP at www.theprintshoplr.com – 1304 East 6th Street, Little Rock, AR 72202 – 501-400-1006) The plan room is completely free to access and view Drawings and Specifications.

1. Hard copies of the Project Manual and Drawings may also be purchased for a non-refundable fee at thePRINTSHOP.
2. Bidders, Subcontractors, suppliers, and others who obtain plans directly from any other source are fully responsible for obtaining all necessary documents for a complete bid, This includes the verification and incorporation of addenda or revision bulletins, prior to bidding the project.

§ 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.)

Submit requests electronically via email to the Architect/Engineer.

§ 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.

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 16:04:26 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa31b493b0a9b9f2da74c98)

§ 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.

§ 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.)

Addenda will be issued through Cromwell Virtual Plan Room at www.theprintshoplr.com.

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

§ 3.4.3 Addenda will be issued no later than three 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.

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 16:04:26 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa31b493b0a9b9f2da74c98)

§ 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.)

Bid Security will be in the amount of 5% of the Base Bid in the form of a Bid Bond or cashiers check.

§ 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.

§ 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, beginningdays 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.)

Submit Bid by paper copy as indicated in §4.3.2.

§ 4.3.2 Paper copies of the Bid, the bid security, and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party receiving the Bids and shall be identified with the Project name, the Bidder's name and address, and, if applicable, the designated portion of the Work for which the Bid is submitted. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof.

§ 4.3.3 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.

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 16:04:26 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa31b493b0a9b9f2da74c98)

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

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

§ 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.

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, 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

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 16:04:26 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa31b493b0a9b9f2da74c98)

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.

§ 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.

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 16:04:26 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa31b493b0a9b9f2da74c98)

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

As amended to include Supplementary Conditions

.

.3 Drawings – Reference Construction Documents

Number	Title	Date

.4 Specifications – Reference Project Manual

Section	Title	Date	Pages

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 16:04:26 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa31b493b0a9b9f2da74c98)

[ ] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:

[ ] The Sustainability Plan:

[ ] Supplementary and other Conditions of the Contract:

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

Contractor's Bid Proposal

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 16:04:26 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa31b493b0a9b9f2da74c98)

SECTION 00 31 00
AVAILABLE PROJECT INFORMATION

PART 1 GENERAL

1.01 EDA CONTRACTING PROVISIONS

A. For Contractor's convenience a copy is included following end of this section.
   1. Appendix B: Standard Buy American Specifications for Bid Package.
   2. Current prevailing Davis-Bacon wage rate determination.
   3. EDA Contracting Provisions for Construction Projects.
   4. Notice of Requirements for Affirmative Action.
   5. Lobbying Restriction Form (Form CD-512).
   6. EDA Construction Site Sign Specifications.

1.02 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. Hazardous Material Survey: Entitled Asbestos Sampling, dated February 11, 2026.
   1. Prepared by Environment Protection Associates, Little Rock, Arkansas.
   2. For Contractor's convenience a copy is included following end of this section.

C. Hazardous Material Abatement Proposal: Entitled Abatement Proposal, dated February 12, 2026.
   1. Prepared by Environment Protection Associates, Little Rock, Arkansas.
   2. For Contractor's convenience a copy is included following end of this section.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

This page was intentionally left blank for duplex printing.

"General Decision Number: AR20260032 05/18/2026

State: Arkansas

Construction Types: Building

Counties: Arkansas Counties of Pulaski

Modification Number Publication Date

0 01/02/2026

1 05/18/2026

BOIL0069-002 01/01/2025

	Rates	Fringes
BOILERMAKER	$ 34.21	23.92

CARP0216-003 07/01/2024

	Rates	Fringes
MILLWRIGHT	$ 34.02	11.88

ELEC0295-010 01/01/2024

	Rates	Fringes
ELECTRICIAN (INCLUDES LOW VOLTAGE WIRING)	$ 28.94	14.95

PAIN0424-010 07/01/2021

	Rates	Fringes
PAINTER (BRUSH, ROLLER, AND SPRAY, EXCLUDES DRYWALL FINISHING/TAPING)	$ 16.25	10.42

PLUM0155-014 08/01/2025

	Rates	Fringes
PLUMBER (INCLUDES HVAC PIPE INSTALLATION)	$ 34.41	15.70

PLUM0155-016 08/01/2025

	Rates	Fringes
PIPEFITTER (EXCLUDES HVAC PIPE INSTALLATION)	$ 34.41	15.70

SHEE0036-034 06/01/2024

	Rates	Fringes
SHEET METAL WORKER (INCLUDES HVAC DUCT INSTALLATION)	$ 26.99	15.67

SUAR2015-029 01/09/2017

	Rates	Fringes
TRUCK DRIVER: DUMP TRUCK	$ 13.80	0.71
SPRINKLER FITTER (FIRE SPRINKLERS)	$ 23.56	2.77
ROOFER	$ 15.39	0.00
OPERATOR: ROLLER	$ 14.78	0.00
OPERATOR: PAVER (ASPHALT, AGGREGATE, AND CONCRETE)	$ 23.75	0.00

OPERATOR: GRADER/BLADE.....$ 14.66 0.00

OPERATOR: CRANE.....$ 17.52 0.00

OPERATOR: BULLDOZER.....$ 16.74 0.00

OPERATOR: BACKHOE/EXCAVATOR/TRACKHOE.....$ 28.21 0.00

LABORER: PIPELAYER.....$ 14.00 0.00

LABORER: MASON TENDER - BRICK.....$ 12.37 0.00

LABORER: COMMON OR GENERAL.....$ 12.85 0.00

IRONWORKER, STRUCTURAL.....$ 19.84 0.00

IRONWORKER, REINFORCING.....$ 14.00 0.00

INSULATOR - MECHANICAL (DUCT, PIPE & MECHANICAL

SYSTEM INSULATION).....$ 17.16 4.76

DRYWALL FINISHER/TAPER.....$ 15.38 0.00

CEMENT MASON/CONCRETE FINISHER.....$ 19.91 3.30

CARPENTER, INCLUDES ACOUSTICAL CEILING

INSTALLATION, AND DRYWALL HANGING.....$ 17.51 2.26

BRICKLAYER.....$ 20.37 3.77

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

==========

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including

preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Note: Executive Order 13658 generally applies to contracts subject to the Davis-Bacon Act that were awarded on or between January 1, 2015 and January 29, 2022, and that have not been renewed or extended on or after January 30, 2022. Executive Order 13658 does not apply to contracts subject only to the Davis-Bacon Related Acts regardless of when they were awarded. If a contract is subject to Executive Order 13658, the contractor must pay all covered workers at least $13.65 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract from May 11, 2026, through December 31, 2026. The applicable Executive Order minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under Executive Order 13658 is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than SU , UAVG , SA , or SC denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The SU identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

SU wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The SA identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination.

The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the SA identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

1) Has there been an initial decision in the matter? This can be:

a) a survey underlying a wage determination

b) an existing published wage determination

c) an initial WHD letter setting forth a position on a wage determination matter

d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys

Wage and Hour Division

U.S. Department of Labor

200 Constitution Avenue, N.W.

Washington, DC 20210

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail to:

Branch of Construction Wage Determinations

Wage and Hour Division

U.S. Department of Labor

200 Constitution Avenue, N.W.

Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator

U.S. Department of Labor

200 Constitution Avenue, N.W.

Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board

U.S. Department of Labor

200 Constitution Avenue, N.W.

Washington, DC 20210.

==========

END OF GENERAL DECISION"

This page was intentionally left blank for duplex printing.

OMB Number: 0610-0096
Expiration Date: 07/31/2029

U. S. DEPARTMENT OF COMMERCE
ECONOMIC DEVELOPMENT ADMINISTRATION

EDA CONTRACTING PROVISIONS
FOR CONSTRUCTION PROJECTS

These EDA Contracting Provisions for Construction Projects (EDA Contracting Provisions) are intended for use by recipients receiving federal assistance from the U. S. Department of Commerce - Economic Development Administration (EDA). They contain provisions specific to EDA and other federal provisions not normally found in non-federal contract documents. The requirements contained herein must be incorporated into all construction contracts and subcontracts funded wholly or in part with federal assistance from EDA.

Please note that Executive Order 11246 ("Equal Employment Opportunity") was revoked by Executive Order 14713 ("Ending Illegal Discrimination and Restoring Merit-Based Opportunity"), on January 21, 2025. Accordingly, on July 1, 2025, the Department of Labor ("DOL") proposed recission of the regulations at 41 CFR § 60-1.4 and 41 CFR § 60-4 which implement Executive Order 11246. In addition, current DOL policy, subject to change, is that the written notifications to the Director of the Office of Federal Contract Compliance Programs required by these regulations are not being accepted and DOL is not enforcing the provisions per Secretary's Order 03-2025 as modified by Order 08-2025. Recipients and contractors should monitor DOL guidance to ensure compliance with current requirements.

Once the regulations are rescinded, EDA will update its requirements. Until such time as the regulations are rescinded or unless there is additional DOL guidance, the Contractor agrees to comply with all applicable requirements of 41 CFR § 60-1.4 and 41 CFR § 60-4.

TABLE OF CONTENTS

1. Definitions
2. Applicability
3. Federally Required Contract Provisions
4. Required Provisions Deemed Inserted
5. Inspection by EDA Representatives
6. Examination and Retention of Contractor's Records
7. Construction Schedule and Periodic Estimates
8. Contractor's Title to Material
9. Inspection and Testing of Materials
10. "OR EQUAL" Clause
11. Patent Fees and Royalties
12. Claims for Extra Costs
13. Contractor's and Subcontractor's Insurance
14. Contract Security Bonds
15. Labor Standards - Davis-Bacon and Related Acts
16. Labor Standards - Contract Work Hours and Safety Standards Act
17. Equal Employment Opportunity
18. Contracting with Small, Minority and Women's Businesses
19. Health, Safety and Accident Prevention
20. Conflict of Interest and Other Prohibited Interests
21. New Restrictions on Lobbying
22. Historical and Archaeological Data Preservation
23. Clean Air and Water
24. Use of Lead-Based Paints on Residential Structures
25. Energy Efficiency
26. Environmental Requirements
27. Debarment, Suspension, Ineligibility and Voluntary Exclusions
28. EDA Project Sign
29. Buy America

1. DEFINITIONS

Agreement – The written instrument that is evidence of the agreement between the Owner and the Contractor overseeing the Work.

Architect/Engineer - The person or other entity engaged by the Recipient to perform architectural, engineering, design, and other services related to the work as provided for in the contract.

Contract – The entire and integrated written agreement between the Owner and the Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

Contract Documents – Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents.

Contractor – The individual or entity with whom the Owner has entered into the Agreement.

Drawings or Plans – That part of the Contract Documents prepared or approved by the Architect/Engineer that graphically shows the scope, extent, and character of the Work to be performed by the Contractor.

EDA - The United States of America acting through the Economic Development Administration of the U.S. Department of Commerce or any other person designated to act on its behalf. EDA has agreed to provide financial assistance to the Owner, which includes assistance in financing the Work to be performed under this Contract. Notwithstanding EDA's role, nothing in this Contract shall be construed to create any contractual relationship between the Contractor and EDA.

Owner – The individual or entity with whom the Contractor has entered into the Agreement and for whom the Work is to be performed.

Project – The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.

Recipient – A non-Federal entity receiving a Federal financial assistance award directly from EDA to carry out an activity under an EDA program, including any EDA-approved successor to the entity.

Specifications – That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.

Subcontractor – An individual or entity having direct contract with the Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.

Work – The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

2. APPLICABILITY

The Project to which the construction work covered by this Contract pertains is being assisted by the United States of America through federal assistance provided by the U.S. Department of Commerce - Economic Development Administration (EDA). Neither EDA, nor any of its departments, entities, or employees is a party to this Contract. The following EDA Contracting Provisions are included in this Contract and all subcontracts or related instruments pursuant to the provisions applicable to such federal assistance from EDA.

3. FEDERALLY REQUIRED CONTRACT PROVISIONS

(a) All contracts in excess of the simplified acquisition threshold - currently fixed at $150,000 (*see* 41 U.S.C. §§ 134 and 1908) must address administrative, contractual, or legal remedies in instances where contractors violate or breach contract terms, and provide for such sanctions and penalties as may be appropriate.

(b) All contracts in excess of $10,000 must address termination for cause and for convenience by the Recipient including the manner by which it will be effected and the basis for settlement.

(c) All construction contracts awarded in excess of $10,000 by recipients of federal assistance and their contractors or subcontractors shall contain a provision requiring compliance with Executive Order 11246 of September 24, 1965, *Equal Employment Opportunity*, as amended by Executive Order 11375 of October 13, 1967, and Department of Labor implementing regulations at 41 C.F.R. part 60.

(d) All prime construction contracts in excess of $2,000 awarded by Recipients must include a provision for compliance with the Davis-Bacon Act (40 U.S.C. §§ 3141-3148) as supplemented by Department of Labor regulations at 29 C.F.R. part 5. The contracts must also include a provision for compliance with the Copeland "Anti-Kickback" Act (18 U.S.C. § 874 and 40 U.S.C. § 3145) as supplemented by Department of Labor regulations at 29 C.F.R. part 3.

(e) All contracts awarded by the Recipient in excess of $100,000 that involve the employment of mechanics or laborers must include a provision for compliance with 40 U.S.C. §§ 3702 and 3704 (the Contract Work Hours and Safety Standards Act) as supplemented by Department of Labor regulations at 29 C.F.R. part 5.

(f) All contracts must include EDA requirements and regulations that involve a requirement on the contractor or sub-contractor to report information to EDA, the Recipient or any other federal agency.

(g) All contracts must include EDA requirements and regulations pertaining to patent rights with respect to any discovery or invention which arises or is developed in the course of or under such contract.

(h) All contracts must include EDA requirements and regulations pertaining to copyrights and rights in data.

(i) All contracts and subgrants in excess of $150,000 must contain a provision that requires compliance with all applicable standards, orders, or requirements issued under the Clean Air Act (42 U.S.C. § 7401 *et seq.*) and the Federal Water Pollution Control Act (Clean Water Act) (33 U.S.C. § 1251 *et seq.*), and Executive Order 11738, *Providing for Administration of the Clean Air Act and the Federal Water Pollution Control Act With Respect to Federal Contracts, Grants, or Loans*.

(j) Contracts must contain mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act (42 U.S.C.§ 6201).

(k) Contracts must contain a provision ensuring that contracts are not to be made to parties on the government wide Excluded Parties List System in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 C.F.R. part 180.

(l) Contracts must contain a provision ensure compliance with the Byrd Anti-Lobbying Amendment (31 U.S.C. § 1352) under which contractors that apply or bid for an award of $100,000 or more must file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. § 1352. Each tier must also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the non-Federal award.

(m) If the Recipient is a state agency or agency of a political subdivision of a state, any contract awarded must contain a provision ensuring compliance with section 6002 of the Solid Waste Disposal Act (42 U.S.C. § 6962), as amended by the Resource Conservation and Recovery Act related to the procurement of recovered materials.

4. REQUIRED PROVISIONS DEEMED INSERTED

Each and every provision of law and clause required by law to be inserted in this contract shall be deemed to be inserted herein and the contract shall be read and enforced as though it were included herein, and if through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon the application of either party the contract shall forthwith be physically amended to make such insertion of correction.

5. INSPECTION BY EDA REPRESENTATIVES

The authorized representatives and agents of EDA shall be permitted to inspect all work, materials, payrolls, personnel records, invoices of materials, and other relevant data and records.

6. EXAMINATION AND RETENTION OF CONTRACTOR'S RECORDS

(a) The Owner, EDA, or the Comptroller General of the United States, or any of their duly authorized representatives shall, generally until three years after final payment under this contract, have access to and the right to examine any of the Contractor's directly pertinent books, documents, papers, or other records involving transactions related to this contract for the purpose of making audit, examination, excerpts, and transcriptions.

(b) The Contractor agrees to include in first-tier subcontracts under this contract a clause substantially the same as paragraph (a) above. "Subcontract," as used in this clause, excludes purchase orders that do not exceed $10,000.

(c) The periods of access and examination in paragraphs (a) and (b) above for records relating to (1) appeals under the disputes clause of this contract, (2) litigation or settlement of claims arising from the performance of this contract, or (3) costs and expenses of this contract to which the Owner, EDA, or Comptroller General or any of their duly authorized representatives has taken exception shall continue until disposition of such appeals, litigation, claims, or exceptions.

7. CONSTRUCTION SCHEDULE AND PERIODIC ESTIMATES

Immediately after execution and delivery of the contract, and before the first partial payment is made, the Contractor shall deliver to the Owner an estimated construction progress schedule in a form satisfactory to the Owner, showing the proposed dates of commencement and completion of each of the various subdivisions of work required under the Contract Documents and the anticipated amount of each monthly payment that will become due to the Contractor in accordance with the progress schedule. The Contractor also shall furnish the Owner (a) a detailed estimate giving a complete breakdown of the contract price and (b) periodic itemized estimates of work done for the purpose of making partial payments thereon. The costs employed in making up any of these schedules will be used only to determine the basis of partial payments and will not be considered as fixing a basis for additions to or deductions from the contract price.

8. CONTRACTOR'S TITLE TO MATERIAL

No materials, supplies, or equipment for the work shall be purchased by the Contractor or by any subcontractor that is subject to any chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller. The Contractor warrants and guarantees that he/she has good title to all work, materials, and equipment used by him/her in the Work, free and clear of all liens, claims, or encumbrances.

9. INSPECTION AND TESTING OF MATERIALS

All materials and equipment used in the completion of the Work shall be subject to adequate inspection and testing in accordance with accepted standards. The laboratory or inspection agency shall be selected by the Owner. Materials of construction, particularly those upon which the strength and durability of any structure may depend, shall be subject to inspection and testing to establish conformance with specifications and suitability for intended uses.

10. "OR EQUAL" CLAUSE

Whenever a material, article, or piece of equipment is identified in the Contract Documents by reference to manufacturers' or vendors' names, trade names, catalogue numbers, etc., it is intended merely to establish a standard. Any material, article, or equipment of other manufacturers and vendors that will perform adequately the duties imposed by the general design will be considered equally acceptable provided the material, article, or equipment so proposed is, in the opinion of the Architect/Engineer, of equal substance and function. However, such substitution material, article, or equipment shall not be purchased or installed by the Contractor without the Architect/Engineer's written approval.

11. PATENT FEES AND ROYALTIES

(a) Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device that is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Architect/Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by the Owner in the Contract Documents.

(b) To the fullest extent permitted by Laws and Regulations, the Contractor shall indemnify and hold harmless the Owner and the Architect/Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

12. CLAIMS FOR EXTRA COSTS

No claims for extra work or cost shall be allowed unless the same was done in pursuance of a written order from the Architect/Engineer approved by the Owner.

13. CONTRACTORS AND SUBCONTRACTORS INSURANCE

(a) The Contractor shall not commence work under this Contract until the Contractor has obtained all insurance reasonably required by the Owner, nor shall the Contractor allow any subcontractor to commence work on his/her subcontract until the insurance required of the subcontractor has been so obtained and approved.

(b) Types of insurance normally required are:

(1) Workers' Compensation
(2) Contractor's Public Liability and Property Damage
(3) Contractor's Vehicle Liability
(4) Subcontractors' Public Liability, Property Damage and Vehicle Liability
(5) Builder's Risk (Fire and Extended Coverage)

(c) **Scope of Insurance and Special Hazards:** The insurance obtained, which is described above, shall provide adequate protection for the Contractor and his/her subcontractors, respectively, against damage claims that may arise from operations under this contract, whether such operations be by the insured or by anyone directly or indirectly employed by him/her and also against any of the special hazards that may be encountered in the performance of this Contract.

(d) **Proof of Carriage of Insurance:** The Contractor shall furnish the Owner with certificates showing the type, amount, class of operations covered, effective dates, and dates of expiration of applicable insurance policies.

14. CONTRACT SECURITY BONDS

(a) If the amount of this Contract exceeds $150,000, the Contractor shall furnish a performance bond in an amount at least equal to one hundred percent (100%) of the Contract price as security for the faithful performance of this Contract and also a payment bond in an amount equal to one hundred percent (100%) of the Contract price or in a penal sum not less than that prescribed by State, Territorial, or local law, as security for the payment of all persons performing labor on the Work under this Contract and furnishing materials in connection with this Contract. The performance bond and the payment bond may be in one or in separate instruments in accordance with local law. Before final acceptance, each bond must be approved by EDA. If the amount of this Contract does not exceed $150,000, the Owner shall specify the amount of the payment and performance bonds.

(b) All bonds shall be in the form prescribed by the Contract Documents except as otherwise provided in applicable laws or regulations, and shall be executed by such sureties as are named in the current list of *Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies* as published in Treasury Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent must be accompanied by a certified copy of the agent's

authority to act. Surety companies executing the bonds must also be authorized to transact business in the state where the Work is located.

15. **LABOR STANDARDS - DAVIS-BACON AND RELATED ACTS**
(as required by section 602 of PWEDA)

(a) **Minimum Wages**

(1) All laborers and mechanics employed or working upon the site of the Work in the construction or development of the Project will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act at 29 C.F.R. part 3, the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at the time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor, which is attached hereto and made a part hereof, regardless of any contractual relationship that may be alleged to exist between the Contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 C.F.R. § 5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 C.F.R. § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein, provided that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates determined under 29 C.F.R. § 5.5(a)(1)(ii) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(2) (i) Any class of laborers or mechanics to be employed under the Contract, but not listed in the wage determination, shall be classified in conformance with the wage determination. EDA shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(A) The work to be performed by the classification requested is not performed by a classification in the wage determination;

(B) The classification is utilized in the area by the construction industry; and

(C) The proposed wage rate, including any bona fide fringe benefits, bears a

reasonable relationship to the wage rates contained in the wage determination.

(ii) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and EDA or its designee agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by EDA or its designee to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210.

(iii) In the event the Contractor, the laborers or mechanics to be employed in the classification or their representatives, and EDA or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), EDA or its designee shall refer the questions, including the views of all interested parties and the recommendation of EDA or its designee, to the Administrator for determination.

(iv) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(2)(ii) or (iii) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(3) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(4) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, provided, that the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(b) **Withholding**

EDA or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the Contractor under this Contract or any other federal contract with the same prime Contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the Contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper employed or working on the site of the Work in the construction or development of the Project, all or part of the wages required by the Contract, EDA or its designee may, after written notice to the Contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations

have ceased. EDA or its designee may, after written notice to the Contractor, disburse such amounts withheld for and on account of the Contractor or subcontractor to the respective employees to whom they are due. The Comptroller General shall make such disbursements in the case of direct Davis-Bacon Act contracts.

(c) **Payrolls and basic records**

(1) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the Work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the Work in the construction or development of the Project. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 C.F.R. § 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, the plan or program is financially responsible, and the plan or program has been communicated in writing to the laborers or mechanics affected, and provide records that show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(2) (i) For each week in which Contract work is performed, the Contractor shall submit a copy of all payrolls to the Owner for transmission to EDA or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 C.F.R. part 5.5(a)(3)(i). This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose. It may be purchased from the Superintendent of Documents (Federal Stock Number 029-005-00014-1), U.S. Government Printing Office, Washington, D.C. 20402; or downloaded from the U.S. Department of Labor's website at https://www.dol.gov/whd/forms/wh347.pdf. The prime Contractor is responsible for the submission of copies of payrolls by all subcontractors

(ii) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the Contract and shall certify the following:

(A) That the payroll for the payroll period contains the information required to be maintained under 29 C.F.R. § 5.5(a)(3)(i) and that such information is correct and complete;

(B) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the Contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 C.F.R. part 3; and

(C) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the Contract.

(iii) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 15(c)(2)(ii) of this section.

(iv) The falsification of any of the above certifications may subject the Contractor or subcontractor to civil or criminal prosecution under section 1001 of Title 18 and section 3729 of Title 31 of the U.S. Code.

(3) The Contractor or subcontractor shall make the records required under paragraph 15(c)(1) of this section available for inspection, copying, or transcription by authorized representatives of EDA or its designee or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit the required records or to make them available, EDA or its designee may, after written notice to the Contractor or Owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 C.F.R. § 5.12.

(d) **Apprentices and Trainees**.

(1) **Apprentices**. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training (Bureau), or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any

apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a Contractor is performing construction on a Project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(2) **Trainees**. Except as provided in 29 C.F.R. § 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program that has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman's hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(3) **Equal employment opportunity**. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity

requirements of Executive Order 11246, *Equal Employment Opportunity*, as amended, and 29 C.F.R. part 30.

(e) **Compliance with Copeland Anti-Kickback Act Requirements**. The Contractor shall comply with the Copeland Anti-Kickback Act (18 U.S.C. § 874 and 40 U.S.C. § 3145) as supplemented by Department of Labor regulations (29 C.F.R. part 3, "Contractors and Subcontractors on Public Buildings or Public Works Financed in Whole or in Part by Loans or Grants of the United States"). The Act provides that the Contractor and any subcontractors shall be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which they are otherwise entitled. The Owner shall report all suspected or reported violations to EDA.

(f) **Subcontracts**. The Contractor and any subcontractors will insert in any subcontracts the clauses contained in 29 C.F.R. §§ 5.5(a)(1) through (10) and such other clauses as EDA or its designee may require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime Contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 C.F.R. § 5.5.

(g) **Contract termination; debarment**. The breach of the contract clauses in 29 C.F.R. § 5.5 may be grounds for termination of the contract, and for debarment as a Contractor and a subcontractor as provided in 29 C.F.R. § 5.12.

(h) **Compliance with Davis-Bacon and Related Act Requirements**. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 C.F.R. parts 1, 3, and 5 are herein incorporated by reference in this contract.

(i) **Disputes concerning labor standards**. Disputes arising out of the labor standards provisions of this Contract shall not be subject to the general disputes clause of this Contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 C.F.R. parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and EDA or its designee, the U.S. Department of Labor, or the employees or their representatives.

(j) **Certification of Eligibility**.

(1)By entering into this Contract, the Contractor certifies that neither it nor any person or firm that has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 C.F.R. § 5.12(a)(1).

(2) No part of this Contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 C.F.R. § 5.12(a)(1).

(3) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. § 1001.

16. LABOR STANDARDS - CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

As used in this paragraph, the terms "laborers" and "mechanics" include watchmen and guards.

(a) **Overtime requirements**. No Contractor or subcontractor contracting for any part of the Contract work, which may require or involve the employment of laborers or mechanics, shall require or permit any such laborer or mechanic in any workweek in which that person is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(b) **Violation; liability for unpaid wages, liquidated damages**. In the event of any violation of the clause set forth in paragraph (a) of this section, the Contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such Contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (a) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (a) of this section.

(c) **Withholding for unpaid wages and liquidated damages**. EDA or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any monies payable on account of work performed by the Contractor or subcontractor under any such Contract or any other federal contract with the same prime Contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime Contractor such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b) of this section.

(d) **Subcontracts**. The Contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraphs (a) through (c) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime Contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (a) through (c) of this section.

17. EQUAL EMPLOYMENT OPPORTUNITY

(a) The Recipient hereby agrees that it will incorporate or cause to be incorporated into any contract for construction work, or modification thereof, as defined in the regulations of the Secretary of Labor at 41 C.F.R. chapter 60, which is paid for in whole or in part with funds obtained from EDA, the following equal opportunity clause:

During the performance of this contract, the Contractor agrees as follows:

(1) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training including apprenticeship. The Contractor agrees to post in conspicuous places available to employees and applicants for employment notices to be provided setting forth the provisions of this nondiscrimination clause.

(2) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

(3) The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.

(4) The Contractor will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers representatives of the Contractor's commitments hereunder, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(5) The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965 and of the rules, regulations, and relevant orders of the Secretary of Labor.

(6) The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to its books, records, and accounts by EDA and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(7) In the event of the Contractor's noncompliance with the nondiscrimination clauses of

this Contract or with any of the said rules, regulations, or orders, this Contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts or federally-assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation or order of the Secretary of Labor, or as otherwise provided by law.

(8) The Contractor will include the portion of the sentence immediately preceding paragraph 17(a)(1) and the provisions of paragraphs 17(a)(1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as EDA or the Secretary of Labor may direct as a means of enforcing such provisions, including sanctions for noncompliance. Provided, however, that in the event the Contractor becomes involved in or is threatened with litigation with a subcontractor or vendor as a result of such direction by EDA or the Secretary of Labor, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

(9) The Recipient further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally-assisted construction work. Provided, however, that if the Recipient so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality, or subdivision of such government that does not participate in work on or under the Contract.

(10)The Recipient agrees that it will assist and cooperate actively with EDA and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish EDA and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist EDA in the discharge of the EDA's primary responsibility for securing compliance.

(11) The Recipient further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a Contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by EDA or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the Recipient agrees that if it fails or refuses to comply with these undertakings, EDA may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this EDA financial assistance; refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case

to the Department of Justice for appropriate legal proceedings.

(b) Exemptions to Above Equal Opportunity Clause (41 C.F.R. chapter 60):

(1) Contracts and subcontracts not exceeding $10,000 (other than Government bills of lading, and other than contracts and subcontracts with depositories of Federal funds in any amount and with financial institutions which are issuing and paying agents for U.S. savings bonds and savings notes) are exempt. The amount of the Contract, rather than the amount of the federal financial assistance, shall govern in determining the applicability of this exemption.

(2) Except in the case of subcontractors for the performance of construction work at the site of construction, the clause shall not be required to be inserted in subcontracts below the second tier.

(3) Contracts and subcontracts not exceeding $10,000 for standard commercial supplies or raw materials are exempt.

18. **CONTRACTING WITH SMALL, MINORITY AND WOMEN'S BUSINESSES**

(a) If the Contractor intends to let any subcontracts for a portion of the work, the Contractor shall take affirmative steps to assure that small, minority and women's businesses are used when possible as sources of supplies, equipment, construction, and services.

(b) Affirmative steps shall consist of:

(1) Placing qualified small and minority businesses and women's business enterprises on solicitation lists;

(2) Ensuring that small and minority businesses and women's business enterprises are solicited whenever they are potential sources;

(3) Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority businesses and women's business enterprises;

(4) Establishing delivery schedules, where the requirements of the contract permit, which encourage participation by small and minority businesses and women's business enterprises;

(5) Using the services and assistance of the U.S. Small Business Administration, the Minority Business Development Agency of the U.S. Department of Commerce, and State and local governmental small business agencies;

(6) Requiring each party to a subcontract to take the affirmative steps of this section; and

(7) The Contractor is encouraged to procure goods and services from labor surplus area firms.

19. **HEALTH, SAFETY, AND ACCIDENT PREVENTION**

(a) In performing this contract, the Contractor shall:

(1) Ensure that no laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to their health and/or safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation;

(2) Protect the lives, health, and safety of other persons;

(3) Prevent damage to property, materials, supplies, and equipment; and

(4) Avoid work interruptions.

(b) For these purposes, the Contractor shall:

(1) Comply with regulations and standards issued by the Secretary of Labor at 29 C.F.R. part 1926. Failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act (40 U.S.C. §§ 3701 – 3708); and

(2) Include the terms of this clause in every subcontract so that such terms will be binding on each subcontractor.

(c) The Contractor shall maintain an accurate record of exposure data on all accidents incident to work performed under this Contract resulting in death, traumatic injury, occupational disease, or damage to property, materials, supplies, or equipment, and shall report this data in the manner prescribed by 29 C.F.R. part 1904.

(d) The Owner shall notify the Contractor of any noncompliance with these requirements and of the corrective action required. This notice, when delivered to the Contractor or the Contractor's representative at the site of the Work, shall be deemed sufficient notice of the noncompliance and corrective action required. After receiving the notice, the Contractor shall immediately take corrective action. If the Contractor fails or refuses to take corrective action promptly, the Owner may issue an order stopping all or part of the Work until satisfactory corrective action has been taken. The Contractor shall not base any claim or request for equitable adjustment for additional time or money on any stop order issued under these circumstances.

(e) The Contractor shall be responsible for its subcontractors' compliance with the provisions of this clause. The Contractor shall take such action with respect to any subcontract as EDA, or the Secretary of Labor shall direct as a means of enforcing such provisions.

20. CONFLICT OF INTEREST AND OTHER PROHIBITED INTERESTS

(a) No official of the Owner who is authorized in such capacity and on behalf of the Owner to negotiate, make, accept, or approve, or to take part in negotiating, making, accepting, or approving any architectural, engineering, inspection, construction or material supply contract or any subcontract in connection with the construction of the Project, shall become directly or indirectly interested personally in this Contract or in any part hereof.

(b) No officer, employee, architect, attorney, engineer, or inspector of or for the Owner who is authorized in such capacity and on behalf of the Owner to exercise any legislative, executive, supervisory or other similar functions in connection with the construction of the Project, shall become directly or indirectly interested personally in this Contract or in any part thereof, any material supply contract, subcontract, insurance contract, or any other contract pertaining to the Project.

(c) The Contractor may not knowingly contract with a supplier or manufacturer if the individual or entity who prepared the Contract Documents has a corporate or financial affiliation with the supplier or manufacturer.

(d) The Owner's officers, employees, or agents shall not engage in the award or administration of this Contract if a conflict of interest, real or apparent, may be involved. Such a conflict may arise when: (i) the employee, officer or agent; (ii) any member of their immediate family; (iii) their partner or (iv) an organization that employs, or is about to employ, any of the above, has a financial interest in the Contractor. The Owner's officers, employees, or agents shall neither solicit nor accept gratuities, favors, or anything of monetary value from the Contractor or subcontractors.

(e) If the Owner finds after a notice and hearing that the Contractor, or any of the Contractor's agents or representatives, offered or gave gratuities (in the form of entertainment, gifts, or otherwise) to any official, employee, or agent of the Owner or EDA in an attempt to secure this Contract or favorable treatment in awarding, amending, or making any determinations related to the performance of this Contract, the Owner may, by written notice to the Contractor, terminate this Contract. The Owner may also pursue other rights and remedies that the law or this Contract provides. However, the existence of the facts on which the Owner bases such findings shall be an issue and may be reviewed in proceedings under the dispute resolution provisions of this Contract.

(f) In the event this Contract is terminated as provided in paragraph (e) of this section, the Owner may pursue the same remedies against the Contractor as it could pursue in the event of a breach of this Contract by the Contractor. As a penalty, in addition to any other damages to which it may be entitled by law, the Owner may pursue exemplary damages in an amount (as determined by the Owner) which shall not be less than three nor more than ten times the costs the Contractor incurs in providing any such gratuities to any such officer or employee.

21. RESTRICTIONS ON LOBBYING

(a) This Contract, or subcontract is subject to 31 U.S.C. § 1352, regarding lobbying restrictions. The section is explained in the common rule, 15 C.F.R. part 28 (55 FR 6736-6748, February 26, 1990). Each bidder under this Contract or subcontract is generally prohibited from using federal funds for lobbying the Executive or Legislative Branches of the Federal Government in connection with this EDA Award.

(b) **Contract Clause Threshold**: This Contract Clause regarding lobbying must be included in each bid for a contract or subcontract exceeding $100,000 of federal funds at any tier under the EDA Award.

(c) **Certification and Disclosure**: Each bidder of a contract or subcontract exceeding $100,000 of federal funds at any tier under the federal Award must file Form CD-512, *Certification Regarding Lobbying – Lower Tier Covered Transactions*, and, if applicable, Standard Form-LLL, *Disclosure of Lobbying Activities*, regarding the use of any nonfederal funds for lobbying. Certifications shall be retained by the Contractor or subcontractor at the next higher tier. All disclosure forms, however, shall be forwarded from tier to tier until received by the Recipient of the EDA Award, who shall forward all disclosure forms to EDA.

(d) **Continuing Disclosure Requirement**: Each Contractor or subcontractor that is subject to the Certification and Disclosure provision of this Contract Clause is required to file a disclosure form at the end of each calendar quarter in which there occurs any event that requires disclosure or that materially affects the accuracy of the information contained in any disclosure form previously filed by such person. Disclosure forms shall be forwarded from tier to tier until received by the Recipient of the EDA Award, who shall forward all disclosure forms to EDA.

(e) **Indian Tribes, Tribal Organizations, or Other Indian Organizations**: Indian tribes, tribal organizations, or any other Indian organizations, including Alaskan Native organizations, are excluded from the above lobbying restrictions and reporting requirements, but only with respect to expenditures that are by such tribes or organizations for lobbying activities permitted by other federal law. An Indian tribe or organization that is seeking an exclusion from Certification and Disclosure requirements must provide EDA with the citation of the provision or provisions of federal law upon which it relies to conduct lobbying activities that would otherwise be subject to the prohibitions in and to the Certification and Disclosure requirements of 31 U.S.C. § 1352, preferably through an attorney's opinion. Note, also, that a non-Indian subrecipient, contractor, or subcontractor under an award to an Indian tribe, for example, is subject to the restrictions and reporting requirements.

22. HISTORICAL AND ARCHAEOLOGICAL DATA PRESERVATION

The Contractor agrees to facilitate the preservation and enhancement of structures and objects of historical, architectural or archaeological significance and when such items are found and/or unearthed during the course of project construction. Any excavation by the Contractor that uncovers an historical or archaeological artifact shall be immediately reported to the Owner and a representative of EDA. Construction shall be temporarily halted pending the notification process and further directions issued by EDA after consultation with the State Historic

Preservation Officer (SHPO) for recovery of the items. *See* the National Historic Preservation Act of 1966 (54 U.S.C. § 300101 *et seq.*, formerly at 16 U.S.C. § 470 *et seq.*) and Executive Order No. 11593 of May 31, 1971.

23. **CLEAN AIR AND WATER**

Applicable to Contracts in Excess of $150,000

(a) **Definition**. "Facility" means any building, plant, installation, structure, mine, vessel, or other floating craft, location, or site of operations, owned, leased, or supervised by the Contractor or any subcontractor, used in the performance of the Contract or any subcontract. When a location or site of operations includes more than one building, plant, installation, or structure, the entire location or site shall be deemed a facility except when the Administrator, or a designee, of the United States Environmental Protection Agency (EPA) determines that independent facilities are collocated in one geographical area.

(b) In compliance with regulations issued by the EPA, 2 C.F.R. part 1532, pursuant to the Clean Air Act, as amended (42 U.S.C. § 7401 *et seq.*); the Federal Water Pollution Control Act, as amended (33 U.S.C. § 1251 *et seq.*); and Executive Order 11738, the Contractor agrees to:

(1) Not utilize any facility in the performance of this contract or any subcontract which is listed on the Excluded Parties List System, part of the System for Award Management (SAM), pursuant to 2 C.F.R. part 1532 for the duration of time that the facility remains on the list;

(2) Promptly notify the Owner if a facility the Contractor intends to use in the performance of this contract is on the Excluded Parties List System or the Contractor knows that it has been recommended to be placed on the List;

(3) Comply with all requirements of the Clean Air Act and the Federal Water Pollution Control Act, including the requirements of section 114 of the Clean Air Act and section 308 of the Federal Water Pollution Control Act, and all applicable clean air and clean water standards; and

(4) Include or cause to be included the provisions of this clause in every subcontract and take such action as EDA may direct as a means of enforcing such provisions.

24. **USE OF LEAD-BASED PAINTS ON RESIDENTIAL STRUCTURES**

(a) If the work under this Contract involves construction or rehabilitation of residential structures over $5,000, the Contractor shall comply with the Lead-based Paint Poisoning Prevention Act (42 U.S.C. § 4831). The Contractor shall assure that paint or other surface coatings used in a residential property does not contain lead equal to or in excess of 1.0 milligram per square centimeter or 0.5 percent by weight or 5,000 parts per million (ppm) by weight. For purposes of this section, "residential property" means a dwelling unit, common areas, building exterior surfaces, and any surrounding land, including outbuildings, fences and play equipment affixed to the land, belonging to an owner and available for use by residents, but not

including land used for agricultural, commercial, industrial or other non-residential purposes, and not including paint on the pavement of parking lots, garages, or roadways.

(b) As a condition to receiving assistance under PWEDA, recipients shall assure that the restriction against the use of lead-based paint is included in all contracts and subcontracts involving the use of federal funds.

25. ENERGY EFFICIENCY

The Contractor shall comply with all standards and policies relating to energy efficiency which are contained in the energy conservation plan issued in compliance with the Energy Policy and Conservation Act (42 U.S.C. § 6201) for the State in which the Work under the Contract is performed.

26. ENVIRONMENTAL REQUIREMENTS

When constructing a Project involving trenching and/or other related earth excavations, the Contractor shall comply with the following environmental constraints:

(1) **Wetlands**. When disposing of excess, spoil, or other construction materials on public or private property, the Contractor shall not fill in or otherwise convert wetlands.

(2) **Floodplains**. When disposing of excess, spoil, or other construction materials on public or private property, the Contractor shall not fill in or otherwise convert 100 year floodplain areas delineated on the latest Federal Emergency Management Agency (FEMA) Floodplain Maps, or other appropriate maps, i.e., alluvial soils on Natural Resource Conservation Service (NRCS) Soil Survey Maps.

(3) **Endangered Species**. The Contractor shall comply with the Endangered Species Act, which provides for the protection of endangered and/or threatened species and critical habitat. Should any evidence of the presence of endangered and/or threatened species or their critical habitat be brought to the attention of the Contractor, the Contractor will immediately report this evidence to the Owner and a representative of EDA. Construction shall be temporarily halted pending the notification process and further directions issued by EDA after consultation with the U.S. Fish and Wildlife Service.

27. DEBARMENT, SUSPENSION, INELIGIBILITY, AND VOLUNTARY EXCLUSIONS

As required by Executive Orders 12549 and 12689, *Debarment and Suspension*, 2 C.F.R. Part 180 and implemented by the Department of Commerce at 2 C.F.R. part 1326, for prospective participants in lower tier covered transactions (except subcontracts for goods or services under the $25,000 small purchase threshold unless the subrecipient will have a critical influence on or substantive control over the award), the Contractor agrees that:

(1) By entering into this Contract, the Contractor and subcontractors certify, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared

ineligible, or voluntarily excluded from participation in this Contract by any federal department or agency.

(2) Where the Contractor or subcontractors are unable to certify to any of the statements in this certification, the Contractor or subcontractors shall attach an explanation to this bid.

See also 2 C.F.R. part 180 and 2 C.F.R. § 200.342.

28. **EDA PROJECT SIGN**

The Contractor shall supply, erect, and maintain in good condition a Project sign according to the specifications provided by EDA. To the extent practical, the sign should be a free standing sign. Project signs shall not be located on public highway rights-of-way. Location and height of signs will be coordinated with the local agency responsible for highway or street safety in the Project area, if any possibility exists for obstructing vehicular traffic line of sight. Whenever the EDA site sign specifications conflict with State law or local ordinances, the EDA Regional Director will permit such conflicting specifications to be modified so as to comply with State law or local ordinance.

29. **BUY AMERICA**

To the greatest extent practicable, contractors are encouraged to purchase American-made equipment and products with funding provided under EDA financial assistance awards.

NOTICE OF REQUIREMENTS FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY (EXECUTIVE ORDER 11246 AND 41 CFR PART 60-4)

The following Notice shall be included in, and shall be a part of all solicitations for offers and bids on all Federal and federally assisted construction contracts or subcontracts in excess of $10,000.

The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.

The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Timetables	Goals for minority participation for each trade	Goals for female participation for each trade
_____	15.7 %	6.9%

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its federally involved and non federally involved construction.
The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order, and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of $10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the subcontractor; employer identification number of the subcontractor; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the subcontract is to be performed.
As used in this Notice, and in the contract resulting from this solicitation, the "covered area" is:

State of _____

County of _____

City of _____

This page was intentionally left blank for duplex printing.

FORM **CD-512**
(REV 12-04)

U.S. DEPARTMENT OF COMMERCE

CERTIFICATION REGARDING LOBBYING
LOWER TIER COVERED TRANSACTIONS

Applicants should review the instructions for certification included in the regulations before completing this form. Signature on this form provides for compliance with certification requirements under 15 CFR Part 28, "New Restrictions on Lobbying."

LOBBYING

As required by Section 1352, Title 31 of the U.S. Code, and implemented at 15 CFR Part 28, for persons entering into a grant, cooperative agreement or contract over $100,000 or a loan or loan guarantee over $150,000 as defined at 15 CFR Part 28, Sections 28.105 and 28.110, the applicant certifies that to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure occurring on or before October 23, 1996, and of not less than $11,000 and not more than $110,000 for each such failure occurring after October 23, 1996.

Statement for Loan Guarantees and Loan Insurance

The undersigned states, to the best of his or her knowledge and belief, that:

In any funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this commitment providing for the United States to insure or guarantee a loan, the undersigned shall complete and submit Standard Form-LLL, ''Disclosure Form to Report Lobbying,'' in accordance with its instructions.

Submission of this statement is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required statement shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure occurring on or before October 23, 1996, and of not less than $11,000 and not more than $110,000 for each such failure occurring after October 23, 1996.

As the duly authorized representative of the applicant, I hereby certify that the applicant will comply with the above applicable certification.

NAME OF APPLICANT	AWARD NUMBER AND/OR PROJECT NAME
PRINTED NAME AND TITLE OF AUTHORIZED REPRESENTATIVE	
SIGNATURE	DATE

This page was intentionally left blank for duplex printing.

OMB Number: 0610-0096
Expiration Date: 07/31/2029

EDA PROJECT SIGN

The Contractor shall supply, erect, and maintain in good condition a project sign according to the specifications set forth below:

EDA SITE SIGN SPECIFICATIONS

Size: 4' x 8' x ¾"

Materials: Exterior grade/MDO plywood (APA rating A-B)

Supports: 4" x 4" x 12' posts with 2" x 4" cross branching

Erection: Posts shall be set a minimum of three feet deep in concrete footings that are at least 12" in diameter.

Paint: Outdoor enamel

Colors: Jet Black, Blue (PMS300), and Gold (PMS7406). Specifically, on white background the following will be placed:

The U. S. Department of Commerce seal in blue, black, and gold;

"EDA" in blue;

"U. S. DEPARTMENT OF COMMERCE ECONOMIC DEVELOPMENT

ADMINISTRATION" in black;

"In partnership with" in blue;

(Actual name of the) "EDA Grant Recipient" in black;

Lettering: Specific fonts are named below; positioning will be as shown on the attached illustration.

"U. S. DEPARTMENT OF COMMERCE ECONOMIC DEVELOPMENT ADMINISTRATION" use Bank Gothic Medium - BANK GOTHIC MED

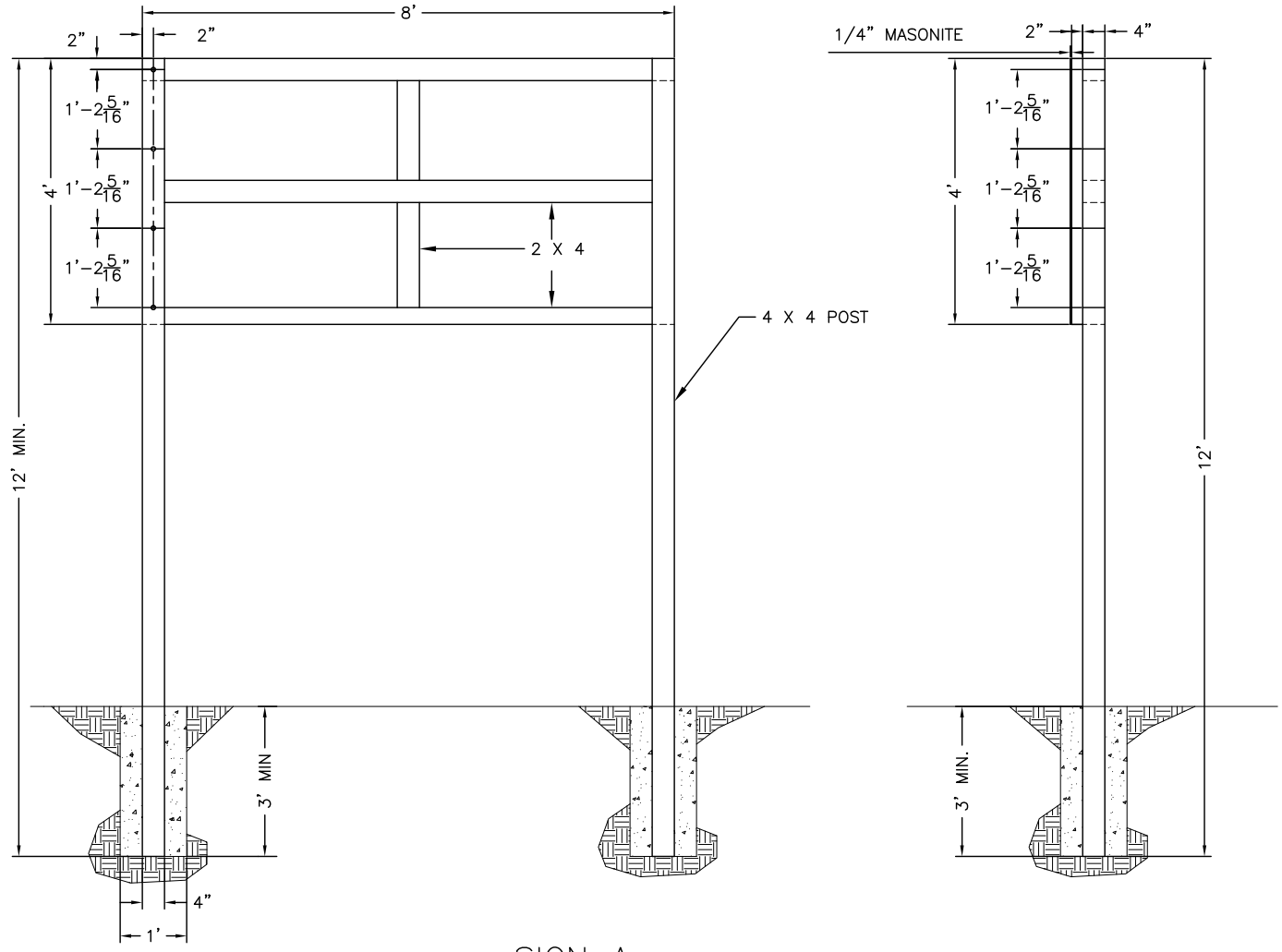
"In partnership with" use Univers™ 55 Oblique - *Univers 55*

(Name of) "EDA Grant Recipient" use Univers™ Extra Black 85 **Univers 85**

Project signs will not be erected on public highway rights-of-way. If any possibility exists for obstruction to traffic line of sight, the location and height of the sign will be coordinated with the agency responsible for highway or street safety in the area.

The EDA Regional Director may permit modifications to these specifications if they conflict with state law or local ordinances.

OMB Number: 0610-0096
Expiration Date: 07/31/2029

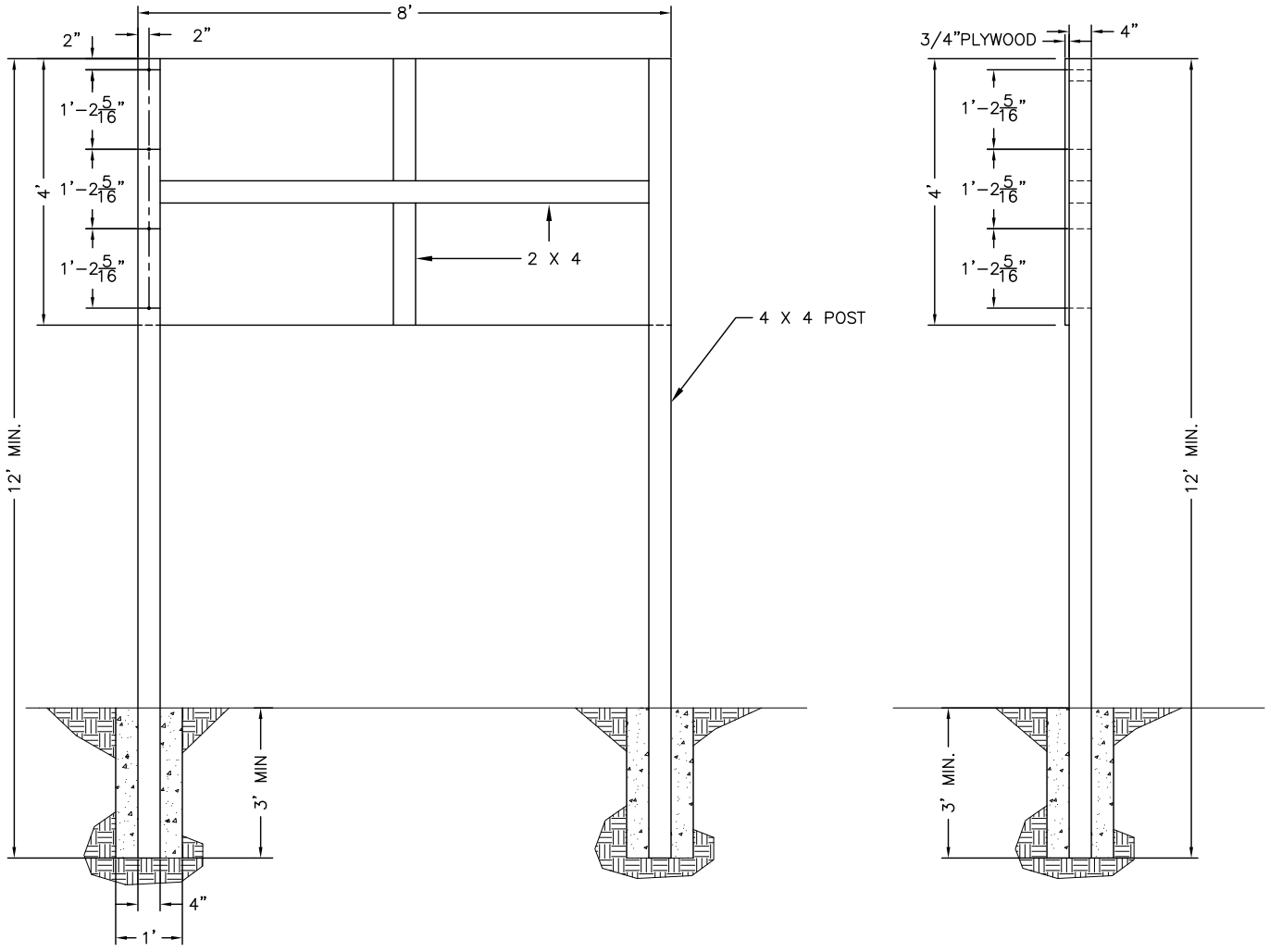


SIGN A
MASONITE SIGN

SCALE: 3/8" = 1'

PROJECT - SIGN A
ECONOMIC DEVELOPMENT ADMINISTRATION

OMB Number: 0610-0096
Expiration Date: 07/31/2029



SIGN B
PLYWOOD SIGN
SCALE: 3/8" = 1'

PROJECT - SIGN B
ECONOMIC DEVELOPMENT ADMINISTRATION



EDA

U.S. DEPARTMENT OF COMMERCE ECONOMIC DEVELOPMENT ADMINISTRATION

In partnership with

<EDA Grant Recipient Name>

2.25”

13.5”

1.75”

1.75”



EDA

10”

Black
Blue= PMS300
Gold= PMS7406

2.0”

1.5”

U.S. DEPARTMENT OF COMMERCE ECONOMIC DEVELOPMENT ADMINISTRATION

4.0”

48”

3.0”

In partnership with

3.0”

<EDA Grant Recipient Name>

3.75”

15.0”

96"

This page was intentionally left blank for duplex printing.

Appendix B: Standard Buy American Specifications for Bid Package

The Contractor is required to comply with the "Buy America Provision" found in section 70914 of the Infrastructure Investments and Jobs Act, Pub. L. 117-58, sections 70901-52 (the "Act"). The Act includes strict domestic source requirements for iron, steel, manufactured products, and construction materials used in EDA Public Works infrastructure projects.

In accordance with section 70914 of the Act and guidance provided at 2 C.F.R. pt. 184, all the iron, steel, manufactured products, and construction materials used in the Project must be produced in the United States and the Contractor shall include this requirement in all bid specifications, contracts, purchase orders, and other procurement documents for goods and materials used in the Project.

EDA may grant waivers to this requirement if it finds that at least one of the following conditions applies:

- Applying this subsection would be inconsistent with the public interest.
- Iron, steel, the relevant manufactured goods, or construction materials are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality.
- Inclusion of iron, steel and manufactured goods produced in the United States will increase the overall project cost by more than 25%.

Specific procedures and documentation are required for each category of waiver. If EDA determines that it is necessary to waive this provision based on their findings, they shall publish in the Federal Register a detailed written justification as to why the provision is being waived.

This section of the law shall be applied in a manner consistent with United States obligations under international agreements.

To ensure compliance with the Buy America Provision, the Contractor shall retain the following information for each item that includes iron, steel, for each manufactured good, and construction materials incorporated into the Project and may be required to submit:

1. Type and quantity of material (iron, steel, manufactured product, construction material);

2. Name and phone number of the supplier of the material;

3. Name of the manufacturer of the material; and

4. The city and State of production.

In addition, the Contractor shall include the following Buy America Contract Clause in all bid specifications, contracts, purchase orders, and other procurement documents for goods and materials used for the Project to require: (i) all iron, steel, manufactured products, and construction materials being purchased for the Project be produced in the United States, and (ii) all suppliers providing iron, steel, manufactured products, and construction materials for the Project provide information related to the origin of these items to EDA upon request.

Buy America Contract Clause

The Contractor acknowledges to and for the benefit of _____ ("Recipient") and the Economic Development Administration ("EDA") that it understands the goods and services under this Agreement are being funded with federal monies and have statutory requirements in section 70914 of the Infrastructure Investments and Jobs Act (Pub. L. 117-58, sections 70901-52) and 2 C.F.R. pt. 184, commonly known as "Build America, Buy America" that require all of the iron and steel, manufactured products, and construction materials used in the project to be produced in the United States ("Build America, Buy America Requirements"). The Build America, Buy America Requirements include all iron and steel, manufactured products, and construction materials provided by the Contactor pursuant to this Agreement. The Contractor hereby represents and warrants to and for the benefit of the Recipient and EDA (a) the Contractor has reviewed and understands the Build America, Buy America Requirements, (b) all of the iron and steel, manufactured products, and construction materials used in the project will be and/or have been produced in the United States in a manner that complies with the Build America, Buy America Requirements, unless a waiver of the requirements is approved, and (c) the Contractor will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the Build America, Buy America Requirements, as may be requested by the Recipient or EDA. Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Recipient or EDA to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney's fees) incurred by the Recipient or EDA resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from EDA or any damages owed to the EDA by the Recipient). If the Contractor has no direct contractual privity with EDA, the Recipient and the Contractor agree that the EDA is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of EDA.

Environmental Protection Associates

#9 Remington Cove
Little Rock, Arkansas 72204
Phone: 501-562-3818
Fax: 501-562-5701
Toll Free: 1-800-530-7706

Asbestos Sampling

To:	Chris East, AIA Cromwell Architects 1300 East 6th Street Little Rock, AR	**From:**	Gary Nooner
Email:	ceast@cromwell.com		
Fax:		**Date:**	February 11, 2026
Phone:	501-372-2900	**Pages:**	**13** Including cover sheet
Cell:	501-920-9558		
Re:	ML Harris Auditorium Philander Smith College	**cc:**	

Comments

Environmental Protection Associates

#9 Remington Cove
Little Rock, Arkansas 72204
501-562-3818
Fax 501-562-5701

February 11, 2026

Cromwell Architects
1300 East 6th Street
Little Rock, AR

RE: Asbestos Sampling
ML Harris Auditorium
Philander Smith College
900 W Daisey L. Gatson Bates Dr.
Little Rock, AR

Mr. Chris East, AIA

On February 5, 2026 at your request I collected samples from the above referenced location to determine if asbestos was present. Ten (10) samples were collected for laboratory analysis.

Laboratory analysis of these samples have determined the following:

Asbestos Detected in the following Materials

	Description	**Location**	
Sample # 01	Black Mastic Under Carpet	See Drawing	Approx. 1,800 Sft.
Sample # 03	Ceiling Texture	See Drawing	Approx. 1,800 Sft.
Sample # 04	Ceiling Texture	See Drawing	See Above
Sample # 05	Window Putty	See Drawing	Approx. 23 each (4x8)
Sample # 07	Floor Tile and Mastic (under carpet)	See Drawing	Approx. 3,800 Sft.
Sample # 08	Floor Tile and Mastic (under carpet)	See Drawing	Approx. 400 Sft.
Sample # 10	Caulking	See Drawing	Approx. 100 lft.

Federal and state regulations with the exception of OSHA, determine a material to be asbestos containing if it contains 1% or more asbestos. OSHA states that any amount is an asbestos material.

Therefore the following materials must be removed by a licensed asbestos contractor if disturbed by renovation or demolition.
Black Matic, Ceiling texture, Window Putty, Floor Tile & Mastic and Caulking
For further clarification of the Arkansas asbestos regulation 21. You may contact the Arkansas Department of Environmental Quality (ADEQ) Phone - 501-682-0718 or visit their website at - www.adeq.state.ar.us

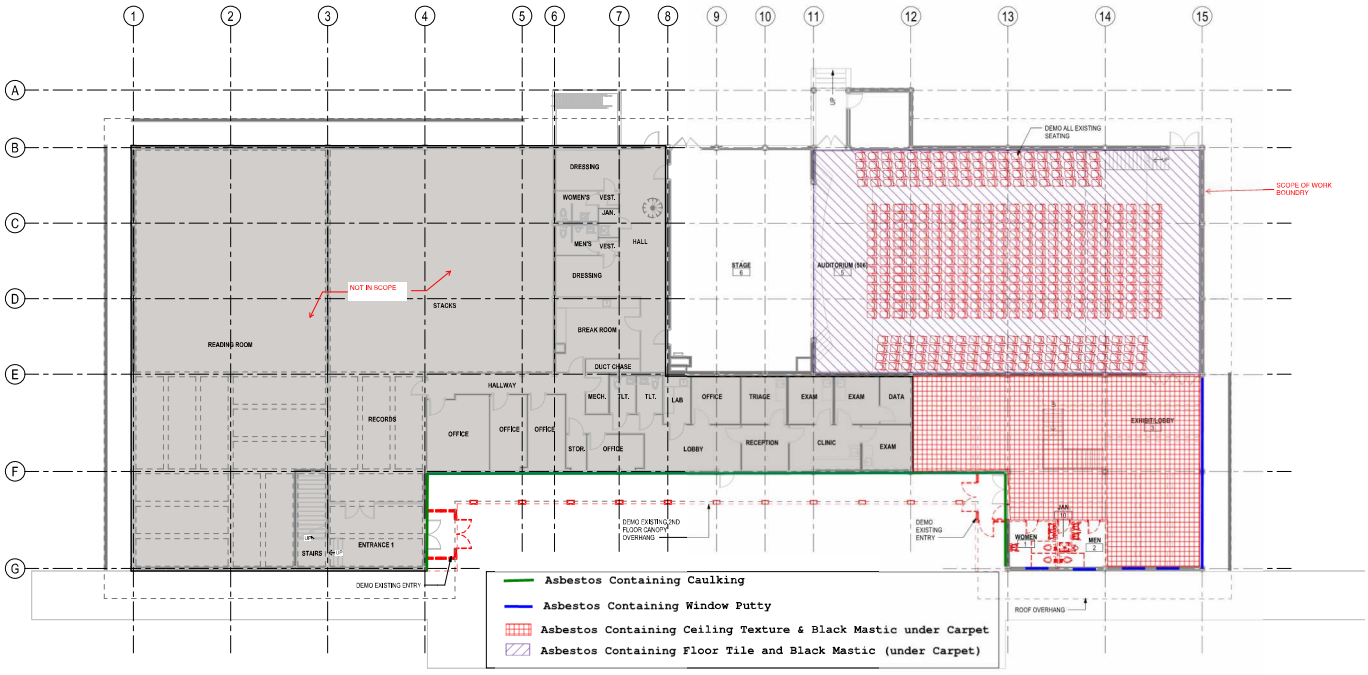
I have attached my chain of custody and laboratory findings. Please contact me with any Questions you may have.

Sincerely,

Gary Nooner
Inspector
License No. 005065

DEMO FLOOR PLAN GENERAL NOTES:

1. EXISTING STRUCTURE TO REMAIN IS SHADED. ITEMS TO BE DEMOLISHED ARE INDICATED DASHED IN RED.
2. SEE SHEET A-101 FOR NEW CONSTRUCTION.
3. CONTRACTOR SHALL VERIFY THAT ALL FIELD CONDITIONS AND DIMENSIONS ARE IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
4. WRITTEN DIMENSIONS ON THESE DRAWINGS SHALL HAVE PRECEDENCE OVER SCALED DIMENSIONS
5. ALL EQUIPMENT, FURNITURE, AND FIXTURES IN SCOPE OF WORK AREA TO BE REMOVED. OWNER TO IDENTIFY ANYTHING TO REMAIN DURING PRE-CONSTRUCTION MEETING.
6. CONTRACTOR RESPONSIBLE FOR ALL TEMPORARY STRUCTURALLY BRACING.
7. REMOVE ANY WALL MOUNTED EQUIPMENT AND SIGNAGE AND PROVIDE TO OWNER IN REUSABLE, UNDAMAGED, CONDITION.
8. REMOVE AND REFINISH WOOD DOOR HARDWARE. PREP FOR NEW HARDWARE
9. ANY WALL PENETRATIONS THAT ARE NOT REUSED ARE TO BE INFILLED WITH COMPATIBLE PATCHING MATERIAL TO MATCH ADJACENT WALL.
10. REMOVE ALL EXITING EXPOSED CONDUIT TO REPAINT WALL
11. EXISTING FLOORING AND BASE TO BE REMOVED
12. REMOVE EXISTING DOOR. KEEP DOOR FRAME
13. MECHANICAL LINE SETS TO BE REMOVED AND SLEEMISHES TO BE REPAIRED. ITEMS SHOWN AS RED BOX.



1 FIRST FLOOR DEMO PLAN
1/8" = 1'-0"

SCALE : 1/8" = 1'-0"

12/31/2025 11:36:23 AM

CROMWELL
1300 East 6th Street Little Rock, AR 72202
501.372.2900 cromwell.com

Project
PHILANDER SMITH UNIVERSITY

PHILANDER SMITH UNIVERITY

ML HARRIS AUDITORIUM

Design Phase
SCHEMATIC PHASE

Revisions

No.	Date	Description

Stamp
NOT FOR CONSTRUCTION

Notes
1. CROMWELL ARCHITECTS ENGINEERS, INC. ALL RIGHTS RESERVED
2. THIS SHEET DESIGNED FOR COLOR PRINTING. CRITICAL INFORMATION MAY BE LOST WITH BLACK AND WHITE PRINTING.

Project Number 2024-060

Issue Date July 2024

Sheet Title
FIRST FLOOR DEMO PLAN

Sheet Number
AD101

Environmental Protection Associates

#9 Remington Cove
Little Rock, Arkansas 72204
501-562-3818
Fax 501-562-5701

Asbestos Sampling Chain of Custody

Field Data Sheet

AL26029 94

Client	Property		
Chris East, AIA	ML Harris Auditorium	Inspector	Gary Nooner
Cromwell Architects	Philander Smith College	Building ID	
1300 East 6th Street	900 W Daisey L. Gatson Bates Dr.	Date	2/5/2026
Little Rock, AR	Little Rock, AR	Turnaround Time	Rush (24 hour)

SAMPLE ID	HA	Sample Description Example: FT1- 12 x 12 white Floor tile	Sample Location	A	C	♦	Class (S,T,M)	Friability (F, NF)	Condition (G, D, SD)	Damage (%)	POT. DAM (L, M, H)	Quantity
01		Black Mastic Under Carpet	See Drawing	X			M	NF	G	10%	H	+/- 1,800 sft
02		Ceramic Tile and Grout	See Drawing	X			M	NF	G	10%	H	+/- 120 sft
03		Ceiling Texture	See Drawing	X			S	F	G	10%	H	+/- 1,800 sft
04		Ceiling Texture	See Drawing	X			S	F	G	10%	H	See Above
05		Window Putty	See Drawing	X			M	NF	G	10%	H	23 each (4x8)
06		Plaster and texture	See Drawing	X			S	NF	G	10%	H	+/- 4,200 sft
07		Floor Tile and Mastic (Under Carpet)	See Drawing	X			M	NF	G	10%	H	+/- 3,800 sft
08		Floor Tile and Mastic (Under Carpet)	See Drawing	X			M	NF	G	10%	H	+/- 400 sft
09		Mudded Fitting	See Drawing	X			T	F	G	10%	H	3 Each
10		Caulking	See Drawing	X			M	NF	G	10%	H	+/- 100 lft

HA - Homogeneous Area **A - Analyze** **C - Catalogue** **♦ - Analyze only if the previous sample was found to be negative.**

Class: S-surfacing, **T**-thermal, **M**-miscellaneous. **Friability: F**-friable, **NF**-non-friable. **Condition: G**-good, **D**-damaged, **SD**-severely damaged. **POT. DAM** (Potential Damage)**: L**-low, **M**-moderate, **H**-high

Relinquished By	Gary Nooner	Time 15:15	Date 2-5-26	Relinquished By 10:30AM	Time _____ Date _____
Received By		Time _____	Date _____	Received By FEB 06 2026	Time _____ Date _____

Comments: **Composite Sample all positive Sheetrock and Joint Compound Samples**

CA Labs
Dedicated to Quality

Crisp Analytical, L.L.C.
1929 Old Denton Road
Carrollton, TX 75006
Phone 972-242-2754
Fax 972-242-2798

CA Labs, L.L.C.
12232 Industriplex, Suite 32
Baton Rouge, LA 70809
Phone 225-751-5632
Fax 225-751-5634

Materials Characterization - Bulk Asbestos Analysis

Laboratory Analysis Report - Polarized Light

Environmental Protection Associates
#9 Remington Cove
Little Rock, AR 72204

Attn: Gary Nooner
Customer Project: ML Harris Auditorium, Philander Smith C
Reference #: CAL2602994AG Date: 02/09/26

Analysis and Method

Summary of polarized light microscopy (PLM / Stereomicroscopy bulk asbestos analysis) using the methods described in 40CFR Part 763 Appendix E to Subpart E (Interim and EPA 600 / R-93 / 116 (Improved). The sample is first viewed with the aid of a stereomicroscope. Numerous liquid slide preparations are created for analysis under the polarized microscope where identifications and quantifications are preformed. Calibrated liquid refractive oils are used as liquid mouting medium. These oils are used for identification (dispersion staining). A calibrated visual estimation is reported, should any asbestiform mineral be present. Other techniques such as acid washing are used in conjugation with refractive oils for detection of smaller quantities of asbestos. All asbestos percentages are based on calibrated visual estimation traceable to NIST standards for regulated asbestos. Traceability to measurement and calibration is achieved by using known amounts and types of asbestos from standards where analyst and laboratory accuracy are measured. As little as 0.001% asbestos can be detected in favorable samples, while detection in unfavorable samples may approach the detection limit of 0.50% (well above the laboratory definition of trace).

Discussion

Vermiculite containing samples may contain trace amounts of actinolite/tremolite. When not detected by PLM, these samples should be analyzed using TEM methods and / or water separation techniques. Suspected actinolite/vermiculite presence will be indicated through the sample comment section of this report.

Fibrous talc containing samples may contain a regulated asbestos fiber known as anthophyllite. Under certain conditions the same fiber may actually contain both talc and anthophyllite (a phenomenon called intergrowth). Again, TEM detection methods are recommended. CA Labs PLM report comments will denote suspected amounts of asbestiform anthophyllite with talc, where further analysis is recommended.

Some samples (floor tiles, surfacings, etc.) may contain fibers too small to be detectable by PLM analysis and should be analyzed by TEM bulk protocols.

A "trace asbestos" will be reported if the analyst observes far less than 1% asbestos. CA Labs defines "trace asbestos" as a few fibers detected by the analyst in several preparations and will indicate as such under these circumstances.

Since allowable variation in quantification of samples close to 1% is high, <1% may be reported. Such results are ideal for point counting, and the technique is mandatory for friable samples (NESHAP, Nov. 1990 and clarification letter 8 May 1991) under 1% percent asbestos or "trace asbestos". **In order to make all initial PLM reports issued from CA Labs NESHAP compliant, all <1% asbestos results (except floor tiles) will be point counted at no additional charge.**

Qualifications

CA Labs is accredited by the National Voluntary Accreditation Program (NVLAP) for selected test methods for airborne fiber analysis (TEM), and for bulk asbestos fiber analysis (PLM). CA Labs is also accredited by AIHA LAP, LLC. in the PLM asbestos field of testing for Industrial Hygiene. All analysts have completed college courses or hold a degree in a natural science (geology, biology, or environmental science). Recognition by a state professional board in one these disciplines is preferred, but not required. Extensive in-house training programs are used to augment the educational background of the analyst. The Laboratory Director and Quality Manager have received supplemental McCrone Research training for asbestos identification. Analysis performed at Crisp Analytical Labs, LLC 1929 Old Denton Road Carrollton, TX 75006

Dallas NVLAP Lab Code 200349-0 TEM/PLM TDSHS 30-0235
AIHA LAP, LLC Laboratory #102929

CA Labs
Dedicated to Quality

Crisp Analytical, L.L.C.
1929 Old Denton Road
Carrollton, TX 75006
Phone 972-242-2754
Fax 972-242-2798

CA Labs, L.L.C.
12232 Industriplex, Suite 32
Baton Rouge, LA 70809
Phone 225-751-5632
Fax 225-751-5634

Overview of Project Sample Material Containing Asbestos

Customer Project: ML Harris Auditorium, Philander Smith College, 900 \ **CA Labs Project #:** CAL2602994AG

Laboratory Sample ID	Sample #	Layer #	Analysts Physical Description of Subsample	Asbestos type / calibrated visual estimate percent	List of Affected Building Material Types
13050	01	*1-1*	***Mastic Under Carpet**/ black and tan mastic*	***2% Chrysotile***	***black and tan mastic***
13052	03	*3-1*	***Ceiling Texture**/ white textured surfacing*	***2% Chrysotile***	***white textured surfacing***
13053	04	*4-1*	***Ceiling Texture**/ white textured surfacing*	***3% Chrysotile***	***gray caulking***
13054	05	*5-1*	***Window Putty**/ gray caulking*	***2% Chrysotile***	***gray floor tile***
13056	07	*7-1*	***Floor Tile and Mastic**/ gray floor tile*	***2% Chrysotile***	***black mastic***
13056		*7-2*	*black mastic*	***2% Chrysotile***	***white surfaced white stucco***
13057	08	*8-1*	***Floor Tile and Mastic**/ gray floor tile*	***2% Chrysotile***	
13057		*8-2*	*black mastic*	***2% Chrysotile***	

Dallas NVLAP Lab Code 200349-0 TEM/PLM TDSHS 30-0235

AIHA LAP, LLC Laboratory #102929

Glossary of abbreviations (non-asbestos fibers and non-fibrous minerals):

ca - carbonate
gypsum - gypsum
bi - binder
or - organic
ma - matrix
mi - mica
ve - vermiculite
ot - other
pe - perlite
qu - quartz
fg - fiberglass
mw - mineral wool
wo - wollastinite
ta - talc
sy - synthetic
ce - cellulose
br - brucite
ka - kaolin (clay)
pa - palygorskite (clay)

This report relates to the items tested as received. This report is not to be used by the customer to claim product certification, approval or endorsement by NVLAP, NIST, AIHA LAP, LLC, or any other agency of the federal government. This report may not be reproduced except in full without written permission from CA Labs. These results are submitted pursuant to CA Labs' current terms and sale, condition of sale, including the company's standard warranty and limitations of liability provisions and no responsibility or liability is assumed for the manner in which the results are used or interpreted. Unless notified in writing to return the samples covered by this report, CA Labs will store the samples for a period of ninety (90) days before discarding. A shipping or handling fee may be assessed for the return of any samples.

CA Labs
Dedicated to Quality

Crisp Analytical, L.L.C.
1929 Old Denton Road
Carrollton, TX 75006
Phone 972-242-2754
Fax 972-242-2798

CA Labs, L.L.C.
12232 Industriplex, Suite 32
Baton Rouge, LA 70809
Phone 225-751-5632
Fax 225-751-5634

Overview of Project Sample Material Containing Asbestos

Customer Project: ML Harris Auditorium, Philander Smith College, 900 \ **CA Labs Project #:** CAL2602994AG

Laboratory Sample ID	Sample #	Layer #	Analysts Physical Description of Subsample	Asbestos type / calibrated visual estimate percent	List of Affected Building Material Types
13059	10	*10-1*	***Caulking**/ white surfaced white stucco*	***2% Chrysotile***	

Dallas NVLAP Lab Code 200349-0 TEM/PLM TDSHS 30-0235
AIHA LAP, LLC Laboratory #102929

Glossary of abbreviations (non-asbestos fibers and non-fibrous minerals):

ca - carbonate
gypsum - gypsum
bi - binder
or - organic
ma - matrix
mi - mica
ve - vermiculite
ot - other
pe - perlite
qu - quartz
fg - fiberglass
mw - mineral wool
wo - wollastinite
ta - talc
sy - synthetic
ce - cellulose
br - brucite
ka - kaolin (clay)
pa - palygorskite (clay)

This report relates to the items tested as received. This report is not to be used by the customer to claim product certification, approval or endorsement by NVLAP, NIST, AIHA LAP, LLC, or any other agency of the federal government. This report may not be reproduced except in full without written permission from CA Labs. These results are submitted pursuant to CA Labs' current terms and sale, condition of sale, including the company's standard warranty and limitations of liability provisions and no responsibility or liability is assumed for the manner in which the results are used or interpreted. Unless notified in writing to return the samples covered by this report, CA Labs will store the samples for a period of ninety (90) days before discarding. A shipping or handling fee may be assessed for the return of any samples.

CA Labs
Dedicated to Quality

Crisp Analytical, L.L.C.
1929 Old Denton Road
Carrollton, TX 75006
Phone 972-242-2754
Fax 972-242-2798

CA Labs, L.L.C.
12232 Industriplex, Suite 32
Baton Rouge, LA 70809
Phone 225-751-5632
Fax 225-751-5634

Polarized Light Asbestiform Materials Characterization

Customer Info: **Attn:** Gary Nooner
Environmental Protection Associates
#9 Remington Cove
Little Rock, AR 72204

Phone # 501-562-3818
Fax #

Customer Project:
ML Harris Auditorium, Philander Smith College, 900 W Daisey L. Gatson Bates Dr.

CA Labs Project #:
CAL2602994AG

Turnaround Time:
24 hour

Date: 2/9/2026
Samples Rec'd: 2/6/26 10:30AM
Date Of Sampling: 2/5/2026
Purchase Order #:

Laboratory Sample ID	Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
13050	01		1-1	***Mastic Under Carpet**/ black and tan mastic*	n	***2% Chrysotile***		98% gy,bi
13051	02		2-1	***Ceramic Tile and Grout**/ green ceramic tile*	y	***None Detected***		100% qu,ot
13051			2-2	*tan mortar*	y	***None Detected***		100% qu,ca
13052	03		3-1	***Ceiling Texture**/ white textured surfacing*	y	***2% Chrysotile***		98% qu,bi,ca
13053	04		4-1	***Ceiling Texture**/ white textured surfacing*	y	***3% Chrysotile***		97% qu,bi,ca
13054	05		5-1	***Window Putty**/ gray caulking*	y	***2% Chrysotile***		98% qu,bi,ca
13055	06		6-1	***Plaster and Texture**/ tan surfaced tan plaster*	n	***None Detected***		100% qu,bi,ca

Dallas NVLAP Lab Code 200349-0 TEM/PLM TDSHS 30-0235

AIHA LAP, LLC Laboratory #102929

Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116). *All samples received in good condition unless noted.*
Preparation Method: HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion attaining / becke line method.

ca - carbonate	mi - mica	fg - fiberglass	ce - cellulose
gy - gypsum	ve - vermiculite	mw - mineral wool	br - brucite
bi - binder	ot - other	wo - wollastonite	ka - kaolin (clay)
or - organic	pe - perlite	ta - talc	pa - palygorskite (clay)
ma - matrix	qu - quartz	sy - synthetic	

Approved Signatories:

Justin Cox
Analyst

Technical Manager
Tanner Rasmussen

Senior Analyst
Julio Robles

1. Fire Damage significant fiber damage - reported percentages reflect unaltered fibers
2. Fire Damage no significant fiber damages effecting fibrous percentages
3. Actinolite in association with Vermiculite
4. Layer not analyzed - attached to previous positive layer and contamination is suspected
5. Not enough sample to analyze
6. Anthophyllite in association with Fibrous Talc
7. Contamination suspected from other building materials
8. Favorable scenario for water separation on vermiculite for possible analysis by another method
9. < 1% Result point counted positive
10. TEM analysis suggested

CA Labs
Dedicated to Quality

Crisp Analytical, L.L.C.
1929 Old Denton Road
Carrollton, TX 75006
Phone 972-242-2754
Fax 972-242-2798

CA Labs, L.L.C.
12232 Industriplex, Suite 32
Baton Rouge, LA 70809
Phone 225-751-5632
Fax 225-751-5634

Polarized Light Asbestiform Materials Characterization

Customer Info: **Attn:** Gary Nooner
Environmental Protection Associates
#9 Remington Cove
Little Rock, AR 72204

Phone # 501-562-3818
Fax #

Customer Project:
ML Harris Auditorium, Philander Smith College, 900 W Daisey L. Gatson Bates Dr.

Turnaround Time:
24 hour

CA Labs Project #:
CAL2602994AG

Date: 2/9/2026
Samples Rec'd: 2/6/26 10:30AM
Date Of Sampling: 2/5/2026
Purchase Order #:

Laboratory Sample ID	Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
13056	07		*7-1*	***Floor Tile and Mastic**/ gray floor tile*	*y*	***2% Chrysotile***		98% qu,ca
13056			*7-2*	*black mastic*	*y*	***2% Chrysotile***		98% gy,bi
13057	08		*8-1*	***Floor Tile and Mastic**/ gray floor tile*	*y*	***2% Chrysotile***		98% qu,ca
13057			*8-2*	*black mastic*	*y*	***2% Chrysotile***		98% gy,bi
13058	09		*9-1*	***Mudded Fitting**/ gray insulation*	*y*	***None Detected***	2% fg	98% qu,ca,ma
13059	10		*10-1*	***Caulking**/ white surfaced white stucco*	*n*	***2% Chrysotile***		98% qu,bi,ca
13059			*10-2*	*white surfaced black tar*	*n*	***None Detected***		100% qu,bi

Dallas NVLAP Lab Code 200349-0 TEM/PLM TDSHS 30-0235

AIHA LAP, LLC Laboratory #102929

Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116). *All samples received in good condition unless noted.*
Preparation Method: HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion attaining / becke line method.

ca - carbonate	mi - mica	fg - fiberglass	ce - cellulose
gy - gypsum	ve - vermiculite	mw - mineral wool	br - brucite
bi - binder	ot - other	wo - wollastonite	ka - kaolin (clay)
or - organic	pe - perlite	ta - talc	pa - palygorskite (clay)
ma - matrix	qu - quartz	sy - synthetic	

Approved Signatories:

Justin Cox
Analyst

Technical Manager
Tanner Rasmussen

Senior Analyst
Julio Robles

1. Fire Damage significant fiber damage - reported percentages reflect unaltered fibers
2. Fire Damage no significant fiber damages effecting fibrous percentages
3. Actinolite in association with Vermiculite
4. Layer not analyzed - attached to previous positive layer and contamination is suspected
5. Not enough sample to analyze
6. Anthophyllite in association with Fibrous Talc
7. Contamination suspected from other building materials
8. Favorable scenario for water separation on vermiculite for possible analysis by another method
9. < 1% Result point counted positive
10. TEM analysis suggested

ARKANSAS DIVISION OF ENVIRONMENTAL QUALITY

ASBESTOS PROGRAM

GARY NOONER

has satisfied the requirements of AHERA/ASHARA under TSCA Title II, and those of Rule 21 of the Arkansas Pollution Control and Ecology Commission, pursuant to Ark. Code Ann. § 20-27-1001 *et seq.*, and is hereby certified to perform certain asbestos-related work, within the State of Arkansas, in the following discipline(s):

Discipline	Expiration Date
Proj Designer	12/31/2026
Inspector	12/31/2026
Air Monitor	12/31/2026
Contractor/Sup	12/31/2026

Certification Number: 005065

Bailey Taylor
Director, Division of Environmental Quality
Chief Administrator of the Environment
Arkansas Department of Energy and Environment

SEEK Watermark

ARKANSAS DIVISION OF ENVIRONMENTAL QUALITY

ASBESTOS PROGRAM

ENVIRONMENTAL PROTECTION ASSOCIATES (EPA)

is qualified to perform certain asbestos-related work within the State of Arkansas, under Rule 21 of the Arkansas Pollution Control and Ecology Commission and Ark. Code Ann. § 20-27-1001 *et seq.*, and is hereby licensed as an

Asbestos Abatement Contractor

License Number: 000020-CCL-CT

Expiration Date: November 30, 2026

Bailey Taylor

Bailey Taylor
Director, Division of Environmental Quality
Chief Administrator of the Environment
Arkansas Department of Energy and Environment

ID #1964

License No. 0003060626

State of Arkansas

Commercial Contractors Licensing Board

ENVIRONMENTAL PROTECTION ASSOCIATES OF RUSSELLVILLE, INC.
9 REMINGTON COVE
LITTLE ROCK, AR 72204

This is to Certify That ENVIRONMENTAL PROTECTION ASSOCIATES OF RUSSELLVILLE, INC.

is duly licensed under the provisions of Ark. Code Ann. § 17-25-101 et. seq. as amended and is entitled to practice Contracting in the State of Arkansas within the following classifications/specialties:

BUILDING
- (COMMERCIAL & RESIDENTIAL)
SPECIALTY
Asbestos
Environmental General

This contractor has an unlimited suggested bid limit.

from May 16, 2025 **until** June 30, 2026 **when this Certificate expires.**

Witness our hands of the Board, dated at North Little Rock, Arkansas.

GREAT SEAL OF THE STATE OF ARKANSAS

CHAIRMAN

SECRETARY

May 16, 2025 - dsa

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 1/13/2026

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Sterling Seacrest Pritchard, Inc. 9900 Maumelle Blvd. STE B North Little Rock AR 72113	CONTACT NAME: Hannah Tryon, CIC, ACSR PHONE (A/C, No, Ext): 501-478-2976 FAX (A/C, No): E-MAIL ADDRESS: htryon@sspins.com
INSURED ENVIPRO-02 Environmental Protection Associates of Russellville, Inc. 9 Remington Cove Little Rock AR 72204	INSURER(S) AFFORDING COVERAGE — NAIC # INSURER A : Arch Specialty Insurance Company — 21199 INSURER B : Arch Insurance Company — 11150 INSURER C : Carolina Casualty Insurance — 10510 INSURER D : INSURER E : INSURER F :

COVERAGES **CERTIFICATE NUMBER:** 1113966921 **REVISION NUMBER:**

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

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY			12EMP2232806	12/31/2025	12/31/2026	EACH OCCURRENCE	$1,000,000
	CLAIMS-MADE X OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$100,000
	X Blkt Contractual						MED EXP (Any one person)	$5,000
	X XCU Included						PERSONAL & ADV INJURY	$1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$2,000,000
	POLICY X PRO-JECT LOC						PRODUCTS - COMP/OP AGG	$2,000,000
	OTHER:							$
B	AUTOMOBILE LIABILITY			11CAB2362901	12/31/2025	12/31/2026	COMBINED SINGLE LIMIT (Ea accident)	$1,000,000
	X ANY AUTO						BODILY INJURY (Per person)	$
	OWNED AUTOS ONLY / SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	X HIRED AUTOS ONLY / X NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$
								$
A	UMBRELLA LIAB X OCCUR			12EMX2232906	12/31/2025	12/31/2026	EACH OCCURRENCE	$5,000,000
	X EXCESS LIAB CLAIMS-MADE						AGGREGATE	$5,000,000
	DED X RETENTION $ 0							$
C	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y/N			BIN926906213	12/31/2025	12/31/2026	X PER STATUTE / OTH-ER	
	ANYPROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? N (Mandatory in NH)	N/A					E.L. EACH ACCIDENT	$1,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$1,000,000
							E.L. DISEASE - POLICY LIMIT	$1,000,000
A	Contractors Pollution Liability Professional Liability* Fungus/Spore/Mold Liability*			12EMP2232806	12/31/2025	12/31/2026	Limit Per Incident Aggregate	1,000,000 2,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

The following applies when required in a written contract or agreement: Certificate holder and owner are included as Additional Insured with respect to General Liability (including ongoing and completed operations), Auto Liability, and Professional Liability; Waiver of subrogation is provided on General Liability, Auto Liability, Umbrella, Professional Liability, and Workers' Compensation. The General Liability policy contains a special endorsement with "Primary and Noncontributory" wording. Umbrella Policy Follows Form in regards to the scheduled underlying General Liability, Auto Liability, Employers' Liability, Contractors Pollution Liability, Fungus/Spore/Mold Liability, and Professional Liability policies shown herein. *Professional Liability and Mold are Claims-Made policies.
Subcontractor No.: 25.008-20500 | Project: CHI St. Vincent Morrilton- MRI Addition, 4 Hospital Drive, Morrilton, AR 72110| Amount: $3,870.00
30 Day Notice of Cancellation applies in favor of Certificate Holder, except 10 days for Non-Payment of Premium.

CERTIFICATE HOLDER

*** For Bidding Purposes***

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

© 1988-2015 ACORD CORPORATION. All rights reserved.

The ACORD name and logo are registered marks of ACORD

This page was intentionally left blank for duplex printing.

Environmental Protection Associates

#9 Remington Cove
Little Rock, Arkansas 72204
Phone: 501-562-3818
Fax: 501-562-5701
Toll Free: 1-800-530-7706

FAX

To: Chris East, AIA
Cromwell Architects
1300 East 6th Street
Little Rock, AR

From: Gary Nooner

Email: ceast@cromwell.com
Fax:

Date: February 12, 2026

Phone: 501-372-2900
Cell: 501-920-9558

Pages: 5 Including cover sheet

Re: ML Harris Auditorium
Philander Smith College

cc:

Comments

Environmental Protection Associates

#9 Remington Cove
Little Rock, Arkansas 72204
501-562-3818
Fax 501-562-5701

PROPOSAL

DATE: February 12, 2026

TO:	Chris East, AIA Cromwell Architects 1300 East 6th Street Little Rock, AR
PROJECT LOCATION:	ML Harris Auditorium Philander Smith College 900 W Daisey L. Gatson Bates Dr. Little Rock, AR

Environmental Protection Associates proposes to provide the following scope of work:
Proper removal and disposal of asbestos containing materials as identified in the asbestos survey.
Materials include Roof caulking-100 lft, Window putty-23 windows, Floor tile-4,200 sft, Black mastic-6,000 sft and ceiling texture-1,800 sft
Price includes Filing a Notice of Intent with the Arkansas Department of Environmental Quality per rule 21.
NOI requires a ten (10) working day waiting period before work may begin.
Project will take approximately eight (8) days to complete.
Price includes third Party Clearance air sampling per ADEQ rule 21.

Owner's Responsibilities:
Provide power and Water for the project.
Remove all furnishings and stored items from the work area(s) prior to our arrival onsite.
Provide Replacement of any removed materials as required.

For the Sum of: **Forty-five thousand one hundred five dollars and no cents**
$45,105.00

Mobilization	**$1,348.00**	**Window Putty**	**$4,404.00**
Auditorium & Balcony	**$15,421.00**	**Lobby Carpet & Mastic**	**$7,706.00**
Roof Caulk	**$1,098.00**	**Lobby Ceiling texture**	**$15,128.00**

Environmental Protection Associates propose to perform the scope of work and alternates under EPA, NESHAPS, AHERA, and State of Arkansas regulations.
Insurance: Provide Workman's Compensation, Automobile and Comprehensive General Liability Insurance.
CGL to include $1,000,000 coverage for asbestos related acts specifically. *Other limits available.*
Project Documentation shall be provided including all paperwork concerning this project.

Respectfully submitted,

Gary Nooner
Project Coordinator

This proposal may be withdrawn by EPA if not accepted within days.
Payment for invoices provided shall be made days from date of invoice.

ACCEPTANCE OF PROPOSAL

The above proposal and its conditions is satisfactory and is hereby accepted. EPA is authorized to do the work as proposed and outlined above.

Date: _____ Signature: _____

Signature: _____

ARKANSAS DIVISION OF ENVIRONMENTAL QUALITY

ASBESTOS PROGRAM

ENVIRONMENTAL PROTECTION ASSOCIATES (EPA)

is qualified to perform certain asbestos-related work within the State of Arkansas, under Rule 21 of the Arkansas Pollution Control and Ecology Commission and Ark. Code Ann. § 20-27-1001 *et seq.*, and is hereby licensed as an

Asbestos Abatement Contractor

License Number: 000020-CCL-CT

Expiration Date: November 30, 2026

Bailey Taylor

Bailey Taylor
Director, Division of Environmental Quality
Chief Administrator of the Environment
Arkansas Department of Energy and Environment

ID #1964

License No. 0003060626

State of Arkansas

Commercial Contractors Licensing Board

ENVIRONMENTAL PROTECTION ASSOCIATES OF RUSSELLVILLE, INC.
9 REMINGTON COVE
LITTLE ROCK, AR 72204

This is to Certify That ENVIRONMENTAL PROTECTION ASSOCIATES OF RUSSELLVILLE, INC.

is duly licensed under the provisions of Ark. Code Ann. § 17-25-101 et. seq. as amended and is entitled to practice Contracting in the State of Arkansas within the following classifications/specialties:

BUILDING
- (COMMERCIAL & RESIDENTIAL)
SPECIALTY
Asbestos
Environmental General

This contractor has an unlimited suggested bid limit.

from May 16, 2025 **until** June 30, 2026 **when this Certificate expires.**

Witness our hands of the Board, dated at North Little Rock, Arkansas.

GREAT SEAL OF THE STATE OF ARKANSAS

CHAIRMAN

SECRETARY

May 16, 2025 - dsa

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 1/13/2026

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Sterling Seacrest Pritchard, Inc. 9900 Maumelle Blvd. STE B North Little Rock AR 72113	CONTACT NAME: Hannah Tryon, CIC, ACSR PHONE (A/C, No, Ext): 501-478-2976 FAX (A/C, No): E-MAIL ADDRESS: htryon@sspins.com
INSURED ENVIPRO-02 Environmental Protection Associates of Russellville, Inc. 9 Remington Cove Little Rock AR 72204	INSURER(S) AFFORDING COVERAGE — NAIC # INSURER A : Arch Specialty Insurance Company — 21199 INSURER B : Arch Insurance Company — 11150 INSURER C : Carolina Casualty Insurance — 10510 INSURER D : INSURER E : INSURER F :

COVERAGES **CERTIFICATE NUMBER:** 1113966921 **REVISION NUMBER:**

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

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY			12EMP2232806	12/31/2025	12/31/2026	EACH OCCURRENCE	$1,000,000
	CLAIMS-MADE X OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$100,000
	X Blkt Contractual						MED EXP (Any one person)	$5,000
	X XCU Included						PERSONAL & ADV INJURY	$1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$2,000,000
	POLICY X PRO-JECT LOC						PRODUCTS - COMP/OP AGG	$2,000,000
	OTHER:							$
B	AUTOMOBILE LIABILITY			11CAB2362901	12/31/2025	12/31/2026	COMBINED SINGLE LIMIT (Ea accident)	$1,000,000
	X ANY AUTO						BODILY INJURY (Per person)	$
	OWNED AUTOS ONLY / SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	X HIRED AUTOS ONLY / X NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$
								$
A	UMBRELLA LIAB X OCCUR			12EMX2232906	12/31/2025	12/31/2026	EACH OCCURRENCE	$5,000,000
	X EXCESS LIAB CLAIMS-MADE						AGGREGATE	$5,000,000
	DED X RETENTION $ 0							$
C	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y/N			BIN926906213	12/31/2025	12/31/2026	X PER STATUTE / OTH-ER	
	ANYPROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? N (Mandatory in NH)	N/A					E.L. EACH ACCIDENT	$1,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$1,000,000
							E.L. DISEASE - POLICY LIMIT	$1,000,000
A	Contractors Pollution Liability Professional Liability* Fungus/Spore/Mold Liability*			12EMP2232806	12/31/2025	12/31/2026	Limit Per Incident Aggregate	1,000,000 2,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

The following applies when required in a written contract or agreement: Certificate holder and owner are included as Additional Insured with respect to General Liability (including ongoing and completed operations), Auto Liability, and Professional Liability; Waiver of subrogation is provided on General Liability, Auto Liability, Umbrella, Professional Liability, and Workers' Compensation. The General Liability policy contains a special endorsement with "Primary and Noncontributory" wording. Umbrella Policy Follows Form in regards to the scheduled underlying General Liability, Auto Liability, Employers' Liability, Contractors Pollution Liability, Fungus/Spore/Mold Liability, and Professional Liability policies shown herein. *Professional Liability and Mold are Claims-Made policies.
Subcontractor No.: 25.008-20500 | Project: CHI St. Vincent Morrilton- MRI Addition, 4 Hospital Drive, Morrilton, AR 72110| Amount: $3,870.00
30 Day Notice of Cancellation applies in favor of Certificate Holder, except 10 days for Non-Payment of Premium.

CERTIFICATE HOLDER

*** For Bidding Purposes***

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

© 1988-2015 ACORD CORPORATION. All rights reserved.

The ACORD name and logo are registered marks of ACORD

This page was intentionally left blank for duplex printing.

SECTION 00 41 00

BID PROPOSAL FORM

FROM: _____

_____

_____

_____

Contractor License No. _____ (hereinafter called "Bidder")

TO: Philander Smith University (hereinafter called "Owner")
905 W Daisy L Gaston Bates Dr.
Little Rock, Arkansas 72202

RE: Philander Smith University M. L. Harris Auditorium Renovation
Economic Development Award No. 08-79-05533
A/E Project No. 2024-060

The Undersigned, having received and examined the Project Manual and the Drawings for the above-referenced Project proposes to furnish all labor, materials, equipment, supervision, and all associated and related items required for the Work, as required by and in strict accordance with the above-named documents for the following sum:

1.1 BASE PROPOSAL

Bidder agrees to perform all of the Work necessary to complete the Total Project as described in the Project Manual and indicated on the Drawings for the sum of:

_____

_____ $ _____

(Amount shall be indicated in both words and figures. In case of discrepancy, the amount indicated in words shall govern.)

1.2 **ALTERNATE PROPOSALS** *(Alternates referred to by title here are described in Section 012300 ALTERNATES.)*

Bidder agrees to perform all of the Work necessary to complete the Alternate(s) as described in the Project Manual and indicated on the Drawings for the following amount(s).

Bidder understands that the Owner reserves the right to accept or reject Alternate Proposals.

ADDITIVE ALTERNATE No. 1 – Digital Display
ADD:

_____ $ _____

ADDITIVE ALTERNATE No. 2 – Packaged Air Handler
ADD:

_____ $ _____

1.3 UNIT PRICES

The Undersigned agrees that the following UNIT PRICES shall govern changes in the Work, whether they be ADDITIONS or DEDUCTIONS to the Contract Sum required during the course of the Work. Unit Prices shall be the same for Additions or Deductions. All Unit Prices shall be total installed costs including overhead, profit, geotechnical engineering and all other necessary costs. Proposing separate add and deduct unit prices shall subject this Bid Proposal to being rejected as "non-responsive."

** All quantities to be approved by project architect prior to execution of the Work.

ITEM & UNIT OF MEASURE	ADDITION or DEDUCTION *(Enter one price only)*

A. FLOORING:

1. ALTERNATIVE CARPET TILE ADHESIVE: Adhesive required to install Carpet Tile on concrete with high relative humidity.
   Price per square foot in place. $_____

   a. Area of Carpet Tile: Insert square footage. (3,100 SF)

   b. Allowance for Alternative Carpet Tile Adhesive included in the Contract Amount: Extend the above Price multiplied by the above Area. $_____

2. REMEDIAL FLOOR COATING: Remediation and floor coating required to install floor covering on high relative humidity in concrete.
   Price per square foot in place. $_____

   a. Area of Remedial Floor Coating: Insert square footage. (3,100 SF)

   b. Allowance for Remedial Floor Coating included in the above Contract Amount: Extend the above Price multiplied by the above Area. $_____

1.4 PERFORMANCE AND PAYMENT BONDS

Bidder agrees to provide a Performance Bond and a Labor and Material Payment Bond as described in the Project Manual for the following amount included in the above Base Bid Proposal:

_____ $ _____

1.5 ADDENDA

The Undersigned has received and examined the following Addenda numbered _____, and has incorporated the provisions in this Bid.

If no Addenda have been issued, write in "NONE"

1.6 FURTHER CONDITIONS

The Undersigned, by submitting this Bid, further agrees:

A. That this Bid shall be valid and may not be withdrawn within 60 days after the scheduled closing time for receiving bids.

B. That Bidder has visited the site and determined the scope and extent of the work and accessibility limitations.

C. To accept the provisions of the "INSTRUCTIONS TO BIDDERS."

D. To enter into and execute a Contract, if awarded on the basis of this Proposal.

E. To furnish the Performance Bond and Labor and Material Payment Bond in accordance with the General Conditions of the Contract.

F. To accomplish the Work in accordance with the Contract Documents, of which this Proposal is made a part.

G. To accomplish the Work, including products, equipment, and systems; complete and functional; ready for operation.

H. The bidder or subcontractors will not employ or contract with any illegal immigrants.

I. To allow any Federal, State or Local inspector, acting in their official capacity, access to the project site.

J. Liquidated Damages: $250.00 per day.

K. To coordinate and schedule all Work with Owner.

L. That it is understood that the Owner may reject any or all bids and waive any informalities or irregularities.

M. Completion of the Work will occur by Wednesday, May 27, 2027; from commencement of the Contract.

1.7 SUBCONTRACTORS

I (We) submit the names of the following subcontractors, we propose to use, and their State Contractor License Nos.

	Name	No.
A.	MECHANICAL WORK - HVAC (indicative of heating, air conditioning, and ventilating)	
	_____	_____
B.	PLUMBING WORK	
	_____	_____
C.	ELECTRICAL WORK (indicative of wiring and illuminating fixtures)	
	_____	_____
D.	ROOFING & SHEET METAL (indicative of roofing application)	
	_____	_____

(Indicate "NONE" if subcontractor not required for this project. Include Prime Bidder's name and license number if Prime Bidder is doing this work itself and the Prime Bidder's contractor license is qualified for this specialty.)

1.8 ATTACHMENTS

Enclosed with this bid proposal are the following:

[_] EDA "Notice of Requirements for Affirmative Action."

[_] Lobbying Restriction Form (Form CD-512).

[_] Bid Security

[_] Power of Attorney for Bid Bond for the Bid Security

Respectfully submitted:

Name of Firm: _____

By: _____ Date: _____

Title: _____ Contractor License No. _____

Business Address: _____

_____

_____

Telephone Number: (___) _____

SEAL
If Bid is by
a Corporation

END OF SECTION

SECTION 00 50 00
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. The Agreement is based on AIA101, an amended template follows this section.

B. The General Conditions are based on AIA A201, as amended.

1.03 FORMS

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

B. Bond Forms:
   1. Performance Bond and Payment Bond Form: AIA A312, as amended.

C. Economic Develepment Adminstrative Requirements:
   1. Notice of Requirements for Affirmative Action (Executive Order 11246 and 41 CFR Part 60-4): To ensure equal employment opportunity.
   2. Certification Regarding Lobbying (CD-512): Lower tier covered transations.
   3. Appendix A: Certification of Compliance with the "Buy America" Provision of the Infrastructure Investments and Jobs Act.

D. Post-Award Certificates and Other Forms:
   1. Agreement Between Contractor and Subcontractor: AIA A401, or approved equivalent.
   2. Digital Data Licensing Agreement: AIA C106 .
   3. Submittal Transmittal Form: AIA G810, or approved equivalent form.
   4. Schedule of Values Form: AIA G703, or approved equivalent form.
   5. Application for Payment Form: AIA G702 and G703, or approved equivalent form.

E. Clarification and Modification Forms:
   1. Request for Information Form: AIA G716, or approved equivalent form.
   2. Substitution Request Form: Section 01 60 01, or approved equivalent form.
   3. Supplemental Instruction Form: AIA G710, or approved equivalent form.
   4. Construction Change Directive Form: AIA G714, as amended.
   5. Proposal Request Form: AIA G709, or approved equivalent form.
   6. Change Order Form: AIA G701, or approved equivalent form.

F. Closeout Forms:
   1. Certificate of Substantial Completion Form: AIA G704, or approved equivalent form.
   2. Contractor's Affidavit of Payment of Debts and Claims Form: AIA G706, or approved equivalent form.
   3. Contractor's Affidavit of Release of Liens Form: AIA G706A, or approved equivalent form.

G. General: Use AIA Contract Documents Series forms, or approved equivalents, for forms not otherwise indicated.

H. AIA Contract Documents: AIA Contract Documents are available from the American Institute of Architects (AIA) at www.aia.org or through AIA Documents on Demand at documentsondemand.aia.org.

I. AIA Document Copies: Additional copies of AIA Contract Documents may be obtained through the AIA Arkansas Chapter at www.aiaar.org or through AIA Documents on Demand at documentsondemand.aia.org.

1.04 REFERENCE STANDARDS

A. AIA A133 - Standard Form of Agreement Between Owner and Construction Manager as Constructor where the basis of payment is the Cost of the Work Plus a Fee with a Guaranteed Maximum Price; 2019.

B. AIA A201 - General Conditions of the Contract for Construction; 2017.

C. AIA A305 - Contractor's Qualification Statement; 2020.

D. AIA A312 - Performance Bond and Payment Bond; 2010.

E. AIA C106 - Digital Data Licensing Agreement; 2013.

F. AIA G701 - Change Order; 2017.

G. AIA G702 - Application and Certificate for Payment; 1992.

H. AIA G703 - Continuation Sheet; 1992.

I. AIA G704 - Certificate of Substantial Completion; 2017.

J. AIA G706A - Contractor’s Affidavit of Release of Liens; 1994.

K. AIA G707 - Consent of Surety to Final Payment; 1994.

L. AIA G709 - Proposal Request; 2018.

M. AIA G710 - Architect's Supplemental Instructions; 2017.

N. AIA G714 - Construction Change Directive; 2017.

O. AIA G716 - Request for Information; 2004.

P. AIA G810 - Transmittal Letter; 2001.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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)

Philander Smith University
900 W. Daisy L. Bates Gatson Dr.
Little Rock, Arkansas 72202

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

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

Philander Smith University ML Harris Auditorium
A/E Project No. 2024-060
EDA Award No. 08-79-05533

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

Cromwell Architects Engineers, Inc.
1300 East 6th Street
Little Rock, Arkansas 72202

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS:
The author of this document may have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes 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 to or deleted from the original AIA text.

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

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

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 document was produced at 16:03:26 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa31a15c9191d447ad2769f)

TABLE OF ARTICLES

1 THE CONTRACT DOCUMENTS

2 THE WORK OF THIS CONTRACT

3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

4 CONTRACT SUM

5 PAYMENTS

6 DISPUTE RESOLUTION

7 TERMINATION OR SUSPENSION

8 MISCELLANEOUS PROVISIONS

9 ENUMERATION OF CONTRACT DOCUMENTS

EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

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

ARTICLE 2 THE WORK OF THIS CONTRACT

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

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[ ] The date of this Agreement.

[X] A date set forth in a notice to proceed issued by the Architect.

[ ] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

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 document was produced at 16:03:26 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa31a15c9191d447ad2769f)

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

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

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:
(Check one of the following boxes and complete the necessary information.)

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

[ ] By the following date:

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

Portion of Work	Substantial Completion Date

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

ARTICLE 4 CONTRACT SUM

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

Base Bid	$	
Performance and Payment Bond	$	Included in above Base Bid
Alternate No. 1	Additive or <deductive> amount	Accepted by Owner
Alternate No. 2	Additive or <deductive> amount	Accepted by Owner
TOTAL CONTRACT AMOUNT	$	

§ 4.2 Alternates

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

Item	Price

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

Item	Price

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 document was produced at 16:03:26 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa31a15c9191d447ad2769f)

§ 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.)

$250 per calendar day

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

None

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

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

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

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the twenty-fifth (25th) day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the tenth (10th) day of the following month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than fifteen (15) days after the Architect receives the 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.

§ 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;

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 document was produced at 16:03:26 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa31a15c9191d447ad2769f)

.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 Architect determines, in the Architect's professional 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 Architect has previously withheld a Certificate 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 Architect may withhold payment, or nullify a Certificate of 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%) retainage shall be held throughout the project.

§ 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.)

Materials or equipment suitable stored on site or off site in a bonded warehouse. Reference General Conditions of the Contract, Article 9.3.2.

§ 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.)

N/A

§ 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.)

An equitable amount agreed upon by the Owner and Contractor ensuring the delivery of Record Drawings and applicable close-out document, not to exceed $10,000.00. Reference General Conditions of the Contract, Article 9.3.1.4.

§ 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.

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 document was produced at 16:03:26 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa31a15c9191d447ad2769f)

§ 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 Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate 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.)

% None

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, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:

(Check the appropriate box.)

[ ] Arbitration pursuant to Section 15.4 of AIA Document A201–2017

[X] Litigation in a court of competent jurisdiction

[ ] Other *(Specify)*

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 document was produced at 16:03:26 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa31a15c9191d447ad2769f)

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

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of 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:
(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

Termination fees will not apply. The Contractor is entitled to payment for all work completed and all materials and equipment purchased prior to the date of termination.

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

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)

§ 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, and elsewhere in the Contract Documents. Contractor to provide a Certificate of Insurance with dollar amounts and coverage limits in accordance with Arkansas State Law. Reference AR Code 22 CAR §112-319 and EDA Contracting Provisions for Construction Projects.

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 document was produced at 16:03:26 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa31a15c9191d447ad2769f)

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™–2017 and elsewhere in the Contract Documents. Contractor to provide a payment bond and performance bond in accordance with Article 14 of the EDA Contracting Provisions for Construction Projects.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with a building information modeling exhibit, if completed, or as otherwise set forth below:
(If other than in accordance with a building information modeling exhibit, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

N/A

§ 8.7 Other provisions:

None

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

.2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds Not Used – See Article 8.5

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

.4 Building information modeling exhibit, dated as indicated below:
(Insert the date of the building information modeling exhibit incorporated into this Agreement.)

.5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda, if any:

Number	Date	Pages

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

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

AIA Document 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 document was produced at 16:03:26 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa31a15c9191d447ad2769f)

[ ] 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:

.9 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™–2017 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.)

Exhibit B, Contractor's Bid Proposal

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

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
BY:	BY:
(Printed name and title)	*(Printed name and title)*

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 document was produced at 16:03:26 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa31a15c9191d447ad2769f)

This page was intentionally left blank for duplex printing.

SECTION 00 72 00
GENERAL CONDITIONS

PART 1 GENERAL

1.01 FORM OF GENERAL CONDITIONS

A. See AIA Document A201 - General Conditions following this document.

B. Modifications to AIA Document A201 - General Conditions

1. Refer to AIA Document A201, General Conditions of the Contract for Construction , as amended, following this Section for the original text of the published standard general conditions with Project specific supplementary conditions indicated as modified text inline with the original text. References to Supplementary Conditions shall be as referring to the modified text.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

This page was intentionally left blank for duplex printing.

AIA® Document A201® – 2017

General Conditions of the Contract for Construction

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

Philander Smith University ML Harris Auditorium
A/E Project No. 2024-060
EDA Award No. 08-79-05533

THE OWNER:
(Name, legal status and address)

Philander Smith University
900 W. Daisy L. Gatson Bates Dr.
Little Rock, Arkansas 72202

THE ARCHITECT:
(Name, legal status and address)

Cromwell Architects Engineers, Inc.
1300 East 6th Street
Little Rock, Arkansas 72202

ADDITIONS AND DELETIONS:
The author of this document may have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes 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 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™–2017, 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

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

10 PROTECTION OF PERSONS AND PROPERTY

11 INSURANCE AND BONDS

12 UNCOVERING AND CORRECTION OF WORK

13 MISCELLANEOUS PROVISIONS

14 TERMINATION OR SUSPENSION OF THE CONTRACT

15 CLAIMS AND DISPUTES

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

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

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

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

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

Capitalization
1.3
Certificate of Substantial Completion
9.8.3, 9.8.4, 9.8.5
Certificates for Payment
4.2.1, 4.2.5, 4.2.9, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 14.1.1.3, 14.2.4, 15.1.4
Certificates of Inspection, Testing or Approval
13.4.4
Certificates of Insurance
9.10.2
Change Orders
1.1.1, 3.4.2, 3.7.4, 3.8.2.3, 3.11, 3.12.8, 4.2.8, 5.2.3, 7.1.2, 7.1.3, **7.2**, 7.3.2, 7.3.7, 7.3.9, 7.3.10, 8.3.1, 9.3.1.1, 9.10.3, 10.3.2, 11.2, 11.5, 12.1.2
Change Orders, Definition of
7.2.1
CHANGES IN THE WORK
2.2.2, 3.11, 4.2.8, **7**, 7.2.1, 7.3.1, 7.4, 8.3.1, 9.3.1.1, 11.5
Claims, Definition of
15.1.1
Claims, Notice of
1.6.2, 15.1.3
CLAIMS AND DISPUTES
3.2.4, 6.1.1, 6.3, 7.3.9, 9.3.3, 9.10.4, 10.3.3, **15**, 15.4
Claims and Timely Assertion of Claims
15.4.1
Claims for Additional Cost
3.2.4, 3.3.1, 3.7.4, 7.3.9, 9.5.2, 10.2.5, 10.3.2, **15.1.5**
Claims for Additional Time
3.2.4, 3.3.1, 3.7.4, 6.1.1, 8.3.2, 9.5.2, 10.3.2, **15.1.6**
Concealed or Unknown Conditions, Claims for
3.7.4
Claims for Damages
3.2.4, 3.18, 8.3.3, 9.5.1, 9.6.7, 10.2.5, 10.3.3, 11.3, 11.3.2, 14.2.4, 15.1.7
Claims Subject to Arbitration
15.4.1
Cleaning Up
3.15, 6.3
Commencement of the Work, Conditions Relating to
2.2.1, 3.2.2, 3.4.1, 3.7.1, 3.10.1, 3.12.6, 5.2.1, 5.2.3, 6.2.2, 8.1.2, 8.2.2, 8.3.1, 11.1, 11.2, **15.1.5**
Commencement of the Work, Definition of
8.1.2
Communications
3.9.1, **4.2.4**
Completion, Conditions Relating to
3.4.1, 3.11, 3.15, 4.2.2, 4.2.9, 8.2, 9.4.2, 9.8, 9.9.1, 9.10, 12.2, 14.1.2, 15.1.2
COMPLETION, PAYMENTS AND
9
Completion, Substantial
3.10.1, 4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1, 9.10.3, 12.2, 15.1.2

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

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

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

Damages for Delay
6.2.3, 8.3.3, 9.5.1.6, 9.7, 10.3.2, 14.3.2
Date of Commencement of the Work, Definition of
8.1.2
Date of Substantial Completion, Definition of
8.1.3
Day, Definition of
8.1.4
Decisions of the Architect
3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 6.3, 7.3.4, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4, 9.5.1, 9.8.4, 9.9.1, 13.4.2, 14.2.2, 14.2.4, 15.1, 15.2
Decisions to Withhold Certification
9.4.1, **9.5**, 9.7, 14.1.1.3
Defective or Nonconforming Work, Acceptance, Rejection and Correction of
2.5, 3.5, 4.2.6, 6.2.3, 9.5.1, 9.5.3, 9.6.6, 9.8.2, 9.9.3, 9.10.4, 12.2.1
Definitions
1.1, 2.1.1, 3.1.1, 3.5, 3.12.1, 3.12.2, 3.12.3, 4.1.1, 5.1, 6.1.2, 7.2.1, 7.3.1, 8.1, 9.1, 9.8.1, 15.1.1
Delays and Extensions of Time
3.2, **3.7.4**, 5.2.3, 7.2.1, 7.3.1, **7.4**, **8.3**, 9.5.1, **9.7**, 10.3.2, **10.4**, 14.3.2, **15.1.6**, 15.2.5
Digital Data Use and Transmission
1.7
Disputes
6.3, 7.3.9, 15.1, 15.2
Documents and Samples at the Site
3.11
Drawings, Definition of
1.1.5
Drawings and Specifications, Use and Ownership of
3.11
Effective Date of Insurance
8.2.2
Emergencies
10.4, 14.1.1.2, **15.1.5**
Employees, Contractor's
3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3.3, 11.3, 14.1, 14.2.1.1
Equipment, Labor, or Materials
1.1.3, 1.1.6, 3.4, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2
Execution and Progress of the Work
1.1.3, 1.2.1, 1.2.2, 2.3.4, 2.3.6, 3.1, 3.3.1, 3.4.1, 3.7.1, 3.10.1, 3.12, 3.14, 4.2, 6.2.2, 7.1.3, 7.3.6, 8.2, 9.5.1, 9.9.1, 10.2, 10.3, 12.1, 12.2, 14.2, 14.3.1, 15.1.4
Extensions of Time
3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3, 7.4, 9.5.1, 9.7, 10.3.2, 10.4, 14.3, 15.1.6, **15.2.5**
Failure of Payment
9.5.1.3, **9.7**, 9.10.2, 13.5, 14.1.1.3, 14.2.1.2
Faulty Work
(See Defective or Nonconforming Work)
Final Completion and Final Payment
4.2.1, 4.2.9, 9.8.2, **9.10**, 12.3, 14.2.4, 14.4.3
Financial Arrangements, Owner's
2.2.1, 13.2.2, 14.1.1.4

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

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

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

11.5
Intent of the Contract Documents
1.2.1, 4.2.7, 4.2.12, 4.2.13
Interest
13.5
Interpretation
1.1.8, 1.2.3, **1.4**, 4.1.1, 5.1, 6.1.2, 15.1.1
Interpretations, Written
4.2.11, 4.2.12
Judgment on Final Award
15.4.2
Labor and Materials, Equipment
1.1.3, 1.1.6, **3.4**, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2
Labor Disputes
8.3.1
Laws and Regulations
1.5, 2.3.2, 3.2.3, 3.2.4, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 9.9.1, 10.2.2, 13.1, 13.3.1, 13.4.2, 13.5, 14, 15.2.8, 15.4
Liens
2.1.2, 9.3.1, 9.3.3, 9.6.8, 9.10.2, 9.10.4, 15.2.8
Limitations, Statutes of
12.2.5, 15.1.2, 15.4.1.1
Limitations of Liability
3.2.2, 3.5, 3.12.10, 3.12.10.1, 3.17, 3.18.1, 4.2.6, 4.2.7, 6.2.2, 9.4.2, 9.6.4, 9.6.7, 9.6.8, 10.2.5, 10.3.3, 11.3, 12.2.5, 13.3.1
Limitations of Time
2.1.2, 2.2, 2.5, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2.7, 5.2, 5.3, 5.4.1, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 12.2, 13.4, 14, 15, 15.1.2, 15.1.3, 15.1.5
Materials, Hazardous
10.2.4, **10.3**
Materials, Labor, Equipment and
1.1.3, 1.1.6, 3.4.1, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1.2, 10.2.4, 14.2.1.1, 14.2.1.2
Means, Methods, Techniques, Sequences and Procedures of Construction
3.3.1, 3.12.10, 4.2.2, 4.2.7, 9.4.2
Mechanic's Lien
2.1.2, 9.3.1, 9.3.3, 9.6.8, 9.10.2, 9.10.4, 15.2.8
Mediation
8.3.1, 15.1.3.2, 15.2.1, 15.2.5, 15.2.6, **15.3**, 15.4.1, 15.4.1.1
Minor Changes in the Work
1.1.1, 3.4.2, 3.12.8, 4.2.8, 7.1, **7.4**
MISCELLANEOUS PROVISIONS
13
Modifications, Definition of
1.1.1
Modifications to the Contract
1.1.1, 1.1.2, 2.5, 3.11, 4.1.2, 4.2.1, 5.2.3, 7, 8.3.1, 9.7, 10.3.2
Mutual Responsibility
6.2
Nonconforming Work, Acceptance of
9.6.6, 9.9.3, **12.3**

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

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

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

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
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

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

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

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

Special Inspections and Testing
4.2.6, 12.2.1, 13.4
Specifications, Definition of
1.1.6
Specifications
1.1.1, **1.1.6**, 1.2.2, 1.5, 3.12.10, 3.17, 4.2.14
Statute of Limitations
15.1.2, 15.4.1.1
Stopping the Work
2.2.2, 2.4, 9.7, 10.3, 14.1
Stored Materials
6.2.1, 9.3.2, 10.2.1.2, 10.2.4
Subcontractor, Definition of
5.1.1
SUBCONTRACTORS
5
Subcontractors, Work by
1.2.2, 3.3.2, 3.12.1, 3.18, 4.2.3, 5.2.3, 5.3, 5.4, 9.3.1.2, 9.6.7
Subcontractual Relations
5.3, 5.4, 9.3.1.2, 9.6, 9.10, 10.2.1, 14.1, 14.2.1
Submittals
3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 7.3.4, 9.2, 9.3, 9.8, 9.9.1, 9.10.2, 9.10.3
Submittal Schedule
3.10.2, 3.12.5, 4.2.7
Subrogation, Waivers of
6.1.1, **11.3**
Substances, Hazardous
10.3
Substantial Completion
4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, **9.8**, 9.9.1, 9.10.3, 12.2, 15.1.2
Substantial Completion, Definition of
9.8.1
Substitution of Subcontractors
5.2.3, 5.2.4
Substitution of Architect
2.3.3
Substitutions of Materials
3.4.2, 3.5, 7.3.8
Sub-subcontractor, Definition of
5.1.2
Subsurface Conditions
3.7.4
Successors and Assigns
13.2
Superintendent
3.9, 10.2.6
Supervision and Construction Procedures
1.2.2, **3.3**, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3, 7.3.4, 8.2, 8.3.1, 9.4.2, 10, 12, 14, 15.1.4
Suppliers
1.5, 3.12.1, 4.2.4, 4.2.6, 5.2.1, 9.3, 9.4.2, 9.5.4, 9.6, 9.10.5, 14.2.1

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

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

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

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

§ 1.1.2 The Contract

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

§ 1.1.3 The Work

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

§ 1.1.4 The Project

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

§ 1.1.5 The Drawings

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

§ 1.1.6 The Specifications

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

§ 1.1.7 Instruments of Service

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

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results. In the case of an inconsistency between these Contract Documents, referenced standards, applicable codes and regulations not clarified by addendum, the most stringent requirements or better quality or greater quantity of Work shall be provided in accordance with the Architect's interpretation.

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

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

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

§ 1.3 Capitalization

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

§ 1.4 Interpretation

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

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

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and 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 mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the 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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

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

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon written protocols governing the transmission and use of, and reliance on, Instruments of Service or any other information or documentation in digital form.

§ 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 written protocols governing the use of, and reliance on, the information contained in the model shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

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

§ 2.1.2 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 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, 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 in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 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. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

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

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one digital copy and one hard copy of the Drawings and Project Manual for execution of the Work. Additional copies will be available from the Architect Engineer's virtual plan room/print shop. (contact thePRINTSHOP at www.theprintshoplr.com – 1304 East 6th Street, Little Rock, AR 72202 – (501) 400-1006. The Contractor is responsible to ensure that sets used for construction are complete, including all modifications, at no additional expense to the Owner.

§ 2.3.7 Live CAD files can be requested via prints@theprintshoplr.com. The cost per file is $150.00.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has 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 approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for 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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

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 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. The Contractor shall perform no portion of the Work at any time without current Contract Documents, modifications, or, where required, reviewed Shop Drawings, Product Data, or Samples for such portion of the Work. Where necessary for performance of the Work, Contractor shall have available at project site and/or main office the referenced standards, manufacturer's instructions, and laws and regulations of authorities having jurisdiction. Any interpretation, clarification, correction, or change of the Contract Documents shall be made by a written modification as defined in paragraph 1.1.1. Interpretations, clarifications, corrections, or changes of the Contract Documents made in any other manner shall not be binding, and the Contractor shall not rely upon such modifications.

§ 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

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

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

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

§ 3.4 Labor and Materials

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

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

.1 Where a definite material is indicated, it is the "basis of design", including aesthetics such as color, pattern, and texture. It is the intent to set a definite standard and shall be included in the contract amount. If the Contractor proposes a substitution, complete data must be submitted for comparison and test when requested by the Architect. No substitution shall be made unless authorized in writing by the Architect. If the Contractor proposes to substitute an equal product, they shall make this fact known, in writing, to the Architect as soon as possible after the award of the contract. Coordinate and submit at the same time all proposed substitutions that affect the design, including aesthetics such as color, pattern, and texture.

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

§ 3.4.4 After the Contract has been executed, the Owner and the Architect will consider a formal request for the substitution of products in place of those specified only under the conditions set forth in the General Requirements of the Specifications (Division 01).

§ 3.4.5 By making requests for substitutions based on Clause 3.4.4 above, the Contractor:

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

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

.2 represents that it will provide the same or better warranty for the substitution that would be for that specified;
.3 certifies that the cost data presented is complete and includes all related costs under this Contract but excludes costs under separate contracts, and excludes the Architect's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and,
.4 will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.

§ 3.4.6 The Contractor shall not permit to be incorporated into the Work any asbestos containing materials, lead based paint, polychlorinated biphenyl (PCB), or any other material, product, or equipment containing hazardous materials as identified by the Environmental Protection Agency and authorities having jurisdiction.

§ 3.4.7 Perform labor in a professional manner by mechanics skilled in their respective trades. Results shall meet or exceed criteria established by their respective trade certifications, applicable reference standards and workmanship required of trade associations, and results shall be in accordance with the Contract Documents.

§ 3.5 Warranty

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

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

§ 3.6 Taxes

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

§ 3.7 Permits, Fees, Notices and Compliance with Laws

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

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

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

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

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

§ 3.8 Allowances

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,

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

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

§ 3.9 Superintendent

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

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

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

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

which shall not unreasonably be withheld or delayed. The Contractor shall make reasonable efforts to assure that the superintendent that starts the Project finishes the Project.

§ 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 Architect's approval. The Architect'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 reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

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

§ 3.10.4 The construction schedule shall be in a detailed format satisfactory to the Owner and Architect. If not accepted, the construction scheduled will be revised by the Owner and Architect and re-submitted to the Contractor for acceptance. The Contractor shall monitor the progress of the Work relative to the Contract Documents, promptly advise the Owner and Architect of any delays or potential delays and update the accepted construction schedule ("progress report"). The Contractor shall provide an affirmative plan to correct the delay, including without limitation, overtime and/or additional labor if needed. In no event shall any progress report constitute an adjustment in the Contract Time or the Contract Sum unless any such adjustment is agreed to by the Owner and authorized pursuant to a written Change Order.

§ 3.10.5 If the Owner or the Architect determines that the performance of the Work is not satisfying the requirements of the accepted construction schedule, the Owner will have the right to order the Contractor to take corrective measures necessary to expedite the progress of construction, including, without limitation (i) working additional shifts or overtime, (ii) supplying additional manpower equipment and facilities, and (iii) other similar measures. These measures shall continue until the progress of the Work complies with the stage of completion required by the accepted construction schedule. The Owner's right to require these measures is solely for the purpose of ensuring the Contractor's compliance with the accepted construction schedule. In no event shall the Owner have control over, charge of, or any responsibility for construction means, methods, techniques, sequence of procedures or for safety precautions and programs in connection with the Work. In no event shall the Owner's order for the Contractor to take corrective measures as provided herein constitute an adjustment in the Contract Time or the Contract Sum unless any such adjustments is agreed to by the Owner and authorized pursuant to a written Change Order.

§ 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.

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

§ 3.12 Shop Drawings, Product Data and Samples

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

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

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

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

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

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

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

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

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

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

§ 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. 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 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 at the time and in the form specified by the Architect.

§ 3.12.11 The Contractor shall submit to the Architect such shop drawings, data, and schedules as are required by the Specifications, General Conditions or that are reasonably requested by the Architect. Submittals shall be coordinated by the Contractor and prepared by a person thoroughly competent and qualified to prepare submittals and shop drawings. Incomplete or poorly prepared submittals and shop drawings are subject to being returned to the Contractor to be redrawn and resubmitted.

§ 3.13 Use of Site

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

§ 3.14 Cutting and Patching

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

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

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall 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.

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

§ 3.16 Access to Work

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

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for 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 and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity 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. 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. The term "Architect", "Engineer", and "Architect Engineer" shall be used interchangeably with the same meaning as "Architect".

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

§ 4.2 Administration of the Contract

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

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

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

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

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

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

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

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

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

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

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

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

§ 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.

§ 4.2.15 Extent of Architect's services are limited to the Owner-Architect Agreement. Nothing contained in these Contract Documents, Supplementary Conditions, General Conditions, or the Agreement Between Owner and Contractor shall be construed as modifying, adding to, or deleting from the Owner-Architect Agreement.

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 Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

.1 Prior to the first Payment Request the Contractor shall furnish in writing to the Owner through the Architect a listing of all subcontractors and suppliers and a listing of the names of persons or entities proposed as manufacturers for each of the principal products required for 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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

Work including, where applicable, the name of the installing Subcontractor. Use AIA Document No. G805, List Of Subcontractors, or other approved form.

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

.1 All subcontractors shall be licensed for their specialty by the Arkansas Contractors License Board.

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

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

§ 5.3 Subcontractual Relations

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

§ 5.4 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.

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

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

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

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

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

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

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

§ 6.2 Mutual Responsibility

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

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

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

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

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

§ 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.

§ 7.2 Change Orders

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

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

§ 7.2.2 Methods used in determining adjustments to the Contract Sum may include any combination 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 7.2.4.

§ 7.2.3 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change which results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect Engineer. 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.

§ 7.2.4 The Contractor shall keep and present, upon written request, in such form as the Architect Engineer may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this section 7.2.4 shall be limited to the following:

.1 costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;
.2 costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

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

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

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

§ 7.2.5 All quotations for changes, be they additions or deductions, shall be submitted in a complete itemized breakdown form acceptable to Architect Engineer, using Contract Unit Prices when set forth therein. The value of any and all such additions or deductions shall be determined as set forth in section 7.2.4, and as follows:

§ 7.2.5.1 The itemized breakdown shall, upon written request, show unit quantities and costs of all labor and materials. Submit all verifying data as necessary or reasonably required by Architect Engineer or Owner to support claims, such as copies or original invoices, payrolls, etc. The burden of proof of cost rests upon the Contractor. Contractor agrees that Owner or Owner's Representative shall have the right, at reasonable times, to inspect and audit the books and records of Contractor to verify the propriety and allowability of such costs.

§ 7.2.5.2 Compute requests for changes in the contract sum, whether additions or deductions, in accordance with the contract requirements. The following is a general guide:

a. For work performed by the Contractor:
   Net Cost of Materials a
   State Sales Tax b
   Net Placing Cost c
   W.C. Insurance Premium and FICA Tax d
   a+b+c+d
   Overhead and profit % (as stated in contract)
   % multiplied by (a+b+c+d) e
   Allowable Bond Premium f
   Total Cost a+b+c+d+e+f

b. Credit for work omitted shall be computed as outlined in 7.2.7 "a thru e".

c. For work performed by Subcontractors:
   Net Cost of Materials a
   State Sales Tax b
   Net Placing Cost c
   W.C. Insurance Premium and FICA Tax d
   a+b+c+d
   Overhead and Profit % (as stated in the contract
   % multiplied by (a+b+c+d) e
   To the cost of that portion of the work (Change) that is performed by the Subcontractor, the General Contractor shall add a Fee Charge of 5% plus the Allowable Bond Premium.

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

§ 7.3 Construction Change Directives

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

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

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

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

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;

.2 Unit prices stated in the Contract Documents or subsequently agreed upon;

.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

.4 As provided in Section 7.3.4.

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

.1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;

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

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

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

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

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

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

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

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

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

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

§ 7.4 Minor Changes in the Work

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

ARTICLE 8 TIME

§ 8.1 Definitions

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

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

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

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

§ 8.2 Progress and Completion

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

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

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

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (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 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.

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

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

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

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

§ 9.3 Applications for Payment

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

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

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

§ 9.3.1.3 Along with the Application for Payment and as a condition to the payment of any amounts stated therein, the Contractor shall submit a revised and updated Construction Schedule reflecting actual job progress to the date of the Application for Payment taking into account all factors known at the time of said Application for Payment.

§ 9.3.1.4 The Owner shall be entitled to retain up to $10,000 from final payment and the payment of retainage until the Contractor delivers to the Architect Engineer all record drawings, record documents, and maintenance manuals required by the Contract Documents.

§ 9.3.2 Until final payment, the Owner will pay 95 percent (withholding 5 percent retainage) of the amount due the Contractor on account of Progress Payments for labor, materials, and equipment incorporated into the Work and 100 percent (withholding 0 percent retainage) of the amount due for materials or equipment suitably stored on site or off site in a bonded warehouse in the name of the Owner and identified for use on the project, less such amounts as the Architect Engineer shall determine for all incomplete Work and unsettled claims. If requested each application and certification for payment shall be accompanied by Release of Liens from all subcontractors and suppliers for Work covered by previous Progress Payments and Consent of Surety for the reduction of retention.

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

§ 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 Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

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

§ 9.5 Decisions to Withhold Certification

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

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- **.4** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- **.5** damage to the Owner or a Separate Contractor;
- **.6** reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- **.7** repeated failure to carry out the Work 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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

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

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

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

§ 9.6 Progress Payments

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

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

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

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

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

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

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

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of 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 will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

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

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

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, 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.

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

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

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (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' 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 reasonable attorneys' fees.

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

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

- **.1** liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents;
- **.3** terms of special warranties required by the Contract Documents; or
- **.4** audits performed by the Owner, if permitted by the Contract Documents, after final payment.

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

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

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

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

§ 10.2 Safety of Persons and Property

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

.1 employees on the Work and other persons who may be affected thereby;

.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

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

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

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

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. 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,

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

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 Architect is not qualified to identify asbestos containing materials or other hazardous materials.

§ 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.

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

§ 10.4 Emergencies

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 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

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

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.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 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. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§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

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

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 to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

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

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

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

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 Successors and Assigns

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

§ 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 Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of 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 Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

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

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

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

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

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall not bear interest. Any amounts retained shall not bear interest. Any claim by the Contractor to the Owner for interest on a delinquent final payment shall only be made pursuant to Arkansas Statutes § 22-9-205. Likewise, Contractor shall include in any subcontracts or supply contracts the obligation to pay interest to the subcontractor or supplier for payments not made in accordance §9.6.2 for payment by Contractor to Subcontractors.

§ 13.6 Equal Employment Opportunity

The Contractor shall maintain policies of employment as follows:

.1 The Contractor shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin, age, or disability. The Contractor shall insure that applicants are employed, and that employees are treated during employment without regard to their race, religion, color, sex, national origin, age, or disability. Such action shall include, but not be limited to the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the policies of non-discrimination.

.2 The Contractor shall, in al 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, national origin, age, or disability.

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

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

.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 Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

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

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

§ 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.

§ 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 requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 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.

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

§ 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.

§ 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 the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 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 mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

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

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

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

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

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

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

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

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

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

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

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

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

§ 15.4 Arbitration

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

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

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

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

§ 15.4.4 Consolidation or Joinder

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

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

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

END

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 15:58:03 CDT on 09/10/2026 under Subscription No.20250109321 which expires on 03/21/2027, 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: (6aa3199ea0717a7124a9e3ae)

This page was intentionally left blank for duplex printing.

SECTION 00 73 00
SUPPLEMENTARY CONDITIONS

PART 1 GENERAL

1.01 MODIFICATIONS TO GENERAL CONDITIONS

A. Refer to AIA Document A201, General Conditions of the Contract for Construction following Section 00 72 00 for the original text of the published standard general conditions with Project supplementary conditions indicated as modified text inline with the original text. References to Supplementary Conditions shall be as referring to the modified text.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 01 10 00
SUMMARY

PART 1 GENERAL

1.01 PROJECT

A. Project Name: 2026-060 Philander Smith University M. L. Harris Auditorium Renovation.

B. Owner's Name: Philander Smith University.

C. Architect Engineer's Name: Cromwell Architects Engineers.
   1. Project Manager: Chris East; 1300 East 6th Street, Little Rock, Arkansas 72202; 501-372-2900; ceast@cromwell.com

D. The Project consists of the The Philander Smith M.L. Harris Auditorium Renovation is a partial renovation to the M.L. Harris Fine Arts Building which will include the Auditorium, Lobby, and utility improvements. The Auditorium will replace all the theater components including seating, audio-visual, rigging, curtains, ADA improvements, and other interior finishes. The Lobby will include replacing the existing non-ADA compliant bathrooms with ADA compliant bathrooms, divide the lobby to create a computer classroom, and replace the existing finishes and systems. The utility upgrades will include a new service, utility transformer, main distribution panel, and downstream distribution. Asbestos remediation will be included and the building will be partially occupied during construction. .

1.02 CONTRACT DESCRIPTION

A. Contract Type: A single prime contract based on a Stipulated Price as described in Document 00 52 00 - Agreement Form.

1.03 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.

1.04 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas as noted on the Drawings and as directed by Owner.

B. Arrange use of site and premises to allow:
   1. Owner occupancy.
   2. Work by Others.

C. To the greatest extent possible, select means, methods, materials and techniques that will minimize noise and odors and that will not adversely affect occupants. Immediately comply with requests of Owner's representative to stop any such activity and take action to resolve the issue.

D. 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.
   3. Access to the roof will ne be allowed from within the building. Contractor to proi

E. Utility Outages and Shutdown:
   1. 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.

2. Existing Utility Interruptions: Do not interrupt utilties serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
   a. Notify Architect Engineer and Owner not less than 2 days in advance of proposed utility interruptions.
   b. Do not proceed with utility interruptions without Owner's written permission.
3. Prevent accidental disruption of utility services to other facilities.

1.05 TIME RESTRICTIONS

A. Coordinate work schedule for system down times with Owner.

1.06 WORK SEQUENCE

A. Coordinate construction schedule and operations with Owner.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 20 00
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 preparation and submittal of application for final payment.

1.02 RELATED REQUIREMENTS

A. Section 00 50 00 - Contracting Forms and Supplements: Forms to be used.

B. Section 00 72 00 - General Conditions: Additional requirements for progress payments, final payment, changes in the Work.

C. Section 00 73 00 - Supplementary Conditions: Percentage allowances for Contractor's overhead and profit.

1.03 SCHEDULE OF VALUES

A. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect Engineer for approval.

B. Forms filled out by hand will not be accepted.

C. Submit Schedule of Values within 15 days after date of Owner-Contractor Agreement.

D. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification section. Identify bonds and insurance.

E. Include separately from each line item, a direct proportional amount of Contractor's overhead and profit.

F. Revise schedule to list approved Change Orders, with each Application For Payment.

G. Digital Submission Requirements: Use procedures specified in Section 01 30 00.

1.04 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.

B. Form: AIA G702 Application and Certificate for Payment and AIA G703 - Continuation Sheet including continuation sheets when required.

C. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect Engineer for approval.

D. Forms filled out by hand will not be accepted.

E. For each item, provide a column for listing each of the following:
   1. Item Number.
   2. Description of work.
   3. Scheduled Values.
   4. Previous Applications.
   5. Work in Place and Stored Materials under this Application.
   6. Authorized Change Orders.
   7. Total Completed and Stored to Date of Application.
   8. Percentage of Completion.
   9. Balance to Finish.
   10. Retainage.

F. Execute certification by signature of authorized officer.

G. 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.

H. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.

I. Submit one electronic and three hard-copies of each Application for Payment.

J. Include the following with the application:
   1. Transmittal letter as specified for submittals in Section 01 30 00.
   2. Construction progress schedule, revised and current as specified in Section 01 30 00.
   3. Current construction photographs specified in Section 01 30 00.
   4. Partial release of liens from major subcontractors and vendors.
   5. Affidavits attesting to off-site stored products.

K. When Architect Engineer requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

1.05 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 Contract Documents.

B. For minor changes not involving an adjustment to the Contract Price or Contract Time, Architect Engineer will issue written instructions directly to Contractor.

C. For other required changes, Architect Engineer will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
   1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
   2. Promptly execute the change.

D. Proposal Request: Architect Engineer may issue a document which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a maximum price quotation within the number of days stipulated in the Proposal Request.

E. Contractor may propose a change by submitting a request for change to Architect Engineer, describing the proposed change and its full effect on the work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation and a statement describing the effect on work by separate or other contractors. Document any requested substitutions in accordance with Section 01 60 00.

F. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
   1. For change requested by Architect Engineer for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
   2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Architect Engineer.
   3. For pre-determined unit prices and quantities, the amount will be based on the fixed unit prices.

G. 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 with additional information:
   a. Origin and date 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.

H. Execution of Change Orders: Architect Engineer will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

I. 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 and adjust the Contract Sum.

J. 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.

K. Promptly enter changes in Project Record Documents.

1.06 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 01 70 00.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 01 21 00
ALLOWANCES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cash allowances.

B. Inspecting and testing allowances.

C. Payment and modification procedures relating to allowances.

1.02 RELATED REQUIREMENTS

A. Section 01 20 00 - Price and Payment Procedures: Additional payment and modification procedures.

1.03 CASH ALLOWANCES

A. Costs Included in Cash Allowances: Cost of product to Contractor or subcontractor, less applicable trade discounts

B. Costs Not Included in Cash Allowances: Product handling at the site, including unloading, uncrating, and storage; and protection of products from elements and from damage.
   1. Do not include labor for installation and finishing unless expressly stated in the Allowance.

C. Architect Engineer Responsibilities:
   1. Select products in consultation with Owner and transmit decision to Contractor.
   2. Prepare Change Order.

D. Contractor Responsibilities:
   1. On notification of which products have been selected, execute purchase agreement with designated supplier and installer.
   2. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
   3. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.

E. Differences in costs will be adjusted by Change Order.

1.04 INSPECTING AND TESTING ALLOWANCES

A. Costs Included in Inspecting and Testing Allowances: Cost of engaging an inspecting or testing agency; execution of inspecting and tests; and reporting results.

B. Costs Not Included in the Inspecting and Testing Allowances:
   1. Costs of incidental labor and facilities required to assist inspecting or testing agency.
   2. Costs of testing services used by Contractor separate from Contract Document requirements.
   3. Costs of retesting upon failure of previous tests as determined by Architect Engineer.

C. Payment Procedures:
   1. Submit one copy of the inspecting or testing firm's invoice with next application for payment.
   2. Pay invoice on approval by Architect Engineer.

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

1.05 SCHEDULE OF ALLOWANCES

A. Allowance amounts are identified on the Bid Proposal Form. Include overhead, profit, and all other costs in the Base Bid unless otherwise indicated.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 01 22 00
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 COSTS INCLUDED

A. Unit prices indicated in the Bid Proposal Form shall include full compensation for all required materials, labor, products, tools, equipment, delivery, erection, overhead, profit, and incidental services necessary to complete the Work.

1.03 UNIT QUANTITIES SPECIFIED

A. Quantities indicated in the Bid Proposal Form are for bidding and contract purposes only. Quantities and measurements of actual Work will determine the payment amount.

1.04 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 and document all measurements and compute quantities. Document measurements and quantities with photographs. Measurements and quantities will be verified by Architect Engineer.

C. Assist by providing necessary equipment, workers, and survey personnel as required.

D. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.

E. Perform surveys required to determine quantities, including control surveys to establish measurement reference lines. Notify Architect Engineer prior to starting work.

F. Contractor's Engineer Responsibilities: Sign surveyor's field notes or keep duplicate field notes, calculate and certify quantities for payment purposes.

1.05 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 Engineer, 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.

1.06 DEFECT ASSESSMENT

A. Replace Work, or portions of the Work, not complying with specified requirements.

B. If, in the opinion of Architect Engineer, it is not practical to remove and replace the Work, Architect Engineer 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 Architect Engineer.
2. The defective Work will be partially repaired to the instructions of the Architect Engineer, and the unit price will be adjusted to a new unit price at the discretion of Architect Engineer.

C. The individual specification sections may modify these options or may identify a specific formula or percentage price reduction.

D. The authority of Architect Engineer to assess the defect and identify payment adjustment is final.

1.07 SCHEDULE OF UNIT PRICES

A. Unit prices are identified on the Bid Proposal Form. Include overhead, profit, and all other costs in the Base Bid unless otherwise indicated.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 23 00
ALTERNATES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Description of Alternates.

B. Documentation of changes to Contract Sum and Contract Time.

1.02 DEFINITIONS

A. Alternate: An Alternate is an amount proposed by bidders and stated on the Bid Proposal Form for specific work identified in the Contract Documents that may be added to or deducted from the Base Bid if accepted by the Owner. The stated amount represents the net addition to or deduction from the Contract Sum required to incorporate the Alternate into the Work, including all additions, substitutions, omissions, changes, and alterations necessary for full implementation. No other adjustments to the Contract Sum will be made.

1.03 GENERAL REQUIREMENTS FOR ALTERNATES

A. Alternates proposed on the Bid Proposal Form will be reviewed and either accepted or rejected at the Owner's sole discretion in numerical order. Accepted Alternates will be identified in the Owner–Contractor Agreement.

B. Coordinate all related Work and modify adjacent construction as required to fully integrate each accepted Alternate into the Project. Include all omissions, changes, alterations, additions, and trade adjustments necessary to implement the accepted Alternate.

C. Descriptions of Alternates shown in the Drawings or Specifications may be brief. Claims for additional compensation will not be allowed due to omissions or discrepancies arising from the brevity of these descriptions. Materials, labor, and methods required to complete each Alternate shall comply with the applicable Drawings and Specification Sections. Alternates that extend or are similar in nature to Base Bid Work shall conform to the same requirements.

D. Include in the Bid all applicable credits for Work omitted or replaced by any Alternate.

E. Some Alternates may be shown incorporated in the Drawings. Carefully review all drawings, notes, and details indicating the limits of Base Bid Work and proposed Alternates.

1.04 SCHEDULE OF ALTERNATES

A. Alternates shall be as identified on the Bid Proposal Form.

B. Alternate No. 1 - Digital display wall to replace graphic vinyl wall:
   1. Additive Item: Refer to specifications and Drawing Number [A-402].

C. Alternate No. 2 - Replace existing packaged air handler serving auditorium space:
   1. Additive Item: Refer to specifications and Drawing Number [M-601].

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General administrative requirements.

B. Electronic document submittal service.

C. Preconstruction meeting.

D. Site mobilization meeting.

E. Progress meetings.

F. Construction progress schedule.

G. Progress photographs.

H. Submittals for review, information, and project closeout.

I. Number of copies of submittals.

J. Submittal procedures.

K. Administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.02 RELATED REQUIREMENTS

A. Section 01 32 16 - Construction Progress Schedule: Form, content, and administration of schedules.

B. Section 01 60 00 - Product Requirements: Product Options and Substitution Requirements.

C. Section 01 70 00 - Execution and Closeout Requirements: Additional coordination requirements.

D. Section 01 78 00 - Closeout Submittals - Closeout Submittals Project record documents, operation and maintenance data, warranties and bonds.

E. Other Sections for specific requirements for submittals in those Sections.

1.03 REFERENCE STANDARDS

A. AIA G203 - BIM Execution Plan; 2022.

B. AIA G716 - Request For Information; 2004, or approved equivalent.

C. AIA G810 - Transmittal Letter; 2001.

1.04 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with Architect Engineer digital project management platform (or approved equivalent) for all correspondence, submittals, Request for Information, and logs.

1.05 PROJECT COORDINATION

A. Project Coordinator: As designated by Contractor.
   1. Requests for Information.
   2. Requests for substitution.
   3. Shop drawings, product data, and samples.
   4. Test and inspection reports.
   5. Design data.
   6. Manufacturer's instructions and field reports.
   7. Applications for payment and change order requests.
   8. Progress schedules.
   9. Coordination drawings.

10. Correction Punch List and Final Correction Punch List for Substantial Completion.
11. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

A. Contractor will schedule a meeting after Notice to Proceed.

B. Attendance Required:
   1. Owner's Representative.
   2. Architect Engineer.
   3. Contractor.

C. Virtual or hybrid meeting may be permitted when approved by Owner.

D. Preconstruction Submittals: Submit the following information to Architect Engineer no later than three (3) business days prior to the Preconstruction Meeting:
   1. Letter designating the Project Superintendent, including name, title, mobile phone number, and email address.
   2. Summary of Contractor’s site-specific safety program and procedures.
   3. Preliminary Construction Progress Schedule in accordance with Section 01 32 00 - Construction Progress Documentation.
   4. Directory of Subcontractors and major suppliers, including names and contact information.
   Note: All items listed above shall be submitted, reviewed, and accepted by the Architect Engineer prior to conducting the Preconstruction Meeting.

E. Agenda: Including, but not necessarily limited to following.
   1. Execution of Owner-Contractor Agreement.
   2. Submission of executed bonds and insurance certificates.
   3. Distribution and confirmation of complete Contract Documents.
   4. Review of items submitted prior to Preconstruction Meeting, including:
      a. Letter designating the Project Superintendent, including contact information.
      b. Summary of Contractor’s site-specific safety program.
      c. Preliminary Construction Progress Schedule.
      d. Directory of Subcontractors and major suppliers.
   5. Designation of personnel representing Owner, Contractor, and Architect Engineer.
   6. Review of project management platform access and digital submittal workflow.
   7. Review of procedures for field communication, Requests for Information (RFI), submittals, substitutions, applications for payment, change orders and Contract closeout procedures.
   8. Coordination and scheduling of required special inspections, materials testing, and field observations in accordance with Section 01 40 00.
   9. Discussion of Owner’s occupancy requirements and site logistics including temporary utilities staging and security.
   10. Scheduling milestones, critical path activities, and anticipated long-lead items.
   11. Other business pertinent to the commencement of construction.

F. Contractor to record minutes and distribute copies within two days after meeting Architect Engineer, Owner, participants, and those affected by decisions made.

3.02 SITE MOBILIZATION MEETING

A. Architect Engineer will schedule meeting at the Project site prior to Contractor occupancy.

B. Attendance Required:
   1. Contractor.
   2. Owner's Representative.
   3. Architect Engineer.

4. Special consultants.
5. Contractor's superintendent.
6. Major subcontractors.

C. Agenda: Including, but not necessarily limited to following.
1. Use of premises by Owner and Contractor.
2. Owner's requirements.
3. Temporary utilities provided by Owner.
4. Survey and building layout.
5. Security and housekeeping procedures.
6. Schedules.
7. Application for payment procedures.
8. Procedures for testing.
9. Procedures for maintaining record documents.
10. Requirements for start-up of equipment.
11. Inspection and acceptance of equipment put into service during construction period.

D. Record minutes and distribute copies within two days after meeting to Architect Engineer, Owner, participants, and those affected by decisions made.

3.03 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work at monthly intervals, or more frequently as required by progress or schedule changes.

B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required: Job superintendent, Major Subcontractors and suppliers, To Be Determined, Architect Engineer, as appropriate to agenda topics for each meeting.

D. Agenda: Including, but not necessarily limited to following.
1. Review minutes of previous meetings.
2. Review of work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede, or will impede, planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Coordination of projected progress.
11. Maintenance of quality and work standards.
12. Effect of proposed changes on progress schedule and coordination.
13. Other business relating to work.

E. Record minutes and distribute copies within two days after meeting to Architect Engineer, Owner, participants, and those affected by decisions made.

3.04 SUBMITTALS

A. Submit to the Architect Engineer such shop drawings, data, and schedules as are required by the specifications, General Conditions or that are reasonably requested by the Architect Engineer. Submittals shall be coordinated by the Contractor and prepared by a person thoroughly competent and qualified to prepare submittals and shop drawings. Incomplete or poorly prepared submittals and shop drawings are subject to being returned to the Contractor to be redrawn and resubmitted.

3.05 REQUESTS FOR INFORMATION (RFI)

A. Each RFI shall address one (1) specific question and include, at a minimum, the following information:
   1. A clear, concise question requiring clarification. Do not combine multiple questions in a single RFI.
   2. Exact location of the issue, including drawing sheet number, detail reference, gridlines, and applicable photo or markup.
   3. Description of the field condition prompting the request.
   4. Contractor’s proposed solution, if applicable.
   5. Statement indicating whether cost and/or schedule impacts are anticipated.
   6. Supporting attachments necessary to fully understand the issue, including photographs, annotated drawings, or sketches.

3.06 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Architect Engineer's responsive action.

B. Informational Submittals: Written information that does not require Architect Engineer's responsive action. Submittals may be rejected for not complying with requirements.

3.07 PROJECT DIGITAL DATA PROTOCOL

A. General: All contract administration documents shall be managed, transmitted, and stored using a secure, cloud-based project management platform. The platform shall provide version control, document tracking, electronic review workflows, and archival capabilities for all project participants.

B. Scope of Use: Use the project management platform for, but not limited to, the following communications and records:
   1. Submittals for review, information, and closeout.
   2. Requests for Information (RFIs).
   3. Revisions to the Contract Documents, including Architect’s Supplemental Instructions (ASI), Proposal Requests (PR), and Change Orders.
   4. Meeting minutes, field reports, and daily logs.
   5. Punch lists and closeout documentation.
   6. Construction progress photographs.
   7. Construction schedules.

C. Access and Permissions: Provide controlled access to parties designated by the Owner and Architect. The Contractor shall maintain current user lists and ensure that all participants have appropriate permissions to submit, review, or comment on documents consistent with their assigned roles.

D. Data Integration and Linking: Link documents within the platform, where applicable, to related records including drawings, specifications, submittals, RFIs, and meeting minutes to maintain traceability and coordination.

E. File Format Requirements:
   1. Upload submittals in searchable PDF format unless otherwise specified. Label files clearly and consistently.
   2. Submit photographs in JPG or PNG format with descriptive file names.
   3. Provide native files (e.g., Revit .rvt, AutoCAD .dwg, Excel .xlsx) when required for coordination or review.
   4. Deliver physical samples, color charts, and mock-ups directly to the Architect as required by the applicable Specification Section.

F. Submission Methods:
   1. Project Management Platform:

2. Email (: When expressly approved by the Construction Administrator, submit digital files via email. Attach files directly and include the project name and document type in the subject line.
3. Cloud Storage: When approved in advance, provide a download link to files stored in a secure cloud storage service. Links shall be accessible without special permissions, logins, or expiration.
4. Compatibility: Ensure all digital submissions are compatible with commonly used software by the project team.
5. Proprietary Software: When proprietary software is used, provide access, viewer files, or instructions necessary for review without requiring additional software purchases by the project team.

G. Record Retention:
1. The Contractor shall maintain all project data within the approved platform for the duration of the Project.
2. At Final Completion, provide the Owner with full access to the complete project archive.
3. Maintain archive accessibility for a minimum of ten (10) years following Project completion.

3.08 SUBMITTAL PROCEDURES

A. Review and coordinate submittals prior to submission to Architect Engineer.

B. Transmit submittals to Architect Engineer for delivery to Owner.

C. The Architect Engineer may request submittals in addition to those specified when deemed necessary to adequately describe the Work covered in the respective sections.

D. General: Electronic PDF or live copies of CAD Drawings of the Contract Drawings may be obtained from Architect Engineer upon payment of a fee (at standard rates) for Contractoruse in preparing submittals, unless otherwise indicated. Contact printshop@cromwell.com; (501) 400-1006.

E. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
a. Architect Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
3. Submittals for finishes and colors, including product data and color samples, shall be coordinated and submitted at the same time.

F. Basis of Design:
1. Products identified in the color and finish schedules or drawing notes including color, shade, hue, translucence, opacity, pattern, and texture - establish the Basis of Design. Provide the Basis of Design product unless a substitution request is submitted and approved in accordance with Division 01 requirements.
2. Substitutions for finishes and colors will not be considered unless all related finishes and colors are fully coordinated and submitted together as a complete substitution package.

G. Submittals Schedule: Comply with requirements in Division 01 Section "Construction Progress Schedule" for list of submittals and time requirements for scheduled performance of related construction activities.

H. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect Engineer's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
   1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with other Contractors and/or subsequent submittals is required. Architect Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
   2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
   3. Resubmittal Review: Allow 15 days for review of each resubmittal.
   4. Sequential Review: Where sequential review of submittals by Architect Engineer's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.

I. Identification: Place a permanent label or title block on each submittal for identification.
   1. Indicate name of firm or entity that prepared each submittal on label or title block.
   2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect Engineer.
   3. Include the following information on label for processing and recording action taken:
      a. Project name.
      b. Architect Engineer's project number.
      c. Owner's project number.
      d. Date of submittal.
      e. Name and address of Architect.
      f. Name and address of Contractor.
      g. Name and address of Subcontractor.
      h. Name and address of Supplier.
      i. Name of Manufacturer.
      j. Submittal number or other unique identifier, including revision designation.
      k. Number and title of applicable Specification Section.
      l. Drawing number(s) and detail reference(s), as applicable.
      m. Location(s) where product is to be installed, as applicable.
      n. Any additional information necessary to clearly identify the submittal.

J. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.

K. Copies: Submit all copies by electronic file, except samples.

L. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect Engineer will return submittals, without review, received from sources other than Contractor.
   1. Transmittal Form: Use form acceptable to Architect Engineer.
   2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect Engineer on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.

M. Resubmittals: Submit resubmittals in the same format as the initial submittal.
   1. Identify the date and content of the previous submittal.
   2. Identify the date and description of each revision on the submittal label or title block and clearly indicate the extent of revisions.
   3. Resubmit until the submittal is approved.

N. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as required for execution of the Work. Indicate distribution on the submittal transmittal.

O. Use for Construction: Use only final submittals bearing the Architect-Engineer's review mark of "No Exceptions Taken" or "Make Corrections Noted." Submittals with other review statuses shall not be used for fabrication or installation.

3.09 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections or subsequently requested by Architect Engineer.

B. Product Data: Collect Product Data into a single submittal for each element of construction and each type of product or equipment.
   1. When information must be specially prepared for the Project because standard published data is not suitable, submit such information as Shop Drawings, not as Product Data.
   2. Mark each submittal to indicate applicable products, models, options, and accessories.
   3. Include the following information, as applicable to the product:
      a. Manufacturer's written recommendations.
      b. Manufacturer's product specifications.
      c. Manufacturer's installation instructions.
      d. Standard color charts.
      e. Manufacturer's catalog cuts.
      f. Wiring diagrams for factory-installed wiring.
      g. Published performance curves.
      h. Operational range diagrams.
      i. Mill reports, where required.
      j. Standard product operation and maintenance manuals.
      k. Evidence of compliance with referenced standards.
      l. est reports from a recognized testing agency.
      m. Application of testing agency labels and seals, where applicable.
      n. Notation of coordination requirements with related Work.
   4. Submit Product Data concurrently with Samples.
   5. Number of Copies: Submit Product Data electronically unless otherwise indicated.

C. Shop Drawings: Prepare project-specific information, accurately drawn to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard published data.
   1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
      a. Dimensions.
      b. Identification of products and components.
      c. Fabrication and installation drawings.
      d. Rough-in and setting diagrams.
      e. Wiring diagrams for field-installed power, signal, and control wiring.
      f. Shop fabrication and manufacturing instructions.
      g. Templates and patterns.
      h. Schedules.
      i. Design calculations, where required..
      j. Evidence of compliance with specified standards.
      k. Notation of coordination requirements with related Work.
      l. Identification of dimensions established by field measurement.
      m. Clear indication of relationship to adjoining construction.
      n. Professional Engineer's seal and signature, where required.

o. Wiring Diagrams: Clearly differentiate between manufacturer-installed and field-installed wiring.

2. Sheet Size: Match Contract Drawing size; maximum sheet size 30 by 42 inches.
3. Number of Copies: Submit Shop Drawings electronically unless otherwise indicated.

D. Samples: Submit Verification Samples for review of kind, color, pattern, and texture to confirm compatibility with other materials and to allow comparison between approved samples and materials delivered and installed.
   1. Transmit Samples that contain multiple, related components (such as accessories) together in one submittal package.
   2. Identification: Attach a label to the unexposed side of each Sample indicating the following:
      a. Generic description of Sample.
      b. Product name and name of Manufacturer.
      c. Sample source.
      d. Number and title of applicable Specification Section.
   3. Disposition: Maintain approved Sample sets at the Project site and make them available for quality control comparisons throughout construction. Approved Samples may be used to determine final acceptance of the associated Work.
      a. Samples permitted to be incorporated into the Work are identified in individual Specification Sections and shall be in undamaged condition at time of use.
      b. Samples not incorporated into the Work and not designated as Owner's property shall remain the property of the Contractor.
   4. Samples for Verification: Submit full-size units or Samples of the size indicated, fabricated from the same materials to be used in the Work, cured and finished as specified, and physically identical to the proposed product. Samples shall represent the full range of expected color, pattern, and texture variations. Samples may include, but are not limited to, partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used products; swatches showing color, texture, and pattern; color range sets; and components used for independent testing or inspection.
      a. Number of Samples: Submit one (1) complete set of Samples. The Architect-Engineer will retain the Sample set.
         1) Submit a single Sample when assembly details, workmanship, fabrication techniques, connections, operation, or similar characteristics are to be demonstrated.
         2) When inherent variation in color, pattern, texture, or other characteristics exists, submit not fewer than three (3) paired Samples demonstrating the anticipated range of variation.

E. Product Schedule or List: Where required by individual Specification Sections, prepare and maintain a written summary identifying products required for the Work and their intended locations. Submit the Product Schedule or List in tabular form and include the following information:
   1. Product type, including a unique identifier for each product.
   2. Room or space number and name.
   3. Location within the room or space.
   4. Number of Copies: Submit one (1) searchable PDF copy unless otherwise indicated.

F. Submittals Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."

G. Application for Payment: Comply with requirements specified in Division 01 Section "Payment Procedures."

H. Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."

I. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use form acceptable to Architect Engineer. Include the following information in tabular form:
   1. Name, address, and telephone number of entity performing subcontract or supplying products.
   2. Number and title of related Specification Section(s) covered by subcontract.
   3. Drawing number and detail references, as appropriate, covered by subcontract.
   4. Number of Copies: Submit one pdf copy via email, of subcontractor list, unless otherwise indicated. One copy will be returned.
      a. Mark up and retain one returned copy as a Project Record Document.

3.10 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.
   1. Number of Copies: Submit one (1) searchable PDF copy unless otherwise indicated.
   2. Certificates and Certifications: Provide a notarized statement signed by an officer or other individual authorized to sign documents on behalf of the entity responsible for the certification.
   3. Test and Inspection Reports: Comply with requirements specified in Division 1 Section "Quality Requirements."

B. Construction Schedule: Comply with requirements specified in Section 01 32 16 - Construction Progress Schedule

C. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

D. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

E. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

F. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

G. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

H. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

I. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

J. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

K. Research/Evaluation Reports: Prepare and submit written evidence from a model code evaluation organization acceptable to the Authorities Having Jurisdiction demonstrating that the product complies with the building code in effect for the Project. Include the following information:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period of the report.
4. Product name and manufacturer.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

L. Schedule of Tests and Inspections: Comply with requirements specified in Section 01 40 00 - Quality Requirements

M. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

N. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

O. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

P. Operation and Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 01 Section "Closeout Submittals."

Q. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

R. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
   1. Preparation of substrates.
   2. Required substrate tolerances.
   3. Sequence of installation or erection.
   4. Required installation tolerances.
   5. Required adjustments.
   6. Recommendations for cleaning and protection.

S. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
   1. Name, address, and telephone number of factory-authorized service representative making report.
   2. Statement on condition of substrates and their acceptability for installation of product.
   3. Statement that products at Project site comply with requirements.
   4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
   5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
   6. Statement whether conditions, products, and installation will affect warranty.
   7. Other required items indicated in individual Specification Sections.

T. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

U. Progress Photographs
   1. Provide photographs documenting the site and construction throughout the progress of the Work. Photographs shall be taken by an experienced photographer acceptable to the Architect Engineer.
   2. In addition to periodic, recurring views, photograph the following milestones:
      a. Completion of site clearing.
      b. Excavations in progress.
      c. Foundations in progress and upon completion.
      d. Structural framing in progress and upon completion.
      e. Building enclosure upon completion.
      f. Final completion, minimum of ten (10) photos.
   3. Views:
      a. Provide aerial photographs from four cardinal views at each specified time, until structure is enclosed.
      b. Provide non-aerial photographs from four cardinal views at each specified time, until Date of Substantial Completion.
      c. Consult with Architect Engineer for instructions on views required.
      d. Provide factual presentation.
      e. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.
   4. Digital Photographs: Provide high-resolution digital photographs and/or 360-degree image scans captured by an experienced technician. Drone photography is permitted where compliant with FAA Part 107 regulations. Submission of images on CD or similar physical media is not permitted.
      a. Submit all images through the approved project management platform in clearly organized folders.
      b. Minimum image resolution shall be 1920 by 1080 pixels; higher resolution is preferred.
      c. File names shall include date, time, location, and view.
      d. Provide monthly compiled PDF summaries with two (2) to four (4) images per page.

V. Material Safety Data Sheets (MSDSs): Submit Material Safety Data Sheets directly to the Owner. Do not submit MSDSs to the Architect-Engineer.
   1. Architect Engineer will not review submittals that include MSDSs and may return such submittals without action for resubmittal excluding MSDSs.

3.11 DELEGATED DESIGN

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are required of Contractor by the Contract Documents, provide products and systems that comply with the specified performance and design criteria.
   1. If the criteria provided are insufficient to perform the required services or certifications, submit a written request for additional information to the Architect Engineer prior to proceeding.

B. Delegated Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement for each product or system assigned to delegated design. The statement shall be signed and sealed by the responsible design professional, registered in the State in which the Project is located.
   1. The statement shall certify that the products and systems comply with the performance and design criteria in the Contract Documents and shall include a list of applicable codes, loads, assumptions, and other factors used in performing the delegated design services.

3.12 CONTRACTOR'S REVIEW

A. Review each submittal and check for coordination with other Work of the Project and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect Engineer.

B. Coordinate submittals with the Project Construction Schedule.

C. Do not indicate "By Others," or words to that effect. Coordinate to indicate the Work of the appropriate trade(s).

D. Approval Stamp: Stamp each submittal with the approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

E. Log each submittal and review for coordination with other Work of the Project and the Project Schedule. Mark with submittal received date stamp before transmitting to Architect Engineer.

F. Coordinate submittals with the Project Construction Schedule. When submittals indicate "By Others," or words to that effect, annotate the submittal to indicate the Work of the appropriate trade(s).

G. Deliver submittals promptly to Architect Engineer.

H. Received submittals returned from Architect Engineer.

I. Revise and maintain the Project Construction Schedule as required when resubmittals are required.

3.13 ARCHITECT ENGINEER'S ACTION

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

B. Action Submittals: Architect Engineer will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
   1. "No Exceptions Taken".
   2. "Make Corrections Noted".
   3. "Revise and Resubmit".
   4. "Not accepted, see Comments".

C. Informational Submittals: Architect Engineer will review each submittal and will not return it, or may return it if it does not comply with requirements.
   1. Architect Engineer will forward each submittal to appropriate party.

D. Partial submittals are not acceptable, will be considered nonresponsive, and may be returned without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

3.14 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Consent of Surety.

B. Submit Correction Punch List for Substantial Completion.

C. Submit Final Correction Punch List for Substantial Completion.

D. See Section 01 78 00 - Closeout Submittals for additional project record documents requirements.

E. When the following are specified in individual sections, submit them at project closeout:
   1. Project record documents.
   2. Operation and maintenance data.

3. Warranties.
4. Bonds.
5. Other types as indicated.

F. Submit for Owner's benefit during and after project completion.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 01 32 16
CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preliminary schedule.

B. Construction progress schedule, bar chart type.

1.02 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary: Coordination and Work sequence.

1.03 REFERENCE STANDARDS

A. AGC (CPSM) - Construction Planning and Scheduling Manual; 2004.

1.04 SUBMITTALS

A. Within 10 days after date established in Notice to Proceed, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Within 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.

D. Within 10 days after joint review, submit complete schedule.

E. Submit updated schedule with each Application for Payment.

F. Submit under transmittal letter form specified in Section 01 30 00 - Administrative Requirements.

1.05 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 22 x 17 inches or width required.

C. Scale and Spacing: To allow for notations and revisions.

D. Programs: Use MS Project for project schedule.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

A. Prepare preliminary critical path schedule in the form of a Gantt Chart.

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 stages and other logically grouped activities.

D. Provide sub-schedules to define critical portions of the entire schedule.

E. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

F. Provide separate schedule of submittal dates for shop drawings, product data, and samples, and dates reviewed submittals will be required from Architect Engineer. Indicate decision dates for selection of finishes.

G. Coordinate content with schedule of values specified in Section 01 20 00 - Price and Payment Procedures.

H. Provide legend for symbols and abbreviations used.

3.03 BAR CHARTS

A. Include a separate bar for each major portion of Work or operation.

B. Identify the first work day of each week.

3.04 REVIEW AND EVALUATION OF SCHEDULE

A. Participate in joint review and evaluation of schedule with Architect Engineer 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 Engineer, Owner, and other concerned parties.

B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

END OF SECTION

SECTION 01 35 53
SECURITY PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Security measures including entry control and miscellaneous restrictions.

1.02 RELATED REQUIREMENTS

A. Section 01 50 00 - Temporary Facilities and Controls: Temporary lighting.

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 directed by Architect Engineer.

D. Allow any Federal, State or Local inspector, acting in their official capacity, access to the project site.

1.04 ENTRY CONTROL

A. Restrict entrance of persons and vehicles into Project site.

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.

E. Coordinate access of Owner's personnel to site in coordination with Owner's security forces.

1.05 RESTRICTIONS

A. Do no work on Sundays.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittals.

B. Quality assurance.

C. References and standards.

D. Testing and inspection services other than Code required special testing and inspections.

E. Control of installation.

F. Manufacturers' field services.

G. Defect assessment.

1.02 RELATED REQUIREMENTS

A. Document 00 72 00 - General Conditions: Inspections and approvals required by public authorities.

B. Section 01 30 00 - Administrative Requirements: Submittal procedures.

C. Section 01 60 00 - Product Requirements: Requirements for material and product quality.

1.03 REFERENCE STANDARDS

A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008 (Reapproved 2019).

B. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation; 2017.

C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2019.

D. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2019.

E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2021.

F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2021.

G. ASTM E699 - Standard Specification for Agencies Involved in Testing, Quality Assurance, and Evaluating of Manufactured Building Components; 2016.

H. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2025.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Design Data: Submit for Architect Engineer's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.

C. Test Reports: After each test/inspection, promptly submit copies of report to Architect Engineer and to Contractor.
   1. Test report submittals are for Architect Engineer's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.

D. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect Engineer, in quantities specified for Product Data.

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 Architect Engineer.

E. Manufacturer's Instructions: When specified in individual specification sections, submit published 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 Architect Engineer's benefit as contract administrator or for Owner.
1. Submit report within 30 days of observation to Architect Engineer for information.
2. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.

1.05 QUALITY ASSURANCE

A. Testing Agency Qualifications:
1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
3. Qualification Statement: Provide documentation showing testing laboratory is accredited under IAS AC89.

1.06 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 Engineer before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect Engineer shall be altered from Contract Documents by mention or inference otherwise in any reference document.

1.07 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Contractor shall employ and pay for services of an independent testing agency to perform other specified testing and inspection, and as required for Contractor's own quality control.

B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

C. Contractor Employed Agency:
1. Testing agency: Comply with requirements of ASTM E329, ASTM E543, ASTM E699, ASTM C1021, ASTM C1077, ASTM C1093, and ASTM D3740.
2. Inspection agency: Comply with requirements of ASTM D3740 and ASTM E329.
3. Laboratory: Authorized to operate in the State in which the Project is located.

4. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.
5. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.

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 Engineer 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 TESTING AND INSPECTION

A. See individual specification sections for other testing and inspection required.

B. 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.

C. Contractor Responsibilities:
   1. 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.
   2. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

D. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect Engineer.

E. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.03 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 as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to Architect Engineer 30 days in advance of required observations.
   1. Observer subject to approval of Architect Engineer.

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.04 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not complying with specified requirements.

END OF SECTION

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary sanitary facilities.

B. Temporary Controls: Barriers and enclosures.

C. Security requirements.

D. Vehicular access and parking.

E. Waste removal facilities and services.

1.02 RELATED REQUIREMENTS

A. Section 01 51 00 - Temporary Utilities.

1.03 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026a.

B. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2023.

1.04 TEMPORARY SANITARY FACILITIES

A. Use of existing facilities is permitted.

B. Maintain daily in clean and sanitary condition.

C. At end of construction, return facilities to same or better condition as originally found.

1.05 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. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.06 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 reinforced polyethylene sheet materials with closed joints and sealed edges at intersections with existing surfaces:
   1. STC rating of 35 in accordance with ASTM E90.
   2. Maximum flame spread rating of 75 in accordance with ASTM E84.

C. Paint surfaces exposed to view from Owner-occupied areas.

1.07 SECURITY

A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

1.08 VEHICULAR ACCESS AND PARKING

A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.

B. Coordinate access and haul routes with governing authorities and Owner.

C. Provide and maintain access to fire hydrants, free of obstructions.

D. Provide means of removing mud from vehicle wheels before entering streets.

E. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

F. Existing parking areaslocated at areas designated by Owner may be used for construction parking.

1.09 WASTE REMOVAL

A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

B. Provide containers with lids. Remove trash from site periodically.

C. 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.

D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.10 FIELD OFFICES

A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture, drawing rack, and drawing display table.

1.11 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.

B. Clean and repair damage caused by installation or use of temporary work.

C. Restore existing facilities used during construction to original condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 55 00
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.

PART 2 PRODUCTS

2.01 MATERIALS

A. Materials for Permanent Construction: As specified in product specification sections, including earthwork, paving base, and topping.

2.02 SIGNS, SIGNALS, AND DEVICES

A. Post Mounted and Wall Mounted Traffic Control and Informational Signs: Specified in Section 01 58 13 - Temporary Project Signage.

B. Traffic Cones and Drums, Flares and Lights: As approved by local jurisdictions.

C. 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 designated existing on-site streets and driveways for construction traffic is permitted.

B. Tracked vehicles not allowed on paved areas.

C. Extend and relocate as work progress requires, provide detours as necessary for unimpeded traffic flow.

D. Location as approved by Architect Engineer.

E. Provide unimpeded access for emergency vehicles. Maintain 20 foot width driveways with turning space between and around combustible materials.

F. Provide and maintain access to fire hydrants free of obstructions.

3.03 PARKING

A. Use of existing parking facilities by construction personnel is not permitted.

B. Use of new parking facilities by construction personnel is not 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 Engineer.

3.04 PERMANENT PAVEMENTS AND PARKING FACILITIES

A. 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. 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. Confine construction traffic to designated haul routes.

B. 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.

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 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. Repair existing facilities damaged by use, to original condition.

B. Remove equipment and devices when no longer required.

C. Repair damage caused by installation.

3.12 MUD FROM SITE VEHICLES

A. Provide means of removing mud from vehicle wheels before entering streets.

END OF SECTION

SECTION 01 58 13
TEMPORARY PROJECT SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project identification sign.

B. Project informational signs.

1.02 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.

1.03 SUBMITTALS

A. See Section 01 30 00 - 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. Lettering: As stated in EDA Site Sign Specifications.

2.02 PROJECT IDENTIFICATION SIGN

A. Content: Include the following in addition to requirement stated in EDA Site Sign Specifications:
   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 Engineer and Consultants.
   4. Name of Prime Contractor and major Subcontractors.

2.03 PROJECT INFORMATIONAL SIGNS

A. Painted informational signs of same colors and lettering as Project Identification sign, or standard products; size lettering to provide legibility at 100 foot distance.

B. Provide at each field office, storage shed , and directional signs to direct traffic into and within site. Relocate as Work progress requires.

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.

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

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General product requirements.

B. Transportation, handling, storage and protection.

C. Product option requirements.

D. Substitution limitations.

E. Procedures for Owner-supplied products.

F. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

A. Section 01 40 00 - Quality Requirements: Product quality monitoring.

B. Section 01 60 01 - Substitution Request Form.

C. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions: Requirements for VOC-restricted product categories.

D. Section 23 05 13 - Common Motor Requirements for HVAC Equipment: Motors for HVAC equipment.

1.03 REFERENCE STANDARDS

A. NEMA MG 00001 - Motors and Generators; 2024.

B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. Submit within 15 days after date of Agreement.
   2. For products specified only by reference standards, list applicable reference standards.

B. 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.

C. 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.

D. 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.

E. Indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

PART 2 PRODUCTS

2.01 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 outside the United States, its territories, Canada, or Mexico, unless specified in specifications, on Finish Schedule, or on drawings.

2. Made using or containing CFC's or HCFC's.
3. 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 01 61 16.
2. If wet-applied, have lower VOC content, as defined in Section 01 61 16.

D. Provide interchangeable components by the same manufacture for components being replaced.

E. Motors: Refer to Section 23 05 13 - Common Motor Requirements for HVAC Equipment, NEMA MG 00001 Type. Specific motor type is specified in individual specification sections.

F. 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.

G. 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.

2.02 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 and "No Substitutes" indicated: 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 or without a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

D. Products indicated in the color and finish schedules or drawing notes; including color, shade, hue, translucence, opacity, pattern, or texture; establish the Basis of Design. Use the Basis of Design. Submit a request for substitution for any product not indicated.

2.03 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

A. Submit substitution requests by completing the form in Section 01 60 01 - Substitution Request Form. Use only this form; other forms of submission are unacceptable.
1. Submit one electronic pdf file of request for substitution for consideration. Limit each request to one proposed substitution.

B. Architect Engineer will consider requests for substitutions only within 30 days after date of Agreement.

C. Basis of Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications may additionally indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. For approval of products by unnamed manufacturers, complete the form in Section 01 60 01 - Substitution Request Form.

D. Substitutions will not be considered for finishes and colors unless all finishes and colors are coordinated and submitted together.

E. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

F. A request for substitution constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
   2. 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 Engineer for review or redesign services associated with re-approval by authorities.

G. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

H. Substitution Submittal Procedure (after contract award):
   1. Submit substitution requests by completing the form in Section 01 60 01 - Substitution Request Form. Use only this form; other forms of submission are unacceptable.
   2. Submit one electronic pdf file of request for substitution for consideration. Limit each request to one proposed substitution.
   3. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
   4. Architect Engineer will notify Contractor in writing of decision to accept or reject request.

3.02 OWNER-SUPPLIED PRODUCTS

A. 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.

B. 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.

3.03 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.

3.04 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in 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 bonded 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

SECTION 01 60 01
SUBSTITUTION REQUEST FORM

NOTE: THIS FORM IS FOR SUBSTITUTION REQUESTS ONLY. IT IS NOT A PRODUCT SUBMITTAL. DO NOT SUBMIT SHOP DRAWINGS FOR REVIEW UNTIL THIS SUBSTITUTION IS FORMALLY APPROVED.

TO: CROMWELL ARCHITECTS ENGINEERS (THROUGH A PRIME BIDDER OR TRADE CONTRACTOR)

ATTENTION: _____ DATE: _____

SECTION: _____ PARAGRAPH: _____

SPECIFIED ITEM: _____

PROPOSED SUBSTITUTE: _____

REASON FOR SUBSTITUTION:

SPECIFIED PRODUCT

☐ Is no longer available

☐ Is unable to meet Project schedule

☐ Is unsuitable for the designated application

☐ Cannot interface with adjacent materials

☐ Is not compatible with adjacent materials

☐ Cannot provide the specified warranty

☐ Cannot be constructed as indicated

PROPOSED PRODUCT

☐ Will reduce construction time

☐ Will result in cost savings of $ _____ to the Project

☐ Is for supplier's convenience

☐ Is for Subcontractor's convenience

☐ Other: _____

FILL IN THE BLANKS BELOW

Will the substitution affect dimensions indicated on the Drawings?

☐ Yes ☐ No

Will the substitution affect wiring, piping, ductwork, or other systems indicated on the Drawings?

☐ Yes ☐ No

Explain: _____

Are there differences between the proposed substitution and the specified item?

☐ Yes ☐ No

Explain: _____

What effect will the substitution have on other trade Contractors?

Explain: _____

If required, will the undersigned pay the Architect-Engineer's costs to revise Working Drawings caused by the substitution?

☐ Yes ☐ No

Manufacturer's warranties for the specified item and the proposed item are:

☐ Same ☐ Different

Explain: _____

Savings associated with accepting the substitution: $ _____

Lead Time for specified item: _____

Lead Time for proposed item: _____

Proposed change in Contract Time:

☐ Yes ☐ No ☐ Add ☐ Deduct _____ Days

CERTIFICATION STATEMENT

By signing below, the undersigned certifies that the information provided is accurate and complete; that the proposed substitution complies with the intent of the Contract Documents; and that all required supporting documentation has been included. The undersigned acknowledges that this request is not a submittal and that no procurement, fabrication, or installation shall proceed until written approval is issued by Addendum or other official Contract modification. Incomplete or poorly organized submissions may be rejected without further review. The burden of proof rests with the proposer.

ATTACHMENTS

☐ Side-by-side product comparison

☐ Product Data for specified product and proposed substitute

☐ Other supporting documentation and test data

SUBMITTED BY

☐ Prime Contractor ☐ Subcontractor ☐ Supplier

Firm: _____

Name: _____

Title: _____

Address: _____

Telephone: _____ Email: _____

Signature: _____ Date: _____

BELOW FOR ARCHITECT ENGINEER USE ONLY

REVIEW COMMENTS

☐ Incomplete Information Remarks:

☐ Substitution is Accepted _____

☐ Not Approved _____

☐ Received Too Late _____

☐ Resubmit Substitution Request _____

Architect has relied upon the information provided by the Contractor, and makes no claim as to the accuracy, completeness, or validity of such information. If an accepted substitution is later found to be not in compliance with the Contract Documents, Contractor shall provide the original specified product.

Reviewed By: _____ Date: _____

Firm: _____ Signature: _____

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 01 61 16
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 01 30 00 - Administrative Requirements: Submittal procedures.

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.

B. VOC-Content-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.

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; Current Edition.

B. ASTM D3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings; 2005 (Reapproved 2018).

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; 2017.

D. CARB (ATCM) - Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products; Current Edition.

E. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board; 2020.

F. CHPS (HPPD) - High Performance Products Database; Current Edition.

G. CRI (GLP) - Green Label Plus Testing Program - Certified Products; Current Edition.
H. SCAQMD 1113 - Architectural Coatings; 1977, with Amendment (2016).
I. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2022).
J. SCS (CPD) - SCS Certified Products; Current Edition.
K. UL (GGG) - GREENGUARD Gold Certified Products; Current Edition.

1.05 SUBMITTALS

A. See Section 01 30 00 - 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.
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. 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. Joint Sealants: SCAQMD 1168 Rule.
3. Paints and Coatings: Each color; most stringent of the following:
   a. 40 CFR 59, Subpart D.
   b. SCAQMD 1113 Rule.
   c. CARB (SCM).
4. Wet-Applied Roofing and Waterproofing: Comply with requirements for paints and coatings.

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

This page was intentionally left blank for duplex printing.

SECTION 01 70 00
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.

J. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary: Limitations on working in existing building; continued occupancy.

B. Section 01 30 00 - Administrative Requirements: Submittals procedures.

C. Section 01 40 00 - Quality Requirements: Testing and inspection procedures.

D. Section 01 51 00 - Temporary Utilities: Temporary heating, cooling, and ventilating facilities.

E. Section 01 78 00 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.

F. Section 01 79 00 - Demonstration and Training: Demonstration of products and systems to be commissioned and where indicated in specific specification sections

G. Section 02 41 00 - Demolition: Demolition of whole structures and parts thereof; site utility demolition.

H. 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 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Survey work: Submit name, address, and telephone number of Surveyor or Engineer before starting survey work.
   1. On request, submit documentation verifying accuracy of survey work.
   2. Submit a copy of site drawing signed by the Land Surveyor or Engineer, that the elevations and locations of the work are in conformance with Contract Documents.
   3. Submit surveys and survey logs for the project record.

C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
   1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences. Include design drawings and calculations for bracing and shoring.
   2. Identify demolition firm and submit qualifications.
   3. Include a summary of safety procedures.

D. Cutting and Patching: Submit written request 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.
6. Include in request:
    a. Identification of Project.
    b. Location and description of affected work.
    c. Necessity for cutting or alteration.
    d. Description of proposed work and products to be used.
    e. Effect on work of Owner or separate Contractor.
    f. Written permission of affected separate Contractor.
    g. Date and time work will be executed.

E. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.04 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 in which the Project is located and acceptable to Architect Engineer. 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 in which the Project is located. 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 in which the Project is located.

1.05 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.

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.

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.

G. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.

H. Pest 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.

1.06 COORDINATION

A. 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.

B. Notify affected utility companies and comply with their requirements.

C. 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.

D. 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.

E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

F. Coordinate completion and clean-up of work of separate sections.

G. 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 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 STRUCTURAL WORK

A. Do not cut-and-patch structural work in a manner resulting in a reduction of load-carrying capacity or load/deflection ratio. Submit proposal and request and obtain Architect Engineer's approval before proceeding with cut-and-patch of structural work.

3.02 VISUAL/QUALITY LIMITATIONS

A. Do not cut-and-patch work exposed to view, exterior and interior, in a manner resulting in noticeable reduction of visual qualities and similar qualities, as judged by Architect Engineer.

B. Engage the original installer/fabricator or, if not available, an acceptable equivalent entity, to perform cutting and patching.

C. Refinish entire surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection. For an assembly, refinish the entire unit.

3.03 LIMITATION ON APPROVALS

A. Architect Engineer's approval to proceed with cutting and patching does not waive right to later require removal/replacement of work found to be cut-and-patched in an unsatisfactory manner, as judged by Architect Engineer.

3.04 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.

3.05 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.

3.06 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 Engineer 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 two copies to Architect Engineer, Owner, participants, and those affected by decisions made.

3.07 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Architect Engineer of any discrepancies discovered.

C. Contractor shall locate and protect survey control and reference points.

D. Control datum for survey is that indicated on drawings.

E. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

F. Promptly report to Architect Engineer 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 Engineer.

H. Utilize recognized engineering survey practices.

I. Establish a minimum of two permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on project record documents.

J. 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.

K. Periodically verify layouts by same means.

L. Maintain a complete and accurate log of control and survey work as it progresses.

M. On completion of foundation walls and major site improvements, prepare a certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.

3.08 GENERAL INSTALLATION REQUIREMENTS

A. 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.

B. Accomplish the Work, including products, equipment, and systems; complete and functional; ready for operation.

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.

3.09 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. 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.

C. Execute work by methods to avoid damage to other work, and which will provide appropriate surfaces to receive patching and finishing. At in place work (new or existing), minimize damage and restore to original or specified condition.

D. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

E. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

F. Restore work with new products in accordance with requirements of Contract Documents.

G. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

H. 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.

3.10 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 and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.11 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. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.12 STARTING EQUIPMENT AND SYSTEMS

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Architect Engineer 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.

3.13 DEMONSTRATION AND INSTRUCTION

A. See Section 01 79 00 - Demonstration and Training.

3.14 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

B. Testing, adjusting, and balancing HVAC systems: See Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC.

3.15 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.

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. Clean 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.

3.16 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.
   1. Provide copies to Architect Engineer 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 Architect Engineer when work is considered ready for Architect Engineer's 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 Engineer's Substantial Completion inspection.

E. Owner will occupy all of the building as specified in Section 01 10 00.

F. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect Engineer's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect Engineer.

G. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

H. Notify Architect Engineer when work is considered finally complete and ready for Architect Engineer's Substantial Completion final inspection.

I. Complete items of work determined by Architect Engineer listed in executed Certificate of Substantial Completion.

3.17 MAINTENANCE

A. Provide service and maintenance of components indicated in specification sections.

B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.

C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION

SECTION 01 78 00
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project record documents.

B. Operation and maintenance data.

C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

A. Section 00 72 00 - General Conditions: Performance bond and labor and material payment bonds, warranty, and correction of work.

B. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

C. Section 01 70 00 - Execution and Closeout Requirements: Contract closeout procedures.

D. Individual Product Sections: Specific requirements for operation and maintenance data.

E. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

A. Project Record Documents: Submit documents to Architect Engineer including Consent of Surety with claim for final Application for Payment.

B. Operation and Maintenance Data:
   1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect Engineer will review draft and return one copy with comments.
   2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect Engineer comments. Revise content of all document sets as required prior to final submission.
   4. Submit two sets of revised final documents in final form within 10 days after final inspection.

C. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
   2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 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. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Addenda.
   3. Change Orders and other modifications to the Contract.

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. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Field changes of dimension and detail.
   2. 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 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble Operation and Maintenance (O&M) data into durable manuals for for use by the Owner’s personnel. Arrange data in the same sequence as, and clearly identified by, the applicable Specification Sections.

B. Where systems involve more than one Specification Section, provide separate tabbed divider for each system.

C. Project Directory: Include project title and address; names, addresses, telephone numbers, and email addresses of the Architect Engineer, Consultants, Contractorand subcontractors, including identification of responsible parties.

D. Tables of Contents: List every item included in the manual using the same identification as the corresponding file name.

E. Drawings: Identify drawings with file names consistent with the Table of Contents and include corresponding bookmarks.

F. Arrangement of Contents: Organize each manual in the following order and provide corresponding bookmarks for ease of navigation:
   1. Project Directory.
   2. Table of Contents
   3. Operation and Maintenance Data, arranged by system and then by product category, including:
      a. Source data.
      b. Operation and maintenance instructions.
      c. Field quality control data.
      d. Copies of warranties and bonds.
   4. Design Data, allowing for inclusion of design data furnished by the Architect-Engineer or others.

G. Transmission: Transmit Operation and Maintenance (O&M) Manuals in accordance with procedures specified in Section 01 30 00.

3.06 WARRANTIES AND BONDS

A. Obtain 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 warranty and bond documents are properly executed, complete, and notarized.

C. Co-execute submittals where required.

D. Retain warranties and applicable bonds until the time specified for submittal.

E. Manual: Assemble warranties and bonds in the same manner as Operation and Maintenance Manuals.

F. Table of Contents: Provide a neatly typed Table of Contents organized in the same sequence as the Project Manual. Identify each item by the number and title of the applicable Specification Section and by the name of the product or Work item.

G. Separate each warranty and applicable bond into individual files corresponding to the Table of Contents. Include complete information and list the Subcontractor, supplier, and manufacturer, including name, address, and telephone number of the responsible principal.

END OF SECTION

SECTION 01 79 00
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. Items specified in individual product Sections.

C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
   1. Roofing, waterproofing, and other weather-exposed or moisture protection products.
   2. Finishes, including flooring, wall finishes, ceiling finishes.
   3. Fixtures and fittings.
   4. Items specified in individual product Sections.

1.02 RELATED REQUIREMENTS

A. Section 01 78 00 - Closeout Submittals: Operation and maintenance manuals.

B. Other Specification Sections: Additional requirements for demonstration and training.

1.03 SUBMITTALS

A. See Section 01 30 00 - 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. Submit to Architect Engineer for transmittal to Owner.
   2. Submit not less than four weeks prior to start of training.
   3. Revise and resubmit until acceptable.
   4. Provide an overall schedule showing all training sessions.
   5. Include at least the following 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 by 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.

D. Training Reports:
   1. Identification of each training session, date, time, and duration.
   2. Sign-in sheet showing names and job titles of attendees.

E. Video Recordings: Submit digital video recording of each demonstration and training session for Owner's subsequent use.
   1. Format: Thumb drive.
   2. Label each thumb drive and container with session identification and date.

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 two weeks 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 two weeks prior to 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

This page was intentionally left blank for duplex printing.

SECTION 02 41 00
DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Selective demolition of building elements for alteration purposes.

1.02 RELATED REQUIREMENTS

A. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

B. Section 01 70 00 - Execution and Closeout Requirements: Project conditions; and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

1.03 REFERENCE STANDARDS

A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2022, with Errata (2021).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Site Plan: Indicate:
   1. Areas for temporary construction and field offices.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Comply with applicable requirements of NFPA 241.
   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. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   6. Do not close or obstruct roadways or sidewalks without permits from authority having jurisdiction.
   7. Conduct operations to minimize obstruction of public and private entrances and exits. Do not obstruct required exits at any time. Protect persons using entrances and exits from removal operations.
   8. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon, or limit access to their property.

B. Do not begin removal until receipt of notification to proceed from Owner.

C. 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.

D. Hazardous Materials:
   1. If hazardous materials are discovered during removal operations, stop work and notify Architect Engineer and Owner; hazardous materials include regulated asbestos containing materials, lead, PCBs, and mercury.

3.02 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 Engineer before disturbing existing installation.
   3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Separate areas in which demolition is being conducted from areas that remain occupied.
   1. Provide, erect, and maintain temporary dustproof partitions of construction indicated on drawings in locations indicated on drawings.
   2. Provide sound retardant partitions of construction and in locations indicated on drawings.

C. Maintain weatherproof exterior building enclosure, except for interruptions required for replacement or modifications; prevent water and humidity damage.

D. Remove existing work as indicated and required to accomplish new work.
   1. Remove items indicated on drawings.

E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, Telecommunications, and Water and Sewer): 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. Verify that abandoned services serve only abandoned facilities before removal.
   4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings. Remove back to source of supply where possible, otherwise cap stub and tag with identification.

F. Protect existing work to remain.
   1. Prevent movement of structure. Provide shoring and bracing 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.

3.03 DEBRIS AND WASTE REMOVAL

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

SECTION 04 26 13
MASONRY VENEER

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Clay facing brick.

B. Mortar and grout.

C. Reinforcement and anchorage.

D. Flashings.

E. Installation of lintels.

F. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 05 50 00 - Metal Fabrications: Loose steel lintels.

B. Section 07 92 00 - Joint Sealants: Sealing control and expansion joints.

1.03 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

B. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2018a.

C. ASTM C90 - Standard Specification for Dry-Cast Loadbearing Concrete Masonry Units; 2024a.

D. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.

E. ASTM C150/C150M - Standard Specification for Portland Cement; 2024.

F. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2018.

G. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale); 2024.

H. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019.

I. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.

J. ASTM C1714/C1714M - Standard Specification for Preblended Dry Mortar Mix for Unit Masonry; 2019a.

K. ASTM C1714/C1714M - Standard specification for preblended dry mortar mix for unit masonry; 2019.

L. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls; 2005.

M. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for masonry units, fabricated wire reinforcement, and mortar.

C. Samples: Submit four samples of decorative block units to illustrate color, texture, and extremes of color range.

D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

1.06 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

B. Use water repellent admixtures for masonry units, mortar and grout by a single manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

B. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos. Site batching of individual components is prohibited.

PART 2 PRODUCTS

2.01 BRICK UNITS

A. Facing Brick: ASTM C216, Type FBS Smooth, Grade SW.
   1. Color and Texture: Match existing - field verify.
   2. Nominal Size: Match existing - field verify.

2.02 MORTAR AND GROUT MATERIALS

A. Masonry Cement: Not permitted.

B. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.

C. Hydrated Lime: ASTM C207, Type S.

D. Mortar Aggregate: ASTM C144.

E. Grout Aggregate: ASTM C404.

F. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.

G. Water: Clean and potable.

H. Accelerating Admixture: Nonchloride type for use in cold weather.

I. Moisture-Resistant Admixture: Water repellent compound designed to reduce capillarity.

J. Use of antifreeze type material with mortar is not allowed.

2.03 REINFORCEMENT AND ANCHORAGE

A. Masonry Veneer Anchors:
   1. For anchoring brick veneer to metal stud, masonry, concrete or wood backups when there is NO insulation or little potential for wallboard deterioration.
      a. This anchor should not to be installed on top of insulation.
      b. Wire: Carbon steel, cold-drawn steel wire conforming to ASTM A1064/A1064M; tensile strength of 80,000 psi; zinc coated hot-dipped galvanized after fabrication per ASTM A153/A153M.
      c. Product: Hohmann & Barnard, Inc.; DW-10HS Veneer Anchor: www.h-b.com.

B. Metal-to-Metal Fasteners: Self-drilling, self-tapping screws; corrosion resistant finish or hot dip galvanized to ASTM A153/A153M.

2.04 FLASHINGS

A. Metal Flashing and Termination Bar:
   1. Flashing: Through-wall, self adhering, 40-mil thick, non-asphalt composite membrane flashing.
      a. Product: Hohmann & Barnard, Inc.; TeXtroflash Flashing: www.h-b.com
   2. Termination Bar: Provide at top of flashing to mechanically secure flashing to backup.

a. Product: Hohmann & Barnard, Inc.; T1 - Termination Bar: www.h-b.com

B. Metal Drip Plate: 26 gauge stainless steel with factory-formed hemmed edge.
1. Product: Hohmann & Barnard, Inc.; DP Series Drip Plates: www.h-b.com

2.05 ACCESSORIES

A. Backer Rods at Control Joints/Expansion Joints: Closed-cell polyethylene foam material; non-absorbent compressible backup.
1. Product: Hohmann & Barnard, Inc.; Standard Backer Rod: www.h-b.com

B. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self expanding; in maximum lengths available.

C. Weep Holes/Vents: Molded PVC grilles, insect resistant; color to match mortar.
1. Product: Hohmann & Barnard, Inc.; QV - Quadro-Vent: www.h-b.com

D. Cavity Mortar Control: Semi-rigid polyethylene panels or polyester mesh fabric netting, sized to thickness of wall cavity; designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage. See drawings for details.
1. Product: Hohmann & Barnard, Inc.; Mortar Trap: www.h-b.com

E. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials. Submit what cleaning agent is recommended for use by masonry manufacturer during submittal process. Use only recommended cleaning agents.

2.06 MORTAR AND GROUT MIXING

A. Mortar for Masonry Veneer: ASTM C270, Property Specification.
1. Masonry below grade and in contact with earth; Type S.
2. Exterior, non-loadbearing masonry; Type N.
3. Site batching of individual components is prohibited.

B. Preblended Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix conforming to ASTM C270 and ASTM C1714/C1714M.
1. Product: Spec Mix LLC; Mortar Cement & Sand Mortar: www.specmix.com

C. Colored Mortar: Proportion selected pigments and other ingredients to match Architect Engineer's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.

D. Grout: ASTM C476; consistency as required to fill volumes completely for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.
1. Product: Spec Mix LLC; Core Fill Grout: www.specmix.com

E. Mixing: Use mechanical batch mixer and comply with referenced standards.

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 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. Brick Units:
1. Mortar Joints: Concave.

3.03 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

B. Lay hollow masonry units with face shell bedding on head and bed joints.

C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

D. Remove excess mortar as work progresses.

E. Interlock intersections and external corners, except for units laid in stack bond.

F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

H. Isolate top joint of masonry veneer from horizontal structural framing members or support angles with compressible joint filler.

3.04 WEEPS/CAVITY VENTS

A. Install weeps in veneer walls at 24 inches on center horizontally on top of through-wall flashing above shelf angles and lintels and at bottom of walls.

B. Install cavity vents in veneer walls at 32 inches on center horizontally below shelf angles and lintels and at top of walls.

C. Match adjoining grout or mortar color.

3.05 CAVITY MORTAR CONTROL

A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.

B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.

C. Install cavity mortar control panels continuously throughout full height of exterior masonry cavities during construction of exterior wythe, complying with manufacturer's installation instructions.
   1. Verify that airspace width is no more than 3/8 inch greater than panel thickness.
   2. Hold cavity mortar control panel tight to face wythe.
   3. Install horizontally between joint reinforcement.
   4. Stagger end joints in adjacent rows.
   5. Fit to perimeter construction and penetrations without voids.

D. Install cavity mortar trap at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

E. If masonry cavities cannot be kept clean, require the use of pull boards.

3.06 REINFORCEMENT AND ANCHORAGE

A. Stud Backup: Secure veneer anchors to stud framed back-up and embed into masonry veneer at maximum 16 inches on center vertically and 16 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.

B. Concrete Wall Backup: Anchor veneer to concrete wall with anchors fitting into dovetail anchor slots in concrete wall. Space anchors at 16 inches on center vertically. Horizontal spacing shall match dovetail anchor slot spacing, 24 inches on center maximum. Where dovetail anchors are not provided or damaged beyond use, provide anchors approved by Architect/Engineer screwed to the wall. Corrugated anchors are not acceptable for use.

3.07 MASONRY FLASHINGS

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.

B. Set drip flashing and counter flashing receptors in mastic with tightly butted, not lapped, joints.

C. Hold the outer edge of membrane flashing 1/2 to 3/4 inch in from the exterior masonry face.

D. Extend membrane flashing 4 to 6 inches above the top of the cavity drainage medium and secure with a termination bar. Seal the top edge.

E. Pan up the ends of through-wall flashing.

F. Support membrane flashing across the cavity with light gauge sheet metal or rigid insulation so it cannot sag into the cavity and hold water.

3.08 LINTELS

A. Galvanized steel for all exposed lintels.

B. Install loose steel lintels over openings, as indicated.

C. Maintain minimum 8 inch bearing on each side of opening.

3.09 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control or expansion joints.

B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

3.10 TOLERANCES

A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

B. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

C. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

D. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

E. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.

3.11 CUTTING AND FITTING

A. Cut and fit for pipes and conduit. 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.

3.12 FIELD QUALITY CONTROL

A. Clay Masonry Unit Tests: Test each variety of clay masonry in accordance with ASTM C67 requirements, sampling 5 randomly chosen units for each 50,000 installed.

B. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C140/C140M for conformance to requirements of this specification.

C. Mortar Tests: Test each type of mortar in accordance with ASTM C780, testing with same frequency as masonry samples.

3.13 CLEANING

A. Remove excess mortar and mortar smears as work progresses.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution recommended by brick manufacturer.

D. Use non-metallic tools in cleaning operations.

3.14 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

SECTION 05 12 00
STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Structural steel framing members.

B. Grouting under base plates.

1.03 REFERENCE STANDARDS

A. ANSI/AISC 360 - Specification for Structural Steel Buildings; American Institute of Steel Construction, Inc.; 2010

B. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges; American Institute of Steel Construction, Inc.; 2010

C. AISC Detailing for Steel Construction, Third Edition; 2009

D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2024.

E. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.

F. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2023.

G. ASTM A563/A563M - Standard Specification for Carbon and Alloy Steel Nuts (Inch and Metric); 2026.

H. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 2021, with Editorial Revision.

I. ASTM A992/A992M - Standard Specification for Structural Steel Shapes; 2020.

J. ASTM A1085 - Standard Specification for Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS); 2013.

K. ASTM E164 - Standard Practice for Contact Ultrasonic Testing of Weldments; 2019.

L. ASTM E165/E165M - Standard Test Method for Liquid Penetrant Examination for General Industry; 2018.

M. ASTM E709 - Standard Guide for Magnetic Particle Testing; 2021.

N. ASTM F436/F436M - Standard Specification for Hardened Steel Washers Inch and Metric Dimensions; 2024.

O. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength; 2020.

P. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.

Q. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2026.

R. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020.

S. RCSC (HSBOLT) - Specification for Structural Joints Using High-Strength Bolts; Research Council on Structural Connections; 2014, with Errata (2015).

T. US Government Department of Labor; Occupational Safety and Health Administration; 29 CFR Part 1926, Safety Standards for Steel Erection.

U. SSPC-SP 3 - Power Tool Cleaning; 2018.

V. Specification for Structural Joints Using High Strength Bolts, Research Council on Structural Connections; 2009.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings:
   1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
   2. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.
   3. Plans shall be at 1/8" = 1'-0" or larger scale.
   4. Contractor shall require the detailer to thoroughly check and back-check all shop drawings before sending for approval, as described in ASIC Detailing for Steel Construction, Chapter 8. Incomplete and/or unchecked shop drawings will be returned without review by the Architect/Engineer.
   5. All shop drawings shall be reviewed and stamped by the general contractor prior to submittal. Shop drawings that have not been reviewed by the Contractor will be returned without review by the Architect/Engineer.
   6. When there are more than 100 sheets of structural steel shop drawings contractor shall submit the shop drawings in sequences so that each of the submittals do not exceed 100 sheets. Divide the sequences to match the erection sequence of the building. Submit the applicable columns, erection plans, and details with each sequence.
   7. Typical details are indicated on the drawings. Details for some special conditions will need to be developed by the detailer during the detailing process. The details will be reviewed during the review process. Final approval of the details will be at the discretion of the engineer of record. No additional charges for making corrections or changes to the shop drawings (redetailing costs) or for miscellaneous fabricated material will be allowed. Steel contractor shall make provisions for detailing corrections and miscellaneous material in the bid price. Adjustments to the contract will only be made for change orders approved prior to the commencement of any action on the changes.

C. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.

D. Mill Test Reports: Indicate structural strength, destructive test analysis and non-destructive test analysis.

E. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

F. Testing and Inspection Laboratory qualifications.

G. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under AISC-Certified Plant Category: BU.

1.05 QUALITY ASSURANCE

A. Fabricate structural steel members in accordance with AISC 303 "Code of Standard Practice for Steel Buildings and Bridges."

B. Fabricator: Fabricator shall be experienced in fabrication of steel similar to the steel required for this project with a minimum of 3 years of documented experience with a record of successful in-service performance as well as sufficient production capacity to fabricate structural steel for this project without delaying the work.

C. Erector: Company specializing in performing the work of this section with minimum 5 years of documented experience.

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

E. Testing and Inspection Agency Qualifications: an independent testing and inspection lab, acceptable to Architect/Engineer, shall perform specified tests and inspections. The testing lab shall be qualified according to ASTM C 1077 and ASTM E 329 for testing indicated as documented according to ASTM E 548. See Section 014533.

PART 2 PRODUCTS

2.01 MATERIALS

A. Steel W Shapes, C Shapes, MC Shapes, and WT Shapes: ASTM A992/A992M.

B. Steel M Shapes, S Shapes, HP Shapes, MT Shapes, ST Shapes, Angles, Plates, and Bars: ASTM A572/A572M Grade 50.

C. Rectangular, Square, and Round Hollow Structural Sections: ASTM A500, Grade C or ASTM A1085

D. Pipe: ASTM A53/A53M, Grade B, Finish black.

E. High-Strength Structural Bolts, Nuts, and Washers: ASTM F3125/F3125M , Grade A325 (A325M), Type 1, medium carbon, plain. Where load indicator bolts are indicated provide twist-off type assemblies conforming to ASTM F3125, Grade F1852.

F. Tension Control Bolts: Twist-off style; ASTM F3125/F3125M, Grade F1852.

G. Unheaded Anchor Rods: ASTM F1554, Grade 36, plain, with matching ASTM A563/A563M nuts and ASTM F436/F436M Type 1 washers.

H. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

I. Shop and Touch-Up Primer: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

J. Touch-Up Primer for Galvanized Surfaces: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

A. Shop fabricate to greatest extent possible. Shop fabrication shall be in accordance with OSHA Safety Standards for Steel Erection.

B. Fabricate connections for bolt, nut, and washer connectors.

C. Develop required camber for members.

2.03 FINISH

A. Prepare structural component surfaces in accordance with SSPC-SP 3.

B. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded, or faying surfaces of a slip critical connection.

C. Galvanize structural steel members, where indicated, to comply with ASTM A123/A123M. Provide minimum 1.7 oz/sq ft galvanized coating.

2.04 SOURCE QUALITY CONTROL

A. High-Strength Bolts: Provide testing and verification of shop-bolted connections in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts.

B. Welded Connections: Visually inspect all shop-welded connections and test 100 percent of welds greater than 5/16" in thickness and all complete penetration welds using one of the following:
   1. Radiographic testing performed in accordance with ASTM E94/E94M.
   2. Ultrasonic testing performed in accordance with ASTM E164.
   3. Liquid penetrant inspection performed in accordance with ASTM E165/E165M.
   4. Magnetic particle inspection performed in accordance with ASTM E709.

C. Charpy V-Notch testing of steel: ASTM A6/A6M hot rolled steel and plates shall be tested in accordance with ASTM A6/A6M, Supplementary Requirement S30, Charpy V-Notch (CVN) Impact Test for Structural Shapes - Alternate Core Location in the following instances:
   1. Typical Steel:
      a. Hot rolled shapes with a flange thickness exceeding 2 inches that are welded with complete-joint penetration groove welds.
      b. Plates exceeding 2 inches in thickness in heavy built up sections subjected to tensile forces.
      c. Plates exceeding 2 inches in thickness that are welded with complete-joint penetration groove welds to the face of other sections.
   2. The impact tests shall meet a minimum average value of 20 ft-lbs (27 J) absorbed energy at +70 degrees Fahrenheit (+20 degrees C).

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.02 ERECTION

A. Erect structural steel in compliance with AISC 303 "Code of Standard Practice for Steel Buildings and Bridges" an in compliance with OSHA Safety Standards for Steel Erection.

B. Allow for erection loads and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.

C. Field weld components and shear studs indicated on drawings.

D. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
   1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
   2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
   3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.
   4. Where welds are exposed in the final construction, make fillet welds oversized and grind to uniform profile with smooth face and transition. Appearance of exposed welds shall be subject to the approval of the Architect.

E. Use carbon steel bolts only for temporary bracing during construction, unless otherwise specifically permitted on drawings. Install high-strength bolts in accordance with RCSC "Specification for Structural Joints Using High-Strength Bolts".

F. Do not field cut or alter structural members without approval of Architect Engineer.

G. After erection, prime welds, abrasions, and surfaces not shop primed.

H. Galvanized Surfaces: After erection of galvanized steel clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780. Use a primer that matches the finish of the galvanizing where the galvanized surface will be exposed in the final construction.

I. Grout solidly between column base plates and bearing surfaces, complying with manufacturer's instructions for nonshrink grout. Use only flowable grout products. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.

J. Shear Stud Connectors: Fusion weld studs to plates or beams with a stud welding gun in accordance with Chapter 7 of AWS D1.1. Do not fillet weld studs.

K. Deformed Bar Anchors: Fusion weld anchors to plates with a stud welding gun in accordance with Chapter 7 of AWS D1.1. Do not fillet weld deformed bar anchors.

3.03 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

3.04 FIELD QUALITY CONTROL

A. An independent testing agency acceptable to the Architect/Engineer shall perform field quality control tests.

B. High-Strength Bolts: Provide testing and verification of field-bolted connections in accordance with RCSC "Specification for Structural Joints Using High-Strength Bolts".

C. Welded Connections: Visually inspect all field-welded connections and test field-welded connections as indicated in the Schedule of Special Inspections by Ultrasonic testing (UT) performed in accordance with ASTM E164.

D. Welds that fail testing shall be repaired and retested at contractor's expense. If a weld fails testing all previous untested similar welds by the same welder shall be tested.

E. High Strength Blind Bolted Connections: Visually inspect all high strength blind bolted connections.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 05 50 00
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated steel and aluminum items.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2024.

C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.

D. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

E. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

F. 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; 2025a.

G. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2026.

H. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020.

I. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; 2018.

J. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).

K. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

L. SSPC-SP 2 - Hand Tool Cleaning; 2018.

1.04 SUBMITTALS

A. See Section 01 30 00 - 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.

C. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

D. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Steel Sections: ASTM A992 Grade 50 or ASTM A572 Grade 50.

B. Hollow Steel Sections: ASTM A500 Grade C or ASTM A1085.

C. Plates: ASTM A570 Grade 50.

D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.

E. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.

F. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

H. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 MATERIALS - ALUMINUM

A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

B. Bolts, Nuts, and Washers: Stainless steel.

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. 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.

D. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

E. 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. Lintels: As detailed; prime paint finish.

2.05 FINISHES - STEEL

A. Prime paint steel items.
   1. Exceptions: Galvanize items to be embedded in concrete, items to be embedded in masonry, and items specified for galvanized finish.
   2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.

B. Prepare surfaces to be primed in accordance with SSPC-SP2.

C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

D. Prime Painting: One coat.

E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.

F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

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.

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. Field weld components as indicated on drawings.

D. Perform field welding in accordance with AWS D1.1/D1.1M.

E. Obtain approval prior to site cutting or making adjustments not scheduled.

F. After erection, prime welds, abrasions, and surfaces not shop primed , except surfaces to be in contact with concrete.

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

This page was intentionally left blank for duplex printing.

SECTION 05 70 00
DECORATIVE METAL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Decorative metal dimensional divider units.

1.02 RELATED REQUIREMENTS

A. Section 09 21 16 - Gypsum Board Assemblies: Placement of backing plates in stud wall construction.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's product data, including description of materials, components, finishes, fabrication details, anchors, and accessories.

B. Shop Drawings: Indicate elevations and sections, details of profile, dimensions, sizes, connection attachments, anchorage, size and type of fasteners, and accessories. Indicate anchor and joint locations, brazed connections, transitions, and terminations.

C. Installer's qualification statement.

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.

B. Installer Qualifications:
   1. Installer specialized in work of type specified with at least three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in factory-provided protective coverings and packaging.

B. Protect materials against damage during transit, delivery, storage, and installation at site.

C. Inspect materials for damage upon delivery. Replace damaged and unrepairable materials. Ensure replacement materials are indistinguishable from undamaged parts and finishes.

D. Prior to installation, store materials and components under cover in a dry location.

PART 2 PRODUCTS

2.01 DECORATIVE METAL UNITS

A. Dimensional Dividers: Factory-fabricated, laser-cut decorative aluminum panels and frame.
   1. Configuration: As indicated on drawings.
   2. Panel Size: 4 by 8 foot.
   3. Material: 3/16 inch laser cut aluminum.
   4. Finish/Pattern: As indicated on drawings.
      a. Provide "rotated" design of front and back panels for dimensional look.
   5. Mounting/Support:
      a. Frame: Rigid welded frame; anchored floor to ceiling.
      b. Pre-Mounted Channels: U-channels attach panels with visible fasteners.
   6. Products:
      a. Moz Designs Inc.; Artessa Dulo Divider: www.mozdesigns.com
      b. Substitutions: Not permitted.

2.02 ACCESSORIES

A. Anchors and Fasteners: Provide anchors, fasteners, and other attachment devices recommended by manufacturer. Ensure attachment devices are of same material as components unless indicated otherwise.

B. Framing: By panel manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate and site conditions are acceptable and ready to receive work.

B. Verify field dimensions of locations and areas to receive work.

C. Notify Architect Engineer immediately of conditions that would prevent satisfactory installation.

D. Do not proceed with work until detrimental conditions have been corrected.

3.02 INSTALLATION

A. Frame anchored floor to ceiling in the field.

B. Comply with manufacturer's drawings and written instructions.

C. Install components plumb and level, accurately fitted, free from distortion or defects, and with tight joints, except where necessary for expansion.

D. Anchor securely to structure.

E. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

3.03 PROTECTION

A. Protect installed components and finishes from damage after installation.

B. Repair damage to exposed finishes to be indistinguishable from undamaged areas.

C. If damage to finishes and components cannot be repaired to be indistinguishable from undamaged finishes and components, replace damaged items.

END OF SECTION

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nonstructural dimension lumber framing.

B. Preservative treated wood materials.

C. Concealed wood blocking, nailers, and supports.

D. Miscellaneous wood nailers, furring, and grounds.

1.02 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2025a.

C. PS 20 - American Softwood Lumber Standard; 2025.

D. SPIB (GR) - Standard Grading Rules; 2021.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide technical data on wood preservative materials and application instructions.

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.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
   1. Species: Southern Pine, unless otherwise indicated.
   2. 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.
   3. 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. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).

B. Sizes: Nominal sizes as indicated on drawings, S4S.

C. Moisture Content: S-dry or MC19.

D. Stud Framing (2 by 2 through 2 by 6):
   1. Grade: No. 2.

E. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16):

F. 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 - General: Use fasteners suitable for proper attachment to substrates and contain weatherized coating approved for use where exposed. Fasteners in treated lumber are required to have high corrosion resistance, compatible with chemical treatment and be approved for use by wood manufacturer.

B. Metal and Finish of Fasteners:
   1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

PART 3 EXECUTION

3.01 PREPARATION

A. Coordinate installation of rough carpentry members specified in other sections.

3.02 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.

3.03 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 walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

C. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

D. Provide nonstructural framing and blocking to support the following:
   1. Cabinets and shelf supports.
   2. Wall brackets.
   3. Handrails.
   4. Grab bars.
   5. Towel and bath accessories.
   6. Wall-mounted door stops.
   7. Chalkboards and marker boards.
   8. Wall paneling and trim.
   9. Joints of rigid wall coverings that occur between studs.
   10. Other wall- or ceiling-mounted items indicated on drawings.

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. Comply with applicable regulations.

B. Do not burn scrap on project site.

C. Do not burn scraps that have been pressure treated.

D. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

E. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.

F. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 06 20 00
FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Finish carpentry items.

B. Shop finishing.

C. Solid surface cladding.

1.02 RELATED REQUIREMENTS

A. Section 09 90 00 - Painting and Coating: Painting and finishing of finish carpentry items.

1.03 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).

B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Submit two samples of wood, 6-inches long.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect from moisture damage.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

A. Quality Standard: Premium Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

B. Interior Woodwork Items:

1. Moldings, Bases, Casings, and Miscellaneous Trim: Clear white pine; prepare for paint finish.

2.02 LUMBER MATERIALS

A. Hardwood Lumber: Maple species, plain-sliced sawn, maximum moisture content of 6 percent, of quality suitable for transparent finish.

2.03 FASTENINGS

A. Fasteners of size and type to suit application.

2.04 ACCESSORIES

A. Primer: As specified in 09 90 00.

B. Wood Filler: Solvent base, tinted to match surface finish color.

2.05 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

2.06 SHOP FINISHING

A. Sand work smooth and set exposed nails and screws.

B. Apply wood filler in exposed nail and screw indentations.

C. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.

D. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
   1. Transparent:
      a. System - 1, Lacquer, Nitrocellulose.

2.07 SOLID SURFACE CLADDING

A. Solid Surfacing Cladding (SS-3): Solid surfacing sheet or plastic resin casting over continuous substrate.
   1. Flat Sheet Thickness: As indicated on Finish Schedule.
   2. Solid Surfacing Sheet and Plastic Resin Quartz Castings: Complying with ISFA-2 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
      a. Color, Finish, and Pattern: As indicated on Finish Schedule.
      b. Thickness as indicated on Drawings.
      c. Manufacturers:
         1) Basis of Design: Staron Solid Surface Material, as manufactured by Samsung; 562-926-5520; www.staron.com.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.02 INSTALLATION

A. Set and secure materials and components in place, plumb and level.

B. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

C. Install according to details on drawings.

D. Upon completion of installation, panels shall be inspected and cleaned as needed.

END OF SECTION

SECTION 06 41 00
ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wood casework with laminate cladding.

B. Cabinet and drawer hardware.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry.

1.03 ABBREVIATIONS AND ACRONYMS

A. AWI: Architectural Woodwork Institute.

B. HPDL: High-pressure decorative laminate.

C. MDF: Medium-density fiberboard.

D. TFL: Thermally-fused laminate.

E. WI: Woodwork Institute.

1.04 REFERENCE STANDARDS

A. ANSI A208.2 - Medium Density Fiberboard (MDF) for Interior Applications; 2022.

B. ANSI/AWI 0400 - Factory Finishing; 2022.

C. ANSI/AWI 0620 - Finish Carpentry/Installation; 2024.

D. ANSI/AWI 0641 - Architectural Wood Casework; 2019.

E. ASTM D1037 - Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials; 2012 (Reapproved 2020).

F. AWI 200 - Care & Storage; 2018.

G. AWI 300 - Materials; 2018.

H. BHMA A156.9 - Cabinet Hardware; 2020.

I. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2024.

J. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

K. PS 1 - Structural Plywood; 2023.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene preinstallation meeting not less than one week prior to completion of framing behind casework; require attendance of contractor, framing contractor, and casework fabricator.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Submit manufacturer's published, product descriptive data.
   1. Panel Substrates: For each type, include type of core, density, thickness, moisture resistant, and fire-resistant.
   2. HPDL Laminates: For each type, indicate description, thickness, and color.
   3. TFL Panels: For each type, indicate materials and color.
   4. Edgebanding: For each type, indicate material, thickness, and color.
   5. Hardware: For each type of cabinet and drawer hardware.
   6. Accessory Components: For each type of glass and grommet.

C. Shop Drawings:

1. Plans and Elevations: Plan and elevation views of each assembly type.
   a. Include rough opening dimensions, casework assembly dimensions, locations and sizes of cutouts, drawer locations, door locations, door swings, and hinge locations
   b. Drawing Scale: 3/8 inch = 1 foot, minimum.
2. Detailed Section: Dimensioned section views of each casework configuration.
   a. Drawing Scale: 1-1/2 inch = 1 foot, minimum.

D. Samples:
1. Samples, Edgebanding: For each edgebanding type, submit one sample strip, 6 inches long.
2. Samples, Laminates: For each laminate type, submit two samples for each specified color.
3. Samples, Hardware: For each hinge, pull, shelf rest, and cabinet lock type, submit one sample, full-size, indicating specified finish.

1.07 QUALITY ASSURANCE

A. Fabricator/Installer Qualifications: Company specializing in fabricating and installing products specified in this section with minimum five years of documented experience.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Store products prior to installation on flat, level, clean surfaces; elevate products above floors and protect from moisture, humidity, and sunlight.

B. Handle materials and products to prevent damage to edges, ends, or surfaces.

1.09 FIELD CONDITIONS

A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

B. Ambient Conditions for Installation and Post-Installation of Wood-Based Products:
1. Temperature Conditions During Installation and Post-Installation: Maintain temperature between 60 degrees F and 90 degrees F.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wilsonart Engineered Surfaces: www.wilsonart.com

B. Substitutions: Not permitted.

2.02 ARCHITECTURAL WOOD CASEWORK

A. Casework Finish: Wood casework with laminate cladding.

B. Provide casework and casework components in sizes and profiles as indicated on drawings.

2.03 PERFORMANCE REQUIREMENTS

A. Architectural Woodwork Institute (AWI) Performance Requirements:
1. Comply with AWI 300, ANSI/AWI 0641, ANSI/AWI 0400, and ANSI/AWI 0620 as applicable for specified casework finish, aesthetic grade, and performance duty level.
   a. Aesthetic Grade: Premium.
   b. Product Performance Duty Level: Duty Level 3.
2. Panel and Material Thicknesses: Provide panels and materials as required to meet specified performance duty level, subject to minimum thickness requirements of AWI 300 and ANSI/AWI 0641 and flatness requirements indicated below.
3. Panel Flatness: Provide panels with maximum variation from flat in 12 inches as measured diagonally across panel.
   a. Premium Grade: Plus or minus 0.063 inch maximum.
4. Cabinet Door Flatness:
   a. Comply with specified performance requirements.

2.04 WOOD CASEWORK WITH LAMINATE CLADDING

A. Casework Construction:
   1. Frameless Cabinet and Door Interface: Flush overlay.
   2. Door and Drawer Front Profile: Flush.

B. Premium Grade - Laminate-Clad Wood Casework:
   1. Exposed Exterior Surfaces: HPDL Panels.
   2. Exposed Interior Door and Drawer: HPDL Panels.
   3. Exposed Interior Surfaces Except at Door and Drawer : HPDL Panels.
   4. Semi-Exposed Interior Surfaces: TFL Panels.

C. Edgebanding Materials for Laminate-Clad Wood Casework:
   1. Thickness: 3mm.
   2. PVC: Well-matched to exposed face..

2.05 THERMALLY FUSED LAMINATE PANELS

A. Description: Thermally Fused Laminate (TFL) panels with one or multiple resin-impregnated sheets of decorative paper thermally fused to panel cores, producing balanced construction.

2.06 PANEL CORES

A. Medium Density Fiberboard (MDF):
   1. Description: Composite panel composed of cellulosic fibers, additives, and bonding system cured under heat and pressure; comply with ANSI A208.2.
   2. Grade and Thickness: As required to meet performance requirements.

2.07 CONCEALED CABINET BASE COMPONENTS

A. Cabinet Base Toe-Kick Subfronts:
   1. Materials: Plywood.
   2. Size: As indicated on drawings.
   3. Finished Face of Toe Kick Subfronts: As indicated on drawings.

2.08 WOOD AND WOOD-BASED MATERIALS

A. AWI 200 Wood Moisture Content Requirements:
   1. Climate Zone 1 - Dry Southwestern US: Between 4 and 9 percent.
   2. Climate Zone 2 - Most of US and Canada: Between 6 and 10 percent.
   3. Climate Zone 3 - Damp Southern Coastal Areas of US: Between 8 and 13 percent.

B. AWI 300 General Requirements for Wood.
   1. Provide wood that is sound, free of decay, shake, pith, wane, and warp.
   2. Provide wood in accordance with AWI 300.

C. Plywood: Comply with PS 1.
   1. Structural I, Grade C-C, Exposure 1.
   2. Performance Category: 23/32 minimum.

D. Moisture-Resistant Wood: Where moisture-resistant wood is specified or indicated on drawings for cabinet base components, provide wood with thickness swelling of not more than 5 percent when tested in accordance with ASTM D1037.

E. Wood Anchoring Strips:
   1. Materials and Size: Fabricator's choice subject to requirements of ANSI/AWI 0641.

2.09 ACCESSORIES

A. Fasteners: Size and type to suit application.

B. Concealed Joint Fasteners: Threaded steel.

C. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.

D. Adhesives: Type recommended by AWI/AWMAC to suit application.

2.10 FABRICATION

A. Shop-fabricate casework to dimensions, profiles, and details indicated on drawings.

B. Fabricate to maximum extents plausible, including doors, drawers, and hardware; fabricate units in sizes transportable through building openings.

C. When necessary to cut and fit on site, provide materials with sufficient allowance for cutting.

D. Wood Casework with Laminate Cladding: Apply laminates in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline.

E. Provide cutouts for plumbing fixtures; verify locations of cutouts from on-site dimensions. Sand and seal cut edges.

F. Hardware: Install hardware in accordance with hardware manufacturer's written instructions; use fasteners supplied by hardware manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify casework and materials required for installation have been delivered, handled and stored as specified.

B. Verify wood blocking that provides casework backing is installed as indicated on drawings.

C. Verify location and sizes of rough-in plumbing and rough-in electrical associated with work of this section.

D. Verify location and sizes of cutouts for appliances and special equipment to be mounted in or adjacent to casework.

3.02 INSTALLATION

A. Install work in accordance with AWI/AWMAC/WI (AWS) requirements for grade indicated.

B. Install work of this section rigid, plumb, and level and in accordance with fabricator's documented instructions; secure casework as indicated on drawings.
   1. Align and secure adjoining cabinet units with fasteners in concealed locations.

C. Install cabinet hardware in accordance with hardware manufacturer's documented instructions using hardware manufacturer's furnished fasteners.

D. Install scribe fillers to close gaps between casework and adjacent walls.

3.03 TOLERANCES

A. Comply with specified performance requirements for tolerances.

3.04 ADJUSTING

A. Adjust hardware for smooth operation in accordance with hardware manufacturer's documented instructions.

3.05 CLEANING

A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.

B. Clean exposed surfaces of casework, shelving, and hardware.

END OF SECTION

SECTION 07 21 00
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Board insulation at cavity wall construction and exterior wall behind exterior wall finish.

B. Batt insulation in exterior wall and ceiling construction.

C. Batt insulation for filling perimeter window and door shim spaces.

1.02 RELATED REQUIREMENTS

A. Section 07 25 00 - Weather Barriers: Weather barrier materials.

1.03 REFERENCE STANDARDS

A. ASTM C240 - Standard Test Methods for Testing Cellular Glass Insulation Block; 2021.

B. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2023.

C. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2024.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026a.

E. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 Degrees C; 2026.

F. ASTM E2357 - Standard Test Method for Determining Air Leakage Rate of Air Barrier Assemblies; 2025.

G. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2025.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

C. Shop Drawings: Submit drawings that indicate location of joint or termination detail conditions and conditions of interface with other materials.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

F. Test Reports: Submit evaluation service reports or other independent testing agency reports showing compliance with specified performance characteristics and physical properties.

1.05 QUALITY ASSURANCE

A. Use only installers with 5 years minimum experience with work similar to work of this Section.

1.06 SEQUENCING

A. Sequence work to ensure fireproofing and firestop materials are in place before beginning work of this section.

B. Coordinate work of this Section with roofing, wall or deck work and with work of other trades for proper time and sequence to avoid construction delays.

C. Pre-installation Meeting: Convene pre-installation meeting after Award of Contract and one week before starting work of this Section to verify project requirements, substrate conditions and coordination with other building sub-trades, and to review manufacturer's written installation instructions.

1.07 FIELD CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 FOAM BOARD INSULATION MATERIALS

A. Extruded Polystyrene (XPS) Board Insulation: Comply with ASTM C578 with either natural skin or cut cell surfaces.
   1. Type and Compressive Resistance: Type IV, 25 psi (173 kPa), minimum.
   2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
   3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
   4. Type and Thermal Resistance, R-value: Type IV, 5.0 (0.88), minimum, per 1 inch thickness at 75 degrees F mean temperature.
   5. Complies with fire resistance requirements indicated on drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
   6. Board Edges: Square.
   7. Type and Water Absorption: Type IV, 0.3 percent by volume, maximum, by total immersion.
   8. Products:
      a. DuPont de Nemours, Inc: www.building.dupont.com
      b. Owens Corning Corporation: www.ocbuildingspec.com.
      c. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 FIBER BLANKET INSULATION MATERIALS

A. Flexible Glass Fiber Blanket Thermal Insulation: Preformed insulation, complying with ASTM C665; friction fit.
   1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
   2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
   3. Combustibility: Non-combustible, when tested in accordance with ASTM E136.
   4. Thickness: As indicated on drawings.
   5. Facing: Unfaced.
   6. Products:
      a. CertainTeed Corporation: www.certainteed.com.
      b. Johns Manville: www.jm.com.
      c. Owens Corning Corporation: www.ocbuildingspec.com.
   7. Substitutions: See Section 01 60 00 - Product Requirements.

B. Mineral Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
   1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
   2. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
   3. Facing: Unfaced.
   4. Thickness: As indicated on drawings.
   5. Products:
      a. Johns Manville: www.jm.com.
      b. ROCKWOOL (ROXUL, Inc): www.rockwool.com.
      c. Thermafiber, Inc: www.thermafiber.com.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 ACCESSORIES

A. Weather Barrier: See Section 07 25 00.

B. Tape: Polyethylene self-adhering type, mesh reinforced, 2 inch wide.

C. Insulation Fasteners: Impaling clip of unfinished steel with washer retainer and clips, to be adhered to surface to receive insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BOARD INSTALLATION AT EXTERIOR WALLS

A. Adhere 6 inches wide strip of polyethylene sheet over expansion joints with double beads of adhesive each side of joint.
   1. Tape seal joints between sheets.
   2. Extend sheet full height of joint.

B. Apply adhesive to back of boards:
   1. Three continuous beads per board length.
   2. Full bed 1/8 inch thick.

C. Install rigid insulation directly to steel studs or exterior grade sheathing at 16 inches on center with manufacturer recommended mechanical fasteners, and tape joints with manufacturer's minimum 4 inches wide sealant tape; comply with ASTM E2357.

D. Install boards horizontally on walls.

E. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.03 BATT INSTALLATION

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

B. Install in exterior wall and ceiling spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

E. Batt Insulation that is not the full depth of the studs needs to be secured in place.

F. Fill the space between curtain wall frames and the wall opening with batt insulation.

3.04 PROTECTION

A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 07 25 00
WEATHER BARRIERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water-resistive barriers.

1.02 RELATED REQUIREMENTS

A. Section 07 21 00 - Thermal Insulation: Weather barrier installed in conjunction with thermal insulation.

1.03 DEFINITIONS

A. Weather Barriers: Materials or assemblies forming water-resistive barriers, air barriers, vapor retarders, or combination of one or more assemblies.

B. Water-Resistive Barriers: Materials or assemblies installed behind exterior wall coverings; designed to prevent liquid water from further penetration into exterior wall assembly.

1.04 REFERENCE STANDARDS

A. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.

B. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.

C. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2025.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section and related Work; require attendance by all affected installers.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on material characteristics, performance criteria, and limitations.

C. Shop Drawings: Show locations and extent of air-barrier materials, accessories, and assemblies specific to Project conditions. Include details for substrate joints and cracks, counterflashing strips, penetrations, terminations, and tie-ins with adjoining construction. Include details of interfaces with other materials that form part of air barrier.

D. Perimeter Door and Window Flashing and Accessory components recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly.

E. Manufacturer's Installation Instructions: Indicate preparation, installation methods, and storage and handling criteria.

F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

G. Special Installation Warranty: Submit warranty and ensure forms have been completed in Owner's name.

1.07 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by materials manufacturers before, during, and after installation.

PART 2 PRODUCTS

2.01 WATER-RESISTIVE BARRIERS

A. Description: Materials installed behind exterior wall coverings; designed to prevent liquid water from further penetration into exterior wall assembly. Primary materials include fluid-applied coatings; accessory materials include flashings, seam tapes, perimeter tapes, and sealants.

B. Comply with NFPA 285 wall assembly requirements in accordance with local building code and authorities having jurisdiction (AHJ).

2.02 FLUID-APPLIED MEMBRANE AIR BARRIER

A. Fluid-Applied, Vapor-Permeable Membrane Air Barrier: Elastomeric, UV-resistant, synthetic membrane, formulated for application minimum 70 mils (wet), 35 mils (dry).
   1. Air Permeance: 0.004 cfm/sq ft, maximum, when tested in accordance with ASTM E2178.
   2. Vapor Permeance: 25 perms, minimum, when tested in accordance with ASTM E96/E96M, Procedure B.
   3. Products:
      a. GCP Applied Technologies; (previously Grace Construction Products); Perm-A-Barrier VPO: www.graceconstruction.com.
         1) Coverage Rates: Apply at a minimum of 90 mils wet and 45 mils dry thickness.
      b. Tremco Global Sealants; ExoAir 230; www.tremcosealants.com.
         1) Coverage Rates: Apply at a minimum of 70 mils wet and 35 mils dry thickness, dark in color, color to be selected by Architect Engineer.
      c. Henry Company; Air-Bloc 31MR; www.henry.com.
         1) Coverage Rates: Apply at a minimum of 70 mils wet and 35 mils dry thickness, dark in color.
      d. W.R. Meadows, Inc; Air-Shield LMP: www.wrmeadows.com.
         1) Coverage Rates: Apply at a minimum of 70 mils wet and 35 mils dry thickness.
      e. Substitutions: Not permitted.

2.03 ACCESSORIES

A. Requirement: Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.

B. Primer: Liquid primer if recommended for substrate by air-barrier material manufacturer.

C. Joint Fillers and Sealants, Primers, Thinners, and Cleaners: Compatible with weather barrier and as recommended by material manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and conditions comply with requirements of this section.

B. Verify that substrates have cured and aged for minimum time recommended in writing by air-barrier manufacturer.

C. Verify that masonry joints are flush and completely filled with mortar.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

3.03 ACCESSORIES INSTALLATION

A. Install accessory materials according to air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.
   1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
   2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches (75 mm) of coverage is achieved over each substrate.
   3. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
   4. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.

B. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

C. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.

D. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

E. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.

F. Retain first paragraph below if strips and transition strips follow installation of projecting interior wythe masonry ties or joint reinforcement.

G. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.

H. Seal top of through-wall flashings to air barrier with an additional 6-inch- (150-mm-) wide, transition strip.

I. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

J. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches (150 mm) beyond repaired areas in strip direction.

3.04 INSTALLATION

A. Install materials in accordance with manufacturer's installation instructions.

B. Air Barriers: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.

C. Apply sealants within recommended temperature range in accordance with manufacturer's installation instructions. Consult manufacturer if temperature is out of this range.

D. Openings and Penetrations in Exterior Water-Resistive Barriers:
   1. Install flashing over sills, covering entire sill framing member, and extend at least 5 inches onto water-resistive barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
   2. At openings filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with sealing tape at least 4 inches wide; do not seal sill flange.

3. At openings filled with nonflanged frames, seal water-resistive barrier to each side of framing at opening using flashing at least 9 inches wide, and covering entire depth of framing.
4. At head of openings, install flashing under water-resistive barrier extending at least 2 inches beyond face of jambs; seal water-resistive barrier to flashing.
5. At interior face of openings, seal gaps between window and door frames and rough framing using appropriate joint sealant over backer rod.
6. Service and Other Penetrations: Form flashing around penetrating items and seal to surface of water-resistive barrier.

3.05 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Owner’s Inspection and Testing: Cooperate with Owner’s testing agency.
1. Allow access to work areas and staging.
2. Notify Owner’s testing agency in writing of schedule for work of this section to allow sufficient time for testing and inspection.
3. Do not cover work of this section until testing and inspection is accepted.

C. Provide the services of the manufacturer's field representative to observe installation and make report.

D. Obtain approval of installation procedures from water-resistive barrier manufacturer based on a mock-up installed in place, prior to proceeding with remainder of installation.

E. Take digital photographs of each portion of installation prior to covering up weather barriers.

3.06 PROTECTION

A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION

SECTION 07 72 36
AUTOMATIC SMOKE VENTS

GENERAL

1.01 SUMMARY

A. Work Included: Provide factory-fabricated double-leaf automatic smoke vents.

1.02 SUBMITTALS

A. Product Data: Submit manufacturer's product data.

B. Shop Drawings: Submit shop drawings including profiles, accessories, location, fusible links, adjacent construction interface, and dimensions.

C. Warranty: Submit executed copy of manufacturer's standard warranty.

1.03 QUALITY ASSURANCE

A. Manufacturer: A minimum of 5 years experience manufacturing similar products.

B. Installer: A minimum of 2 years experience installing similar products.

C. Manufacturer's Quality System: Registered to ISO 9001 Quality Standards including in-house engineering for product design activities.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver products in manufacturer's original packaging. Store materials in a dry, protected, well-vented area. Inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.

1.05 WARRANTY

A. Manufacturer's Warranty: Provide manufacturer's standard warranty. Materials shall be free of defects in material and workmanship for a period of five years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Basis-of-Design Manufacturer: Type ACDSV Double-Leaf Automatic Roof Fire Vent by The BILCO Company, P.O. Box 1203, New Haven, CT 06505, 1-800-366-6530, Fax: 1-203-535-1582, Web: www.bilco.com.

2.02 AUTOMATIC ROOF FIRE VENT

A. Furnish and install where indicated on plans: metal fire vent Type ACDSV, size as indicated on drawings. The roof fire vent shall be double leaf. The roof fire vent shall be preassembled from the manufacturer.

B. Performance characteristics:
   1. Vent(s) shall be UL listed.
   2. Covers shall be reinforced to support a minimum live load of 40 psf (195 kg/m2) with a maximum deflection of 1/150th of the span or 90 psf (439 kg/m2) wind uplift.
   3. Corrosion resistant gas springs shall open the vent covers simultaneously when latch is manually released or when heat breaks the UL listed fusible link. Opening shall be in a controlled manner to avoid damage to surrounding roof surfaces.
   4. Entire roof fire vent shall be weathertight with fully welded corner joints on cover and curb.
   5. Latch mechanisms shall hold the covers in the closed position without overstressing the fusible link and withstand 90 psf (439 kg/m2) wind uplift forces acting on the cover.

6. Latch operation: When heat parts the UL listed fusible link, the latch shall release instantaneously, allowing vent covers to open. The latch shall be designed for easy resetting, after a fire or test, so that the covers cannot be latched closed unless the mechanism has been reset properly. Manufacturer shall provide instructions for resetting the latch with each unit.
7. Sound Transmission Rating: Vent(s) shall carry STC-50 and OITC 46 sound ratings.
8. ISO 140-18 Rainfall Sound Rating – 37.5 db.

C. Covers: Shall be 14-gauge (1.9mm) galvannealed steel with a 5-3/4” (146mm) beaded flange with formed reinforcing members.

D. Gasket: Dual EPDM gaskets shall be permanently adhered to the underside of the covers.

E. Cover insulation: Shall be mineral wool of 4" (102mm) in thickness, fully covered and protected by a 12-gauge (2.75mm) galvanneal steel liner.

F. Curb: Shall be 12" (305mm) in height and of 10-gauge (3.5mm) galvannealed steel with a fixed center channel. Curb shall be formed with a 6-7/8” (175mm) flange with 7/16" (11mm) holes provided for securing to roof deck. Curb shall be equipped with integral metal capflashing of 14-gauge (1.9mm) galvannealed steel and feature the Bil-Clip® flashing system, including stamped tabs, 6" (153mm) on center, to be bent inward to hold single-ply roofing membrane securely in place.

G. Curb insulation: Shall be 4" (102mm) mineral wool insulation, fully enclosed by a 10-gauge (3.5mm) galvannealed steel liner.

H. Lifting mechanisms: Corrosion resistant gas springs open covers automatically against a 10 lb/ft2 (49Kg/m2) snow/wind load. Gas springs shall have built in dampers to assure a controlled rate of opening and automatically lock the covers in the full open position. A release mechanism shall be provided to allow the covers to be closed.

I. Latch mechanism: Shall be the BILCO Thermolatch® II positive hold/release mechanism with a separate latching point for each cover controlled by a single UL listed 165°F (74°C) fusible link. Fusible link shall be curb mounted on a non-hinged end to allow the latching mechanism to be easily reset from the roof level.

J. Hardware: Corrosion resistant gas springs and hot dip galvanized steel stop cables. All other hardware is zinc plated/chromate sealed.

K. Finish: Factory finish shall be alkyd base red oxide primer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates and openings for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install products in strict accordance with manufacturer’s instructions and approved submittals. Locate units level, plumb, and in proper alignment with adjacent work.
1. Test units for proper function and adjust until proper operation is achieved.
2. Test fusible link and install replacement fusible link after testing.
3. Repair finishes damaged during installation.
4. Restore finishes so no evidence remains of corrective work.

3.03 ADJUSTING AND CLEANING

A. Clean exposed surfaces using methods acceptable to the manufacturer which will not damage finish.

END OF SECTION

SECTION 07 92 00
JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nonsag gunnable joint sealants.

B. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.

B. Section 08 80 00 - Glazing: Glazing sealants and accessories.

C. Section 09 21 16 - Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.

1.03 REFERENCE STANDARDS

A. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants; 2018 (Reapproved 2022).

B. ASTM C834 - Standard Specification for Latex Sealants; 2017 (Reapproved 2023).

C. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2024.

D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

E. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2023.

F. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2025.

G. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2022.

H. ASTM C1311 - Standard Specification for Solvent Release Sealants; 2022.

I. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2022).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
   1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
   2. List of backing materials approved for use with the specific product.
   3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
   4. Substrates the product should not be used on.
   5. Substrates for which use of primer is required.
   6. Substrates for which laboratory adhesion and/or compatibility testing is required.
   7. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
   8. Sample product warranty.
   9. Certification by manufacturer indicating that product complies with specification requirements.

C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.

D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

E. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect Engineer and submit at least two physical samples for verification of color of each required sealant.

F. Sustainable Design Documentation: For sealants and primers, submit VOC content and emissions documentation as specified in Section 01 61 16.

G. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.

H. Installation Plan: Submit at least four weeks prior to start of installation.

I. Installation Log: Submit filled out log for each length or instance of sealant installed.

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 the work of this section and with at least three years of documented experience.

C. 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 to manufacturer sufficient samples for testing.
   5. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
   6. Testing is not required if sealant manufacturer provides data showing previous testing, not older than 24 months, that shows satisfactory adhesion, lack of staining, and compatibility.

D. Installation Plan: Include schedule of sealed joints, including the following.
   1. Installation Log Form: Include the following data fields, with known information filled out.
      a. Date of installation.
      b. Name of installer.
      c. Actual joint width; provide space to indicate maximum and minimum width.
      d. Actual joint depth to face of backing material at centerline of joint.
      e. Air temperature.

1.06 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective work within a five year period after Date of Substantial Completion.

C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 JOINT SEALANT APPLICATIONS

A. Scope:
   1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
      a. Wall expansion and control joints.
      b. Joints between door, window, and other frames and adjacent construction.
      c. Joints between different exposed materials.
      d. Openings below ledge angles in masonry.
      e. Other joints indicated below.

2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
    a. Joints between door, window, and other frames and adjacent construction.
    b. In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, piping, and other openings; between wall/ceiling and other construction; and other flanking sound paths.
        1) Exception: Such gaps and openings in gypsum board and plaster finished stud walls and suspended ceilings.
    c. Other joints indicated below.
3. Do not seal the following types of joints.
    a. Intentional weepholes in masonry.
    b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
    c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
    d. Joints where installation of sealant is specified in another section.
    e. Joints between suspended panel ceilings/grid and walls.

B. Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.
1. Lap Joints in Sheet Metal Fabrications: Butyl rubber, non-curing.

C. Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.
1. Wall and Ceiling Joints in Non-Wet Areas: Acrylic emulsion latex sealant.
2. Wall and Ceiling Joints in Wet Areas: Non-sag polyurethane sealant for continuous liquid immersion.
3. Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.
4. In Sound-Rated Assemblies: Acrylic emulsion latex sealant.

D. Interior Wet Areas: restrooms; fixtures in wet areas include plumbing fixtures, countertops, cabinets, and other similar items.

E. Sound-Rated Assemblies: Walls and ceilings identified as "STC-rated", "sound-rated", or "acoustical".

2.02 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.

B. Colors: As indicated on drawings.

2.03 NONSAG JOINT SEALANTS

A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus and minus 50 percent, minimum.
2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
4. Color: Match adjacent finished surfaces.
5. Cure Type: Single-component, neutral moisture curing.

B. Type General Purpose Exterior -Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single component; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus and minus 25 percent, minimum.
2. Color: Match adjacent finished surfaces.

C. Type General Purpose Interior Sealant -Acrylic Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.

1. Color: Standard colors matching finished surfaces, Type OP (opaque).

D. Non-Curing Butyl Sealant: Solvent-based; ASTM C1311; single component, non-sag, non-skinning, non-hardening, non-bleeding; vapor-impermeable; intended for fully concealed applications.

2.04 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.

E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

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. Verify that backer rods are of the correct size.

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.

E. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in inconspicuous area to verify that it does not stain or discolor slab.

3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Perform acoustical sealant application work in accordance with ASTM C919.

D. 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.

E. Install bond breaker backing tape where backer rod cannot be used.

F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

G. 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.

H. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 08 11 13
HOLLOW METAL FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-fire-rated hollow metal frames.

B. Hollow metal frames for wood doors.

C. Accessories, including glazing.

1.02 RELATED REQUIREMENTS

A. Section 08 71 00 - Door Hardware.

B. Section 08 80 00 - Glazing: Glass for doors and borrowed lites.

C. Section 09 90 00 - Painting and Coating: Field painting.

1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2023.

C. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2025.

D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2025a.

E. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2021a.

F. 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; 2018a.

G. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.

H. ASTM C476 - Standard Specification for Grout for Masonry; 2023.

I. BHMA A156.115 - Hardware Preparation in Steel Doors and Frames; 2016.

J. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

K. NAAMM HMMA 840 - Guide Specifications for Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2024.

L. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2025.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

D. Samples: Submit two samples of metal, 2 by 2 inches in size, showing factory finishes, colors, and surface texture.

E. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

F. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.

B. Maintain at project site copies of reference standards relating to installation of products specified.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hollow Metal Frames:
   1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com.
   2. Republic Doors, an Allegion brand: www.republicdoor.com.
   3. Steelcraft, an Allegion brand: www.allegion.com.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

A. Requirements for Hollow Metal Frames:
   1. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
   2. Accessibility: Comply with ICC A117.1 and ADA Standards.
   3. Door Top Closures: Flush end closure channel, with top and door faces aligned.
   4. Door Edge Profile: Beveled, both sides.
   5. Typical Door Face Sheets: Flush.
   6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
   7. Hardware Preparation: In accordance with BHMA A156.115, with reinforcement welded in place, in addition to other requirements specified in door grade standard.
   8. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
   1. Frame Finish: Same as hollow metal door.

B. Interior Door Frames, Non-Fire Rated: Face welded type. Back-seal remaining joints with joint sealant.

C. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.

2.04 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.05 ACCESSORIES

A. Glazing: As specified in Section 08 80 00, factory installed.

B. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.

C. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.

D. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.

E. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

B. Install fire rated units in accordance with NFPA 80.

C. Coordinate frame anchor placement with wall construction.

D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

E. Install door hardware as specified in Section 08 71 00.

F. Comply with glazing installation requirements of Section 08 80 00.

3.03 TOLERANCES

A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.04 ADJUSTING

A. Adjust for smooth and balanced door movement.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 08 14 16
FLUSH WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flush wood doors; flush configuration; non-rated.

1.02 RELATED REQUIREMENTS

A. Section 08 12 13 - Hollow Metal Frames.

B. Section 08 71 00 - Door Hardware.

C. Section 08 80 00 - Glazing.

D. Section 09 90 00 - Painting and Coating.

1.03 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).

B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.

C. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2025.

D. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.

C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.

D. Samples: Submit three samples of door veneer, 8 by 10 inches in size illustrating wood grain, stain color, and sheen. Samples should reflect typical range of color and grain to be expected in finished Work

E. Test Reports: Show compliance with specified requirements for the following:
   1. Sound-retardant doors and frames; sealed panel tests are not acceptable.

F. Manufacturer's Installation Instructions: Indicate special installation instructions.

G. Specimen warranty.

H. Warranty, executed in Owner's name.

1.05 QUALITY ASSURANCE

A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver and store doors in accordance with specified quality standard.

B. Accept doors on site in manufacturer's packaging, and inspect for damage.

C. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and break seal on site to permit ventilation.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide manufacturer's warranty on interior doors for the life of the installation. Complete forms in Owner's name and register with manufacturer.
   1. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wood Veneer Faced Doors:
   1. Haley Brothers: www.haleybros.com.
   2. Forte Opening Solutions: www.forteopenings.com.
   3. Oregon Door: www.oregondoor.com.
   4. VT Industries, Inc: www.vtindustries.com.
   5. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 DOORS

A. Doors: See drawings for locations and additional requirements.
   1. Quality Standard: Custom Grade, Standard Duty performance, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
   2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated. Veneer thickness shall not be less 1/50 inch.

B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
   1. Provide solid core doors at each location.
   2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with UL 10C - Positive Pressure; Underwriters Laboratories Inc (UL) or Intertek/Warnock Hersey (WHI) labeled without any visible seals when door is open.
   3. Wood veneer facing site applied transparent finish.

2.03 DOOR AND PANEL CORES

A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.

2.04 DOOR FACINGS

A. Veneer Facing for Transparent Finish: Match existing wood species, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face; unless otherwise indicated.
   1. Vertical Edges: Same species as face veneer.
   2. "Pair Match" each pair of doors; "Set Match" pairs of doors within 10 feet of each other when doors are closed.
   3. Finish: See Section 09 90 00.

2.05 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard specified.

B. Cores Constructed with stiles and rails:
   1. Provide solid blocks at lock edge for hardware reinforcement.
   2. Provide solid blocking for other throughbolted hardware.

C. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

D. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.

E. Provide edge clearances in accordance with the quality standard specified.

2.06 ACCESSORIES

A. Hollow Metal Door Frames: See Section 08 12 13.

B. Glazing: See Section 08 80 00.

C. Glazing Stops: Wood, of same species as door facing, mitered corners; prepared for countersink style tamper proof screws.

D. Door Hardware: See Section 08 71 00.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality standard.
   1. Install fire-rated doors in accordance with NFPA 80 requirements.

B. Use machine tools to cut or drill for hardware.

C. Coordinate installation of doors with installation of frames and hardware.

D. Coordinate installation of glazing.

3.03 TOLERANCES

A. Comply with specified quality standard for fit and clearance tolerances.

B. Comply with specified quality standard for telegraphing, warp, and squareness.

3.04 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 08 43 13
ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aluminum-framed storefront, with vision glass.

B. Aluminum doors and frames.

C. Door hardware.

1.02 RELATED REQUIREMENTS

A. Section 05 50 00 - Metal Fabrications: Steel attachment devices.

B. Section 07 25 00 - Weather Barriers: Sealing framing to water-resistive barrier installed on adjacent construction.

C. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.

D. Section 08 71 00 - Door Hardware: Hardware items other than specified in this section.

E. Section 08 80 00 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

A. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems; 2015.

B. AAMA 501.4 - Recommended Static Test Method for Evaluating Curtain Wall and Storefront Systems Subjected to Seismic and Wind Induced Interstory Drifts; 2018.

C. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).

D. AAMA 612 - Voluntary Specification, Performance Requirements, and Test Procedures for Combined Coatings of Anodic Oxide and Transparent Organic Coatings on Architectural Aluminum; 2017a.

E. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.

F. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site; 2015.

G. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

H. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

I. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

J. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

K. ASTM C1184 - Standard Specification for Structural Silicone Sealants; 2018, with Editorial Revision.

L. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.05 PERFORMANCE REQUIREMENTS

A. General Performance:
   1. Product to comply with the specified performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction, as determined by testing of aluminum storefront systems representing those indicated for this project.
   2. Aluminum storefront systems shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, and internal drainage details.

C. Shop Drawings: Indicate system dimensions, plans, elevations, sections, details, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.

D. Samples: Submit two samples 12 inches in size illustrating finished aluminum surface, glass, glazing materials.

E. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.

F. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.

G. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.

H. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.

I. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.07 QUALITY ASSURANCE

A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State in which the Project is located.

B. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

D. Source Limitations: Obtain aluminum-framed storefront system through one source from a single manufacturer.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.09 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.10 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

D. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Kawneer North America: www.kawneer.com.

B. Other Acceptable - Aluminum-Framed Storefronts Manufacturers:
   1. EFCO Corporation: www.efcocorp.com.
   2. Oldcastle BuildingEnvelope: www.oldcastlebe.com.
   3. YKK AP America Inc.: www.ykkap.com.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 ALUMINUM-FRAMED STOREFRONT

A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices. Including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of storefront units.
   1. Product: Kawneer; Trifab VersaGlaze 451T Thermal Framing System.
   2. Glazing Position: Centered (front to back).
   3. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.
   4. Front, center, back, multi-plane, structural silicone or weatherseal.
   5. Screw spline.
   6. Finish Color: As indicated on drawings.
   7. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
   8. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
   9. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
   10. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
   11. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
   12. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

B. Performance Requirements
   1. Wind Load: Static air design load of 35 psf shall be applied in the positive and negative direction in accordance with ASTM E330. There shall be no deflection in excess of L/175 of the span of any framing member. Structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.
      a. Design Wind Loads: Comply with requirements of ASCE 7.
   2. Water Penetration Resistance on Manufactured Assembly: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 8 psf as defined in AAMA 501.

3. Air Infiltration: Air leakage rate shall not exceed 0.06 cfm/ft2 at a static air pressure differential of 6.2 psf with interior seal, or, rate shall not exceed 0.06 cfm/ft2 at a static air pressure differential of 1.6 psf without interior seal, when tested in accordance with ASTM E 283.
4. System Internal Drainage: Drain to the exterior by means of a weep drainage network using subsill, any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
5. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
6. Uniform Load: A static air design load of 35 psf shall be applied in the positive and negative direction in accordance with ASTM E 330.
    a. There shall be no deflection in excess of L/175 of the span of any framing member.
    b. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.
7. Seismic:
    a. When tested to AAMA 501.4, system must meet design displacement (elastic) of 0.010 x the story height and ultimate displacement (inelastic) of 1.5 x the design displacement.
8. Thermal Movements:
    a. Allow for thermal movements resulting from the following:
        1) 0°F (-18 C) to 180°F (82 C) maximum change (range) in ambient and surface temperatures
        2) 75°F (24 C) test interior ambient air temperature
    b. Test performance shows no buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5 for a minimum 3 cycles.

2.03 COMPONENTS

A. Aluminum Framing System: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
    1. Thermal Barrier: Thermal break with dual nominal 1/4 inch (6.4 mm) separation consisting of a two-part chemically curing, high-density polyurethane, which is mechanically and adhesively joined to aluminum storefront sections.
        a. Thermal break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505.
    2. Framing members for interior applications need not be thermally broken.

B. Glazing System: See Section 08 80 00.
    1. For Exterior Framing: Type Low-e.
    2. Glazing Gaskets:
        a. Manufacturer's standard compression types.
        b. Replaceable, extruded EPDM rubber.
    3. Spacers and Setting Blocks:
        a. Manufacturer's standard elastomeric type.
    4. Bond-Breaker Tape:
        a. Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
    5. Glazing Sealants: For structural-sealant-glazed systems as recommended by manufacturer for joint type, and as follows:
        a. Structural Sealant per ASTM C1184:

1) Single-component neutral-curing silicone formulation that is compatible with the system components with which it comes in contact.
2) Specifically formulated and tested for use as structural sealant and approved by a structural-sealant manufacturer for use in the aluminum-framed systems indicated.
3) Color: Black

b. Weatherseal Sealant: ASTM C920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O.
1) Single-component neutral-curing formulation that is compatible with the structural sealant and other system components with which it comes in contact
2) Recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.
3) Color: Matching structural sealant.

C. Entrance Swing Doors: Glazed aluminum.
1. Door stile and rail face dimensions:
a. Medium Stile: 3-1/2 inch vertical face dimension, 1-3/4 inch depth, 10 inch bottom rail, high traffic applications.
2. Major portions of the door members to be 0.125 inch nominal in thickness and glazing molding to be 0.05 inch thick.
3. Glazing gaskets shall be either EPDM elastomeric extrusions or a thermoplastic elastomer.
4. Provide adjustable glass jacks to help center the glass in the door opening.
5. Entrance System Fabrication:
a. Door corner construction shall consist of mechanical clip fastening, SIGMA 1-1/8 inch long fillet welds along top and bottom of rail extrusion at stile and rail intersection, and deep penetration plug weld at all four corners of door.
1) Must be full penetration plug weld to leg of clip, 1-1/8-inch long fillet welds along top and bottom or rails at vertical stile intersection. No tie-rod construction of any type or partial design allowed. Meeting rail to still joint fillet weld “only” is not acceptable.
2) Glazing stops shall be hook-in type with EPDM glazing gaskets reinforced with non-stretchable chord.
6. Entrance Performance Requirements:
a. Structural: Corner strength shall be tested per dual moment load test procedure and certified by an independent testing laboratory to ensure weld compliance and corner integrity.
7. Finish: Same as storefront.

2.04 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M) 6063-T6 alloy and temper; not less than 0.070 inch (1.8 mm) wall thickness at any location for the main frame.

B. Fasteners: Stainless steel.

C. Glazing Accessories: As specified in Section 08 80 00.

2.05 FINISHES

A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

2.06 HARDWARE

A. For each door, include weatherstripping, sill sweep strip, and threshold.

B. Other Door Hardware: See Section 08 71 00.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other work.

B. Verify that storefront wall openings and adjoining water-resistive and/or air barrier seal materials are ready to receive work of this section.

3.02 INSTALLATION

A. Comply with drawings and manufacturer's written instructions for installing aluminum-framed storefront system, accessories, and other components

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Set sill members in bed of sealant or with gaskets, as indicated, for weather-tight construction.

G. Install aluminum-framed storefront system and components to drain condensation, water penetrating joints, and moisture migrating within aluminum-framed storefront system to the exterior.

H. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

I. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

J. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.

K. Coordinate attachment and seal of perimeter air and vapor barrier materials.

L. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

M. Set thresholds in bed of sealant and secure.

N. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inch per 3 feet non-cumulative or 0.06 inch per 10 feet, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.04 FIELD QUALITY CONTROL

A. Water-Spray Test: Provide water spray quality test of installed storefront components in accordance with AAMA 501.2 during construction process and before installation of interior finishes.
   1. Perform a minimum of two tests in each designated area as indicated on drawings.
   2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.

B. Field Tests:
   1. Architect shall select storefront units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured.
   2. Tests that do not meet the specified performance requirements and units that have deficiencies shall be corrected as part of the contract amount.

3. Testing shall be performed per AAMA 501.2 Hose Test using proper water pressure and nozzele per test standard.

3.05 ADJUSTING

A. Adjust operating hardware for smooth operation.

3.06 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Clean glass immediately after installation.
   1. Comply with glass manufacturer's written recommendations for final cleaning and maintenance.
   2. Remove non-permanent labels and clean surfaces.

C. Clean aluminum surfaces.

D. Avoid damaging protective coatings and finishes.

E. Remove excess sealants, glazing materials, dirt, and other substances.

F. Repair or replace damaged installed products.

G. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during the construction period.

H. Remove construction debris from project site and legally dispose of debris.

I. Remove excess sealant by method acceptable to sealant manufacturer.

3.07 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 08 71 00
DOOR HARDWARE

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ANSI/BHMA A156.2 - Bored & Preassembled Locks and Latches; 2017.

B. ANSI/BHMA A156.3 - Exit Devices; 2014.

C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2023.

D. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus; 2026.

E. BHMA A156.1 - American National Standard for Butts and Hinges; 2016.

F. BHMA A156.4 - American National Standard for Door Controls - Closers; 2013.

G. BHMA A156.5 - American National Standard for Cylinders and Input Devices for Locks; 2014.

H. BHMA A156.26 - American National Standard for Continuous Hinges; 2017.

I. BHMA A156.28 - American National Standard for Recommended Practices for Mechanical Keying Systems; 2018.

J. BHMA A156.31 - American National Standard for Electric Strikes and Frame Mounted Actuators; 2013.

K. ISO 9000 - Quality management systems -- Fundamentals and vocabulary; 2015.

L. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

M. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2025.

N. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

O. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2025.

P. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2017.

Q. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

R. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

S. UL 305 - Standard for Panic Hardware; Current Edition, Including All Revisions.

T. UL 1784 - Standard for Air Leakage Tests of Door Assemblies and Other Opening Protectives; Current Edition, Including All Revisions.

U. WDMA I.S. 1A - Interior Architectural Wood Flush Doors; 2013.

1.02 SUMMARY

A. Section includes:
   1. Mechanical and electrified door hardware
   2. Electronic access control system components

B. Section excludes:
   1. Windows
   2. Cabinets (casework), including locks in cabinets
   3. Signage
   4. Toilet accessories
   5. Overhead doors

C. Related Sections:

1. Division 01 "General Requirements" sections for Allowances, Alternates, Owner Furnished Contractor Installed, Project Management and Coordination.
2. Division 06 Section "Rough Carpentry"
3. Division 06 Section "Finish Carpentry"
4. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
5. Division 08 Sections:
   a. "Flush Wood Doors"
   b. "Interior Aluminum Doors and Frames"
   c. "Aluminum-Framed Entrances and Storefronts"
6. Division 26'Electrical" sections for connections to electrical power system and for low-voltage wiring.
7. Division 28'Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system.

1.03 REFERENCES

A. UL LLC
   1. UL 10B - Fire Test of Door Assemblies
   2. UL 10C - Positive Pressure Test of Fire Door Assemblies
   3. UL 1784 - Air Leakage Tests of Door Assemblies
   4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute
   1. Sequence and Format for the Hardware Schedule
   2. Recommended Locations for Builders Hardware
   3. Keying Systems and Nomenclature
   4. Installation Guide for Doors and Hardware

C. NFPA – National Fire Protection Association
   1. NFPA 70 – National Electric Code
   2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
   3. NFPA 101 – Life Safety Code
   4. NFPA 105 – Smoke and Draft Control Door Assemblies
   5. NFPA 252 – Fire Tests of Door Assemblies

D. ANSI - American National Standards Institute
   1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities
   2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
   3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
   4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
   5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

1.04 SUBMITTALS

A. General:
   1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
   2. Prior to forwarding submittal:
      a. Review drawings and Sections from related trades to verify compatibility with specified hardware.
      b. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
    a. Wiring Diagrams: For power, signal, and control wiring and including:
        1) Details of interface of electrified door hardware and building safety and security systems.
        2) Schematic diagram of systems that interface with electrified door hardware.
        3) Point-to-point wiring.
        4) Risers.
3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
    a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
4. Door Hardware Schedule:
    a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
    b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
    c. Indicate complete designations of each item required for each opening, include:
        1) Door Index: door number, heading number, and Architect's hardware set number.
        2) Quantity, type, style, function, size, and finish of each hardware item.
        3) Name and manufacturer of each item.
        4) Fastenings and other pertinent information.
        5) Location of each hardware set cross-referenced to indications on Drawings.
        6) Explanation of all abbreviations, symbols, and codes contained in schedule.
        7) Mounting locations for hardware.
        8) Door and frame sizes and materials.
        9) Degree of door swing and handing.
        10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.
5. Key Schedule:
    a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
    b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
    c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
    d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.

e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

C. Informational Submittals:
1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
2. Provide Product Data:
a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
b. Include warranties for specified door hardware.

D. Closeout Submittals:
1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
b. Catalog pages for each product.
c. Final approved hardware schedule edited to reflect conditions as installed.
d. Final keying schedule
e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

E. Inspection and Testing:
1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
a. Fire door assemblies, in compliance with NFPA 80.
b. Required egress door assemblies, in compliance with NFPA 101.

1.05 QUALITY ASSURANCE

A. Qualifications and Responsibilities:
1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project’s vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
a. For door hardware: DHI certified AHC or DHC.
b. Can provide installation and technical data to Architect and other related subcontractors.
c. Can inspect and verify components are in working order upon completion of installation.
d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.
4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:
   1. Fire-Rated Door Openings:
      a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
      b. Provide only items of door hardware that are listed products tested by UL LLC, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.
   2. Smoke and Draft Control Door Assemblies:
      a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105
      b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.
   3. Electrified Door Hardware
      a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
   4. Accessibility Requirements:
      a. Comply with governing accessibility regulations cited in "REFERENCES" article 08 71 00, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.

C. Pre-Installation Meetings
   1. Keying Conference
      a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
         1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
         2) Preliminary key system schematic diagram.
         3) Requirements for key control system.
         4) Requirements for access control.
         5) Address for delivery of keys.
   2. Pre-installation Conference
      a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
      b. Inspect and discuss preparatory work performed by other trades.
      c. Inspect and discuss electrical roughing-in for electrified door hardware.
      d. Review sequence of operation for each type of electrified door hardware.
      e. Review required testing, inspecting, and certifying procedures.
      f. Review questions or concerns related to proper installation and adjustment of door hardware.
   3. Electrified Hardware Coordination Conference:
      a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping

B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.

C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.

D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.

E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.07 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

1.08 WARRANTY

A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.
   1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
   2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.
      a. Mechanical Warranty
         1) Locks
            (a) Schlage ND Series: 10 years
         2) Exit Devices
            (a) Von Duprin: 10 years
         3) Closers
            (a) LCN 4000 Series: 30 years

1.09 MAINTENANCE

A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

B. Turn over unused materials to Owner for maintenance purposes.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Approval of alternate manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category are only to be considered by official substitution request in accordance with section 01 25 00.

B. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.

C. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.02 MATERIALS

A. Fabrication
   1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.
   2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
   3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with "Metal Doors and Frames", "Flush Wood Doors", "Stile and Rail Wood Doors" to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.

B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
   1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

C. Cable and Connectors:
   1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.
   2. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
   3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

2.03 HINGES

A. Manufacturers and Products:
   1. Scheduled Manufacturer and Product:
      a. Ives 5BB series

B. Requirements:
   1. Provide hinges conforming to ANSI/BHMA A156.1.
   2. Provide five knuckle, ball bearing hinges.
   3. 1-3/4 inch thick doors, up to and including 36 inches wide:
      a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches high
      b. Interior: Standard weight, steel, 4-1/2 inches high
   4. 1-3/4 inch thick doors over 36 inches wide:
      a. Exterior: Heavy weight, bronze/stainless steel, 5 inches high
      b. Interior: Heavy weight, steel, 5 inches high
   5. 2 inches or thicker doors:
      a. Exterior: Heavy weight, bronze or stainless steel, 5 inches high
      b. Interior: Heavy weight, steel, 5 inches high
   6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
   7. Provide three hinges per door leaf for doors 90 inches or less in height, and one additional hinge for each 30 inches of additional door height.
   8. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
      a. Steel Hinges: Steel pins
      b. Non-Ferrous Hinges: Stainless steel pins
      c. Out-Swinging Exterior Doors: Non-removable pins

d. Out-Swinging Interior Lockable Doors: Non-removable pins
e. Interior Non-lockable Doors: Non-rising pins

9. Provide hinges with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component. Provide mortar guard for each electrified hinge specified.

2.04 CONTINUOUS HINGES

A. Manufacturers:
   1. Scheduled Manufacturer:
      a. Ives

B. Requirements:
   1. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
   2. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
   3. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
   4. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
   5. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
   6. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
   7. Provide hinges 1 inch shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.05 CYLINDRICAL LOCKS – GRADE 1

A. Manufacturers and Products:
   1. Scheduled Manufacturer and Product:
      a. Schlage ND series
   2. Acceptable Manufacturers and Products:
      a. Best 9K Series

B. Requirements:
   1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3-hour fire doors.
   2. Indicators: Where specified, provide escutcheon with lock status indicator window on top of lockset rose:
      a. Escutcheon height (including rose) 6.05 inches high by 3.68 inches wide.
      b. Indicator window measuring a minimum 3.52-inch by .60 inch with 1.92 square-inches of front facing viewing area and 180-degree visibility with a total of .236 square-inches of total viewable area.
      c. Provide snap-in serviceable window to prevent tampering. Lock must function if indicator is compromised.
      d. Provide messages color-coded with full text and symbol, as scheduled, for easy visibility.
      e. Unlocked and Unoccupied message will display on white background, and Locked and Occupied message will display on red background.
   3. Cylinders: Refer to "KEYING" article, herein.
   4. Provide locks with standard 2-3/4 inches backset, unless noted otherwise, with 1/2-inch latch throw. Provide proper latch throw for UL listing at pairs.
   5. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.

6. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
7. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
8. Provide electrified options as scheduled in the hardware sets.
9. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.
   a. Lever Design: Rhodes

2.06 EXIT DEVICES

A. Manufacturers and Products:
   1. Scheduled Manufacturer and Product:
      a. Von Duprin 98/35A series
   2. Acceptable Manufacturers and Products:
      a. Precision

B. Requirements:
   1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
   2. Cylinders: Refer to "KEYING" article, herein.
   3. Provide smooth touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
   4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
   5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
   6. Provide exit devices at pool gates with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
   7. Provide flush end caps for exit devices.
   8. Provide exit devices with manufacturers' approved strikes.
   9. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
   10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
   11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
   12. Removable Mullions: 2 inches x 3 inches steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
   13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
   14. Provide electrified options as scheduled.
   15. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
   16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

2.07 CYLINDERS

A. Manufacturers:
   1. Scheduled Manufacturer and Product:
      a. TYPE AS REQUIRED
         (VERIFY CORE TYPE AND KEY SYSTEM WITH OWNER PRIOR TO SUBMITTAL)

B. Requirements:

1. Provide cylinders/cores to match Owner's existing key system, compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.

2.08 KEYING

A. Scheduled System:
   1. Existing factory registered system:
      a. Provide cylinders/cores keyed into Owner's existing factory registered keying system. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Requirements:
   1. Construction Keying:
      a. Temporary Construction Cylinder Keying.
         1) Provide construction cores that permit voiding construction keys without cylinder removal, furnished in accordance with the following requirements.
            (a) Split Key or Lost Ball Construction Keying System.
            (b) 3 construction control keys, and extractor tools or keys as required to void construction keying.
            (c) 12 construction change (day) keys.
         2) Owner or Owner's Representative will void operation of temporary construction keys.
   2. Permanent Keying:
      a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
         1) Master Keying system as directed by the Owner.
      b. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
      c. Provide keys with the following features:
         1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
         2) Patent Protection: Keys and blanks protected by one or more utility patent(s).
         3) Geographically Exclusive: Where High Security or Security cylinders/cores are indicated, provide nationwide, geographically exclusive key system complying with the following restrictions.
      d. Identification:
         1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
         2) Identification stamping provisions must be approved by the Architect and Owner.
         3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
         4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
         5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
      e. Quantity: Furnish in the following quantities.
         1) Permanent Control Keys: 3.
         2) Master Keys: 6.
         3) Change (Day) Keys: 3 per cylinder/core that is keyed differently
         4) Key Blanks: Quantity as determined in the keying meeting.

2.09 KEY CONTROL SYSTEM

A. Manufacturers:
   1. Scheduled Manufacturer:
      a. Telkee
   2. Acceptable Manufacturers:
      a. HPC
      b. Lund

B. Requirements:
   1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
      a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
      b. Provide hinged-panel type cabinet for wall mounting.

2.10 DOOR CLOSERS

A. Manufacturers and Products:
   1. Scheduled Manufacturer and Product:
      a. LCN 4040XP series
   2. Acceptable Manufacturers and Products:
      a. Best EHD9000

B. Requirements:
   1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
   2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
   3. Cylinder Body: 1-1/2-inch 1.5 inch diameter piston with 5/8-inch (0.63 inch) diameter double heat-treated pinion journal. QR code with a direct link to maintenance instructions.
   4. Hydraulic Fluid: Fireproof, passing requirements of UL 10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees Fahrenheit to -30 degrees Fahrenheit.
   5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards. Provide snap-on cover clip, with plastic covers, that secures cover to spring tube.
   6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck. Provide graphically labelled instructions on the closer body adjacent to each adjustment valve. Provide positive stop on reg valve that prevents reg screw from being backed out.
   7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
   8. Pressure Relief Valve (PRV) Technology: Not permitted.
   9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
   10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.
   11. Closers shall be capable of being upgraded by adding modular mechanical or electronic components in the field.

2.11 DOOR TRIM

A. Manufacturers:
   1. Scheduled Manufacturer:
      a. Ives

B. Requirements:
   1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

2.12 PROTECTION PLATES

A. Manufacturers:
   1. Scheduled Manufacturer:
      a. Ives

B. Requirements:
   1. Provide protection plates with a minimum of 0.050 inch thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
   2. Sizes plates 2 inches less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch less width of door on pairs without a mullion or edge guards.
   3. At fire rated doors, provide protection plates over 16 inches high with UL label.

2.13 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:
   1. Scheduled Manufacturers:
      a. Glynn-Johnson

B. Requirements:
   1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.

2.14 DOOR STOPS AND HOLDERS

A. Manufacturers:
   1. Scheduled Manufacturer:
      a. Ives

B. Provide door stops at each door leaf:
   1. Provide wall stops wherever possible. Provide concave type where lockset has a push button of thumbturn.
   2. Where a wall stop cannot be used, provide universal floor stops.
   3. Where wall or floor stop cannot be used, provide overhead stop.
   4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

2.15 SILENCERS

A. Manufacturers:
   1. Scheduled Manufacturer:
      a. Ives

B. Requirements:
   1. Provide "push-in" type silencers for hollow metal or wood frames.
   2. Provide one silencer per 30 inches of height on each single frame, and two for each pair frame.
      a. Zero International
   3. Omit where gasketing is specified.

2.16 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

B. Scheduled Manufacturer:
   1. Zero International

C. Seals and Gasketing: Provide continuous gasketing on exterior openings, to the head and jambs, forming a continuous seal between the door and the frame. Provide smoke, light, or sound gasketing on interior doors where indicated.
   1. Provide self-tapping fasteners for aluminum extruded gasketing being applied to hollow metal frames.
      a. Provide non-corrosive fasteners for all exterior applications.
      b. Provide security fasteners where indicated.
   2. Provide neoprene, EPDM, silicone, or nylon brush inserts as specified in hardware sets. Provide non brush inserts of solid or sponge cell, as specified in hardware sets. Vinyl inserts are not allowed except where specified in hardware sets.

D. Smoke Labeled Gasketing: At all smoke labeled openings, provide smoke listed perimeter gasketing assemblies complying with NFPA 105 listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for smoke control ratings indicated based on testing according to UL 1784.

E. Fire Listed Gasketing: Assemblies complying with NFPA 80 that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction for fire ratings indicated based on testing according to UL 10C.
   1. Where frame-applied intumescent seals are required by the manufacturer, provide gaskets that comply with UL 10C Standard for Positive Pressure Fire Tests of Door Assemblies and UBC 7-2, Fire Tests of Door Assemblies.

F. Sound-Rated Gasketing: Provide acoustic gasketing to meet Sound Transmission Class (STC) rating required.

G. Meeting-Stile Gasketing: Provide meeting-stile gasketing that fastens to the meeting stiles forming a continuous seal when doors are closed.

H. Door Sweeps or Shoes: Apply to the bottom of the door to close the gap between the door bottom and finished floor or saddle threshold.
   1. Provide solid neoprene, EPDM, silicone, or nylon brush type of seal as specified in hardware sets. Vinyl inserts are not allowed except where specified in hardware sets.

I. Automatic Door Bottoms:
   1. Provide closed cell sponge, bulb neoprene. or EPDM type of seal as specified in hardware sets.
   2. Door bottom to be mortised, semi mortised, or surface mount as with a minimum thickness as specified in hardware sets.

J. Rain Drips:
   1. Provide overhead rain drips for out-swinging hollow metal doors that are not covered against 45 degree blowing rain. Aluminum extrusion to be a minimum of .088 inches thick and extend 2.50 inches from the face of the frame, in anodized finish to match door.
   2. Door sweeps or shoes with integral rain drip must meet ADA requirements

K. Thresholds: Provide threshold units not less than 4 inches wide, formed to accommodate change in floor elevation where indicated, and fabricated to accommodate door hardware and fit door frames.
   1. Threshold extrusion to be a minimum thickness as specified in hardware sets.

2.17 FINISHES

A. FINISH: BHMA 626/652 (US26D); EXCEPT:
   1. Hinges at Exterior Doors: BHMA 630 (US32D)

2. Aluminum Geared Continuous Hinges: BHMA 628 (US28)
3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
4. Protection Plates: BHMA 630 (US32D)
5. Overhead Stops and Holders: BHMA 630 (US32D)
6. Door Closers: Powder Coat to Match
7. Wall Stops: BHMA 630 (US32D)
8. Latch Protectors: BHMA 630 (US32D)
9. Weatherstripping: Clear Anodized Aluminum
10. Thresholds: Mill Finish Aluminum

PART 3 EXECUTION

3.01 EXAMINATION

A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Custom Steel Doors and Frames: HMMA 831.
3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
4. Installation Guide for Doors and Hardware: DHI TDH-007-20

B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.

C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.

D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.

E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.

H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.

I. Lock Cylinders:
1. Install construction cores to secure building and areas during construction period.
2. Replace construction cores with permanent cores as indicated in keying section.
3. Furnish permanent cores to Owner for installation.

J. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:

1. Conduit, junction boxes and wire pulls.
2. Connections to and from power supplies to electrified hardware.
3. Connections to fire/smoke alarm system and smoke evacuation system.
4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
5. Connections to panel interface modules, controllers, and gateways.
6. Testing and labeling wires with Architect's opening number.

K. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

L. Continuous Hinges: Re-locate the door and frame fire rating labels where they will remain visible so that the hinge does not cover the label once installed.

M. Door Closers & Auto Operators: Mount closers/operators on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers/operators so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.

N. Overhead Stops/Holders: Mount overhead stops/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.

O. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.

P. Thresholds:
1. Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
2. Aluminum thresholds to be cut-in, and scribed around mullions, frame members, and stops. Do not butt to thresholds. Provide a continuous surface across full width of opening from jamb to jamb.
3. Where aluminum panic-type (rabbeted) thresholds with neoprene inserts are specified, undercut doors as required to properly mate with seal in threshold.

Q. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.

R. Perimeter Gasketing:
1. Apply to head and jamb, forming seal between door and frame.
2. Install gasketing in a manner eliminating need to cut any seal to install surface mounted hardware. Install compatible mounting bracket for surface mounted hardware unless minimum 1/4 inch thick solid aluminum seals are provided for mounting of surface applied hardware.

S. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

T. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.03 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
1. Spring Hinges: Adjust to achieve positive latching when door can close freely from an open position of 30 degrees.
2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.04 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items per manufacturer's instructions to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.05 DOOR HARDWARE SCHEDULE

A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.

B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.

C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.

D. Hardware Sets:

HARDWARE GROUP NO. 201

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80 RHO	626	SCH
1	EA	PERMANENT CORE	TYPE AS REQUIRED (VERIFY CORE TYPE AND KEY SYSTEM WITH OWNER PRIOR TO SUBMITTAL)	626	BES
1	EA	SURFACE CLOSER	4040XP RW/PA TBWMS X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

HARDWARE GROUP NO. 207A

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112XY	628	IVE
1	EA	STOREROOM LOCK	ND80 RHO	626	SCH
1	EA	PERMANENT CORE	TYPE AS REQUIRED (VERIFY CORE TYPE AND KEY SYSTEM WITH OWNER PRIOR TO SUBMITTAL)	626	BES
1	EA	OH STOP	100S SERIES X SIZE & MTG AS REQ	630	GLY
1	EA	SURFACE CLOSER	4040XP RW/PA TBWMS X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	SET	SEAL	PERIMETER SEAL BY FRAME MFR		

-VERIFY ALUMINUM DOOR IS WIDE STILE.
-5" STILE IS REQUIRED FOR THE SPECIFIED LOCK, COORDINATE WITH DOOR MFR./SUPPLIER.

HARDWARE GROUP NO. 801

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8303 10" 4" X 16" F	630	IVE
1	EA	SURFACE CLOSER	4040XP RW/PA TBWMS X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 807

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8303 10" 4" X 16" F	630	IVE
1	EA	OH STOP	100S SERIES X SIZE & MTG AS REQ	630	GLY
1	EA	SURFACE CLOSER	4040XP RW/PA TBWMS X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. E714A

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	112XY	628	IVE
1	EA	PANIC HARDWARE	CD-3547A-EO LENGTH AS REQ	626	VON
1	EA	PANIC HARDWARE	CD-3547A-NL-OP LENGTH AS REQ	626	VON
2	EA	SFIC MORTISE CYLINDER W/ CONST CORE	TYPE AS REQ	626	SCH
1	EA	SFIC RIM CYLINDER W/ CONST CORE	TYPE AS REQ		
3	EA	PERMANENT CORE	TYPE AS REQUIRED	626	BES

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
			(VERIFY CORE TYPE AND KEY SYSTEM WITH OWNER PRIOR TO SUBMITTAL)		
2	EA	90 DEG OFFSET PULL	8190-O 10"	630	IVE
2	EA	SURFACE CLOSER	4040XP SCUSH TBWMS X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	RAIN DRIP	142AA DW + 4" (OMIT @ COVERED OPENINGS)	AA	ZER
1	SET	SEAL	PERIMETER SEAL BY FRAME MFR		
1	SET	ASTRAGAL	MEETING STILE SEAL BY DOOR MFR		
2	EA	DOOR SWEEP	8198AA	AA	ZER
1	EA	THRESHOLD	65A	A	ZER

****EXISTING DOOR THIS HARDWARE SET IS BASED ON A NEW DOOR AND IS BASED OFF THE PERFORMANCE AND SECURITY NEEDS REQUIRED** -GC & SUPPLIER TO SURVEY EXISTING DOORS TO DETERMINE DOOR, FRAME & HARDWARE CONDITIONS. -IF NEW HARDWARE IS REQUIRED, COORDINATE CURRENT DOOR AND FRAME PREPS WITH SPECIFIED HARDWARE. - DO NOT ORDER NEW HARDWARE FOR THIS OPENING UNTIL THE SURVEY IS COMPLETED.**

HARDWARE GROUP NO. E800CWT

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
8	EA	HINGE	5BB1HW 5 X 4.5	652	IVE

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	PUSH PLATE	8200 4" X 16"	630	IVE
2	EA	PULL PLATE	8303 10" 4" X 16" F	630	IVE
2	EA	SURFACE CLOSER	4040XP SCUSH TBWMS X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	SILENCER	SR64	GRY	IVE

****EXISTING DOOR THIS HARDWARE SET IS BASED ON A NEW DOOR AND IS BASED OFF THE PERFORMANCE AND SECURITY NEEDS REQUIRED** -GC & SUPPLIER TO SURVEY EXISTING DOORS TO DETERMINE DOOR, FRAME & HARDWARE CONDITIONS. -IF NEW HARDWARE IS REQUIRED, COORDINATE CURRENT DOOR AND FRAME PREPS WITH SPECIFIED HARDWARE. - DO NOT ORDER NEW HARDWARE FOR THIS OPENING UNTIL THE SURVEY IS COMPLETED.**

END OF SECTION

SECTION 08 80 00
GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Insulating glass units.

B. Glazing units.

C. Plastic films.

1.02 RELATED REQUIREMENTS

A. Section 08 11 13 - Hollow Metal Frames: Glazed lites in doors and borrowed lites.

B. Section 08 14 16 - Flush Wood Doors: Glazed lites in doors.

C. Section 08 43 13 - Aluminum-Framed Storefronts: Glazing provided as part of storefront assembly.

1.03 REFERENCE STANDARDS

A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

B. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2019).

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

D. ASTM C1036 - Standard Specification for Flat Glass; 2025.

E. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2025.

F. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2025.

G. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2021a.

H. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2024.

I. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2019.

J. GANA (SM) - GANA Sealant Manual; 2008.

K. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2023.

L. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2023.

M. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2023.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by each of the affected installers.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.

C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, indicate joint design, sealant contact width and depth dimensions, special application requirements, and applicable information on gaskets, spacers, setting blocks and any other accessories.

D. Samples: Submit two samples 12 by 12 inch in size of glass units, showing coloration.

E. Certificate: Certify that products of this section meet or exceed specified requirements.

F. Manufacturer's qualification statement.

G. Installer's qualification statement.

H. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with GANA (GM) for glazing installation methods. Maintain one copy on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the 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 documented experience.

1.07 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 40 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Insulating Glass Units: Provide a ten (10) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Glass Fabricators: Certified or accepted by approved Glass Manufacturer.

B. Glass Manufacturers:
   1. Guardian Glass, LLC: www.guardianglass.com.
   2. Vitro Architectural Glass (formerly PPG Glass): www.vitroglazings.com.
   3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
   1. Design Pressure: Calculated in accordance with ASCE 7.
   2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
   3. Seismic Loads: Design and size glazing components to withstand seismic loads and sway displacement in accordance with the requirements of ASCE 7
   4. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
   5. Glass thicknesses listed are minimum.

B. Weather-Resistive Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure water-resistive barrier, vapor retarder, and/or air barrier.

C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
   1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 7 computer program.
   2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 7 computer program.
   3. Solar Optical Properties: Comply with NFRC 300 test method.

2.03 GLASS MATERIALS

A. Float Glass: Provide float glass based glazing unless otherwise indicated.
   1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
   2. Kind HS - Heat-Strengthened Type: Complies with ASTM C1048; where resistance to thermal stresses is indicated or required.
   3. Kind FT - Fully Tempered Type: Complies with ASTM C1048; where safety glass is indicated or required.
   4. Tinted Type: ASTM C1036, Class 2 - Tinted, Quality - Q3, with color and performance characteristics as indicated.
   5. Thicknesses: As indicated; provide greater thickness as required for exterior glazing wind load design.

2.04 INSULATING GLASS UNITS

A. Insulating Glass Units: Types as indicated.
   1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
   2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
   3. Metal-Edge Spacers: Aluminum, bent and soldered corners.
   4. Spacer Color: Black.
   5. Edge Seal:
      a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.
      b. Color: Black.
   6. Purge interpane space with dry air, hermetically sealed.

2.05 INSULATING GLASS UNITS - SCHEDULE

A. Vision Glass: Type Low-E Tinted Insulating Glass - Light-gray, low-reflective glass outdoor appearance.
   1. Product: Solarban R60 (2) "Optigray" Fully Tempered, HT + Clear HT by Vitro Architectural Glass.
      a. Insulating Unit Construction: 1/4 inch "Optigray" glass, Solarban R60 Solar Control (sputtered) on surface (2) + 1/2 inch air space + 1/4 inch Clear Float Glass.
   2. Product: SunGuard SuperNeutral SN68 (2) "Crystal Gray" Fully Tempered, HT + Clear HT by Guardian Glass.
      a. Insulating Unit Construction: 1/4 inch "Crystal Gray" glass, SunGuard SuperNeutral SN 68 (sputtered) on surface (2) + 1/2 inch air space + 1/4 inch Clear Float Glass.
   3. Performance Values: Visible Light Transmission (VLT) 48-50 percent; SHGC 0.30-0.35; Light to Solar Gain (LSG) 1.43 - 1.64; Visible Light Reflectance – Exterior 8 percent, Interior 9-11 percent; Heat Transfer Coefficient U-Value Winter – 0.29.
   4. Manufacturer's Certified Fabricator only.

5. Substitutions: Refer to Section 01 60 00 - Product Requirements.

2.06 GLAZING UNITS

A. Monolithic Interior Vision Glazing:
   1. Applications: Interior glazing unless otherwise indicated.
   2. Glass Type: Annealed float glass.
   3. Tint: Clear.
   4. Thickness: 1/4 inch, nominal.

2.07 PLASTIC FILMS

A. Decorative Plastic Privacy Film: Polyester type.
   1. Series Type: Frosted; to be selected.
   2. Thickness Without Liner: 0.002 inch.
   3. Visible Light Transmittance (VLT): To be selected.
   4. Manufacturers:
      a. Llumar, an Eastman Chemical Company; Decorative Window Film, Llumar: www.llumar.com.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

2.08 GLAZING COMPOUNDS

A. Butyl Sealant: Single component; ASTM C920 Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.

B. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; nonbleeding, nonstaining; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.

2.09 ACCESSORIES

A. Setting Blocks: Neoprene, with 80 to 90 Shore A durometer hardness; ASTM C864 Option I. Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.

B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option I. Minimum 3 inch long by one half the height of the glazing stop by thickness to suit application, self adhesive on one face.

C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.

D. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option I; color black.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

3.02 PREPARATION

A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.

B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

3.04 INSTALLATION - PLASTIC FILM

A. Install plastic film with adhesive, applied in accordance with film manufacturer's instructions.

B. Place without air bubbles, creases or visible distortion.

C. Install film tight to perimeter of glass and carefully trim film with razor sharp knife. Provide 1/16 inch to 1/8 inch gap at perimeter of glazed panel unless otherwise required. Do not score the glass.

3.05 CLEANING

A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.

B. Remove nonpermanent labels immediately after glazing installation is complete.

C. Clean glass and adjacent surfaces after sealants are fully cured.

D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.06 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 09 05 61
COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. This section applies to all floors identified in the contract documents to receive floor coverings, including but not limited to the following:
   1. Carpet tile flooring.
   2. Tile flooring.

B. Removal of existing floor coverings.

C. Preparation of new and existing concrete floor slabs for installation of floor coverings.

D. Testing of concrete floor slabs for moisture and alkalinity (pH).

E. Provide alternate adhesive due to unsatisfactory moisture or pH conditions.
   1. Contractor shall perform all specified installations with alternate adhesive, if special adhesive is needed as indicated by test results. See Allowances and Bid Form

F. Remediation of concrete floor slabs due to unsatisfactory moisture or alkalinity (pH) conditions.
   1. Contractor shall perform all specified remediation of concrete floor slabs, if remediation is needed as indicated by test results. See Allowances and Bid Form

G. Patching compound.

1.03 RELATED REQUIREMENTS

A. Section 01 21 00 - Allowances: Allowances created by extension of bid unit pricing for alternate adhesive and remediation treatment if required.

B. Section 01 22 00 - Unit Prices: Bid pricing for remediation treatments if required.

C. Section 01 40 00 - Quality Requirements: Additional requirements relating to testing agencies and testing.

1.04 PRICE AND PAYMENT PROCEDURES

A. Section 004100 - Bid Proposal Form: Proposed unit prices and allowances.

B. Allowances: See Section 01 21 00 - Allowances and Section 004100 - Bid Proposal Form. Allowances included in the Contract (Base Bid) Amount. Allowances are based on the proposed unit price multiplied by the indicated area.
   1. Include costs for moisture and pH testing by an independent agency engaged by the Contractor in the contract sum (base bid).

C. Unit Prices: See Section 01 22 00 - Unit Prices.

D. Unit Price for Alternate Flooring Adhesive: State on the bid form the unit price per square foot for using the alternate adhesive, in the event such remediation is required.
   1. Base the unit price on the quantity indicated on the Bid Proposal Form.
   2. Indicate on the Bid Proposal Form the Allowance for Alternate Flooring Adhesive by multiplying the proposed unit price by the indicated area.
   3. Include costs for moisture and pH testing in the contract sum (base bid). Cost for moisture and pH testing is excluded from this unit price.

E. Unit Price for Moisture Mitigation Remedial Floor Coating: State on the bid form the unit price per square foot for the floor coating, installed, in the event such remediation is required.
   1. Base the unit price on the quantity indicated on the Bid Proposal Form.

2. Indicate on the Bid Proposal Form the Allowance for Remedial Floor Coating by multiplying the proposed unit price by the indicated area.
3. Include costs for moisture and pH testing in the contract sum (base bid). Cost for moisture and pH testing is excluded from this unit price.

1.05 REFERENCE STANDARDS

A. ACI 117 - Specifications for Tolerances for Concrete Construction and Materials; 2010 (Reapproved 2015).

B. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 50 mm [2 in.] Cube Specimens); 2024.

C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2022.

D. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2023.

E. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.

F. ASTM F3010 - Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings; 2018.

G. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; 2011.

H. International Concrete Repair Institute (ICRI) Certification program for concrete slab moisture testing.

1.06 ADMINISTRATIVE REQUIREMENTS

A. Coordinate scheduling of cleaning and testing, so that preliminary cleaning has been completed for at least 24 hours prior to testing.

1.07 SUBMITTALS

A. Visual Observation Report: For existing floor coverings to be removed.

B. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
   1. Moisture and alkalinity (pH) limits and test methods.
   2. Manufacturer's required bond/compatibility test procedure.

C. Remedial Materials Product Data: Manufacturer's published data on each product to be used for remediation.
   1. Manufacturer's qualification statement.
   2. Manufacturer's statement of compatibility with types of flooring applied over remedial product.
   3. Test reports indicating compliance with specified performance requirements, performed by nationally recognized independent testing agency.
   4. Manufacturer's installation instructions.
   5. Specimen Warranty: Copy of warranty to be issued by coating manufacturer and certificate of underwriter's coverage of warranty.

D. Testing Agency's Report:
   1. Description of areas tested; include floor plans and photographs.
   2. Summary of conditions encountered.
   3. Moisture and alkalinity (pH) test reports.
   4. Copies of specified test methods.
   5. Include certification of accuracy by authorized official of testing agency.
   6. Submit report to Architect Engineer and Owner.
   7. Submit report not more than five business days after conclusion of testing.

E. Adhesive Bond and Compatibility Test Report.

1.08 QUALITY ASSURANCE

A. Moisture and alkalinity (pH) testing shall be performed by an independent testing agency employed and paid by Contractor.

B. Contractor may perform adhesive and bond test with Contractor's own personnel or hire a testing agency.

C. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified.
   1. Acceptable Testing Agencies:
      a. George Donnelly Testing and Inspections; 1 Curso Lane, Hot Springs Village, Arkansas 71909; (501) 915-0626: www.moisturetesting.com.
      b. Grubbs, Hoskyn, Barton & Wyatt, Inc.; 1 Trigon Place, Little Rock, Arkansas 72209; (501) 455-2536: www.grubbsengineers.com.
      c. Other testing agent approved by Owner.
      d. Other testing agent certified as an ICRI Concrete Slab Moisture Testing Technician - Grade I.

D. Contractor's Responsibility Relating to Independent Agency Testing:
   1. Provide access for and cooperate with testing agency.
   2. Confirm date of start of testing at least 10 days prior to actual start.
   3. Allow at least 4 business days on site for testing agency activities.
   4. Achieve and maintain specified ambient conditions.
   5. Notify Architect Engineer when specified ambient conditions have been achieved and when testing will start.

E. Remedial Coating Installer Qualifications: Company specializing in performing work of the type specified in this section, trained by or employed by coating manufacturer, and able to provide at least 3 project references showing at least 3 years' experience installing moisture emission coatings.

1.09 WARRANTY

A. Provide for a 20-year minimum Manufacturer's Material and Labor Warranty for Moisture Control System components, including replacement of all damaged floor covering.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, handle, and protect products in accordance with manufacturer’s instructions and recommendations.

B. Deliver materials in manufacturer’s packaging; include installation instructions.

C. Keep materials from freezing.

1.11 FIELD CONDITIONS

A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F or more than 85 degrees F.

B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

PART 2 PRODUCTS

2.01 MATERIALS

A. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:

1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.
2. Latex or polyvinyl acetate additions are permitted; gypsum content is prohibited.
3. Compressive Strength: 4000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M.

B. Alternate Flooring Adhesive: Floor covering manufacturer's recommended product, suitable for the moisture and pH conditions present; low-VOC.

C. Remedial Floor Coating: Single- or multi-layer coating or coating/overlay combination intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of pH found, and suitable for adhesion of flooring without further treatment, installed per manufacturer's instructions including mechanical surface prep.
1. Thickness: As required for application and in accordance with manufacturer's installation instructions.
2. Acceptable Products (As recommended by manufacturer for specific project conditions):
   a. ARDEX Engineered Cements; ARDEX MC RAPID epoxy moisture control system; with ARDEX K13 or K15 self-leveling underlayment: www.ardexamericas.com.
   b. KOSTER American Corp.; either KOSTER VAP I 2000 FS, KOSTER VAP I 2000 UFS, or KOSTER VAP I 2000 ZERO VOC epoxy moisture control system; with either KOSTER LevelStrong 4500 psi, or LevelStrong HS 6500 psi self-leveling underlayment: www.kosterusa.com.
   c. MAPEI; either MAPEI Planiseal VS, or MAPEI Planiseal VS Fast epoxy moisture-reduction barrier; with MAPEI Ultraplan 1 Plus self-leveling underlayment: www.mapei.com.

PART 3 EXECUTION

3.01 CONCRETE SLAB PREPARATION

A. Prepare slab in accordance with ASTM F710.

B. Perform following operations in the order indicated:
1. Preliminary cleaning.
2. Moisture vapor emission tests; 3 tests in the first 1000 square feet and one test in each additional 1000 square feet, unless otherwise indicated or required by flooring manufacturer.
3. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
4. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
5. Specified remediation, if required.
6. Patching, smoothing, and leveling, as required.
7. Other preparation specified.
8. Adhesive bond and compatibility test.
9. Protection of substrate prior to flooring installation.

C. Remediations:
1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.
2. Excessive Moisture Emission or Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating or remedial sheet membrane over entire suspect floor area.

3. Excessive pH: If remedial floor coating is necessary to address excessive moisture, no additional remediation is required; if not, if an adhesive that is resistant to the level present is available and acceptable to the flooring manufacturer, use that adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching compound as recommended by flooring manufacturer.

3.02 REMOVAL OF EXISTING FLOOR COVERINGS

A. Comply with local, State, and federal regulations and recommendations of RFCI (RWP), as applicable to floor covering being removed.

B. Dispose of removed materials in accordance with local, State, and federal regulations and as specified.

3.03 PRELIMINARY CLEANING

A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.

B. Do not use solvents or other chemicals for cleaning.

3.04 MOISTURE VAPOR EMISSION TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. Test in accordance with ASTM F1869 and as follows.

C. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.

D. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet per 24 hours.

E. Report: Report the information required by the test method.

3.05 INTERNAL RELATIVE HUMIDITY TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.

C. Test in accordance with ASTM F2170 Procedure A and as follows.

D. Testing with electrical impedance or resistance apparatus may not be substituted for the specified ASTM test method, as the values determined are not comparable to the ASTM test values and do not quantify the moisture content sufficiently.

E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if any test value exceeds 75 percent relative humidity.

F. Report: Report the information required by the test method.

3.06 ALKALINITY TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. The following procedure is the equivalent of that described in ASTM F710, repeated here for the Contractor's convenience.

1. Use a wide range alkalinity (pH) test paper, its associated chart, and distilled or deionized water.

2. Place several drops of water on a clean surface of concrete, forming a puddle approximately 1 inch in diameter. Allow the puddle to set for approximately 60 seconds, then dip the alkalinity (pH) test paper into the water, remove it, and compare immediately to chart to determine alkalinity (pH) reading.
3. Use of a digital pH meter with probe is acceptable; follow meter manufacturer's instructions.

C. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

3.07 PREPARATION

A. See individual floor covering section(s) for additional requirements.

B. Comply with requirements and recommendations of floor covering manufacturer.

C. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.

D. Do not fill expansion joints, isolation joints, or other moving joints.

E. Provide finish surface tolerance meeting the requirements of the floor covering manufacturer. In the absence of manufacturer tolerance specifications ensure that the surface have no deviation exceeding 1/4 inch in 10 foot measured by the straight edge method as referenced in ACI 117 Floor Flatness Tolerances. Note: If leveling compound is required address relative humidity content and application of remedial floor coating if required prior to the installation of leveling compound.

3.08 ADHESIVE BOND AND COMPATIBILITY TESTING

A. Comply with requirements and recommendations of floor covering manufacturer.

3.09 APPLICATION OF REMEDIAL FLOOR COATING

A. Comply with requirements and recommendations of coating manufacturer.

3.10 INSTALLATION OF REMEDIAL FLOOR SHEET MEMBRANE

A. Install in accordance with sheet membrane manufacturer's instructions.

3.11 PROTECTION

A. Cover prepared floors with building paper or other durable covering.

END OF SECTION

SECTION 09 21 16
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Performance criteria for gypsum board assemblies.

B. Metal stud wall framing.

C. Metal channel ceiling framing.

D. Acoustic insulation.

E. Gypsum sheathing.

F. Gypsum wallboard.

G. Joint treatment and accessories.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.

B. Section 07 21 00 - Thermal Insulation: Thermal insulation.

C. Section 07 25 00 - Weather Barriers: Water-resistive barrier over sheathing.

1.03 REFERENCE STANDARDS

A. AISI S220 - North American Standard for Cold-Formed Steel Nonstructural Framing; 2020.

B. AISI S240 - North American Standard for Cold-Formed Steel Structural Framing; 2015, with Errata (2020).

C. ANSI A108/A118/A136 - American National Standard Specification for the Installation of Ceramic Tile; 2017.

D. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 2025.

E. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2017 (Reapproved 2022).

F. ASTM C514 - Standard Specification for Nails for the Application of Gypsum Board; 2004 (Reapproved 2020).

G. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2024.

H. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2024.

I. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2020.

J. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2025.

K. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2020 (Reapproved 2024).

L. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2019.

M. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2024.

N. ASTM C1288 - Standard Specification for Fiber-Cement Interior Substrate Sheets; 2023.

O. ASTM C1325 - Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units; 2017.

P. ASTM C1325 - Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units; 2025.

Q. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2024.

R. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026a.

S. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2023.

T. ASTM E413 - Classification for Rating Sound Insulation; 2022.

U. GA-216 - Application and Finishing of Gypsum Panel Products; 2024.

V. GA-600 - Fire Resistance and Sound Control Design Manual; 2024.

W. UL (FRD) - Fire Resistance Directory; Current Edition.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.

C. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.

D. Test Reports: For stud framing products that do not comply with AISI S220 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

1.05 QUALITY ASSURANCE

A. Perform in accordance with ASTM C840. Comply with requirements of GA-600 for fire-rated assemblies.

1.06 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire rated assemblies as indicated on drawings.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.

B. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with the following characteristics:

1. Acoustic Attenuation: STC of 45-49 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

2.02 METAL FRAMING MATERIALS

A. Steel Sheet: ASTM A1003/A1003M, subject to the ductility limitations indicated in AISI S220 or equivalent.

B. Manufacturers - Metal Framing, Connectors, and Accessories:

1. ClarkDietrich: www.clarkdietrich.com.
2. Marino: www.marinoware.com.
3. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 GYPSUM BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:

1. CertainTeed Corporation: www.certainteed.com.
2. Georgia-Pacific Gypsum: www.gpgypsum.com.
3. Gold Bond Building Products, LLC provided by National Gypsum Company: www.goldbondbuilding.com.

4. USG Corporation: www.usg.com.
5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Gypsum Wallboard: Paper-faced wallboard as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
   2. Fire Resistant Type: Complying with Type X requirements, UL or WH rated.
      a. At Assemblies Indicated with Fire-Resistance Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
      b. Thickness:
         1) Vertical Surfaces: 5/8 inch.
         2) Ceilings: 5/8 inch.
         3) Edges: Tapered.
   3. Paper-Faced Products:
      a. CertainTeed Corporation; Type X Drywall: www.certainteed.com.
      b. Georgia-Pacific Gypsum; ToughRock Fireguard X: www.gpgypsum.com.
      c. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond Fire-Shield Gypsum Board: www.goldbondbuilding.com.
      d. USG Corporation; USG Sheetrock Brand Firecode X Panels: www.usg.com.

C. Backing Board For Non-Wet Areas: Water-resistant gypsum backing board as defined in ASTM C1396/C1396M; sizes to minimum joints in place; ends square cut.
   1. Application: Vertical surfaces behind thinset tile, except in wet areas.
   2. Type X Thickness: 5/8 inch.
   3. Edges: Tapered.
   4. Products:
      a. American Gypsum Company; M-Bloc: www.americangypsum.com.
      b. Certainteed Corporation; M2Tech or ProRoc Brand Moisture and Mold Resistant Gypsum Board.
      c. Georgia-Pacific Gypsum; ToughRock Mold-Guard Gypsum Board: www.gpgypsum.com.
      d. Georgia-Pacific Gypsum; DensArmor Plus: www.gpgypsum.com.
      e. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond XP Fire-Shield Gypsum Board: www.goldbondbuilding.com.
      f. USG Corporation; Sheetrock Brand Mold Tough Gypsum Panels.
      g. Substitutions: See Section 01 60 00 - Product Requirements.

D. Ceiling Board: Gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Ceilings, unless otherwise indicated.
   2. Thickness: 5/8 inch.
   3. Edges: Tapered.
   4. Products:
      a. CertainTeed Corporation; Interior Ceiling Drywall: www.certainteed.com.
      b. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond Ceiling Board: www.goldbondbuilding.com.
      c. USG Corporation; Sheetrock Brand Ceiling Panels: www.usg.com.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

E. Exterior Sheathing Board: Sizes to minimize joints in place; ends square cut.
   1. Application: Exterior sheathing, unless otherwise indicated.
   2. Glass Mat Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.
   3. Core Type: Type X, as indicated.

4. Board Thickness: 1/2 inch.
5. Edges: Square.
6. Glass Mat Faced Products:
    a. CertainTeed Corporation; GlasRoc Type X Exterior Sheathing: www.certainteed.com.
    b. Georgia-Pacific Gypsum; DensGlass Sheathing: www.gpgypsum.com.
    c. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond eXP Fire-Shield Sheathing: www.goldbondbuilding.com.
    d. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 GYPSUM BOARD ACCESSORIES

A. Batt Insulation: Complying with ASTM C665; for acoustical control and fire-protection applications.
    1. Mineral Fiber Batt Insulation: Flexible preformed batt or blanket; friction fit; unfaced.
        a. Formaldehyde-free, non-combustible, moisture-resistant, non-corrosive, non-deteriorating, mildew-resistant, and vermin-resistant mineral.
        b. Flame Spread and Smoke Developed: 0 (zero), when tested in accordance with ASTM E84.
        c. Thickness: As indicated on Drawings.
        d. Products:
            1) Thermafiber, Inc. (an Owens Corning company); Thermafiber SAFB (Sound Attenuation Fire Blanket): www.owenscorning.com.

B. Water-Resistive Barrier: See Section 07 25 00.

C. Finishing Accessories: ASTM C1047, extruded aluminum alloy (6063 T5) or galvanized steel sheet ASTM A924/A924M G90, unless noted otherwise.
    1. Types: As detailed or required for finished appearance.
    2. Special Shapes: In addition to conventional corner bead and control joints, provide U-bead at exposed panel edges.

D. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
    1. Fiberglass Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
    2. Paper Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
    3. Joint Compound: Drying type, vinyl-based, ready-mixed.
    4. Joint Compound: Setting type, field-mixed.

E. Screws: ASTM C 1002; self-piercing tapping type; cadmium-plated for exterior locations.

F. Nails for Attachment to Wood Members: ASTM C514.

G. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

2.05 TEAR AWAY BEAD

A. Trim: Engineered rigid PVC trim used to finish exposed edge of drywall.
    1. Self-Extinguishing: Shall not continue to support combustion once flame source is removed.
    2. Meet or exceed following ASTM Standards:
        a. ASTM E84 - Achieve Class A rating for Smoke and Flame Spread.
        b. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard.
    3. Products: Trim-Tex Inc.; Tear Away Bead: www.trim-tex.com, or similar.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with ASTM C1007AISI S220 and manufacturer's instructions.

B. Studs: Space studs at 16 inches on center.
   1. Extend partition framing to structure where indicated and to ceiling in other locations.
   2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
   3. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.

C. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

D. Blocking: Install mechanically fastened steel channel blocking for support of:
   1. Framed openings.
   2. Wall-mounted cabinets.
   3. Plumbing fixtures.
   4. Toilet partitions.
   5. Toilet accessories.
   6. Wall-mounted door hardware.

3.03 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
   1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
   2. At exterior soffits, not more than 30 feet apart in both directions.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.04 JOINT TREATMENT

A. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.

3.05 FINISH

A. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
   1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
   2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
   3. Level 3: Walls to receive textured wall finish.
   4. Level 2: Utility areas, behind cabinetry, and on backing board to receive tile finish.
   5. Level 1: Fire-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.
   6. Level 0: Temporary partitions.

B. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch.
   2. Taping, filling, and sanding are not required at base layer of double-layer applications.

C. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

D. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

3.06 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 22 36
LATH

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal lath for gypsum plaster.

1.02 RELATED REQUIREMENTS

A. Section 09 23 00 - Gypsum Plastering.

1.03 REFERENCE STANDARDS

A. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2019.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2025a.

C. ASTM A924/A924M - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process; 2020.

D. ASTM C841 - Standard Specification for Installation of Interior Lathing and Furring; 2003 (Reapproved 2018).

E. ASTM C847 - Standard Specification for Metal Lath; 2018.

F. ASTM C1063 - Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster; 2021.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on furring and lathing components, structural characteristics, material limitations, and finish.

C. Samples:
   1. Submit two samples, 6 inch in size illustrating lath material and finish.

PART 2 PRODUCTS

2.01 LATH

A. Diamond Mesh Metal Lath: ASTM C847, cold-rolled carbon-steel sheet with ASTM A653/A653M, G60 (Z180), hot-dip galvanized-zinc coating.
   1. Weight: 3.4 lb/sq yd.

B. Corner Mesh: ASTM C1063; Fabricated from expanded-metal lath with ASTM A653/A653M, G60 (Z180), hot-dip galvanized-zinc coating.

C. Strip Mesh: Fabricated from expanded-metal lath with ASTM A653/A653M, G60 (Z180), hot-dip galvanized-zinc coating.

D. Cornerbeads: ASTM C841 or ASTM C1063; galvanized steel corner beads, unless noted otherwise.

E. Fasteners for Attaching Metal Lath to Substrates: ASTM C841.

F. Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch diameter unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that substrates are ready to receive work and conditions are suitable for application.

C. Do not begin until unacceptable conditions have been corrected.

D. If substrate preparation is the responsibility of another installer, notify Architect Engineer of unsatisfactory preparation before proceeding.

3.02 INSTALLATION - GENERAL

A. Install interior lath and furring for gypsum plaster in accordance with ASTM C841.

SECTION 09 23 00
GYPSUM PLASTERING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Gypsum plastering on metal lath.

1.02 RELATED REQUIREMENTS

A. Section 09 22 36 - Lath: Metal lath, furring, and accessories for plaster base.

1.03 REFERENCE STANDARDS

A. ASTM C28/C28M - Standard Specification for Gypsum Plasters; 2010 (Reapproved 2015).

B. ASTM C631 - Standard Specification for Bonding Compounds for Interior Gypsum Plastering; 2009 (Reapproved 2020).

C. ASTM C841 - Standard Specification for Installation of Interior Lathing and Furring; 2003 (Reapproved 2018).

D. ASTM C842 - Standard Specification for Application of Interior Gypsum Plaster; 2005 (Reapproved 2025).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittals procedures.

B. Product Data: Provide data on plaster materials, characteristics, and limitations of products specified.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section with minimum three years experience.

1.06 FIELD CONDITIONS

A. Do not apply plaster when substrate or ambient air temperature is under 50 degrees F or over 80 degrees F.

B. Maintain minimum ambient temperature of 50 degrees F during and after installation of plaster.

PART 2 PRODUCTS

2.01 PLASTER MATERIALS

A. Base-Coat: Ready-mixed gypsum plaster, ASTM C28/C28M; mill-mixed type, requiring only the addition of water.

B. Finish-Coat: Ready-mixed finishing plaster; mill-mixed, gaged, sand float type prepared mixture of gypsum plaster and sand.

C. Water for Mixing and Finishing Plaster: Clean, fresh, potable and free of mineral or organic matter that could adversely affect plaster, lath, or accessories.

D. Bonding Compound: ASTM C631 Type recommended for bonding plaster to substrate.

2.02 LATH AND ACCESSORIES

A. Metal Lath and Accessories: As specified in Section 09 22 36.

2.03 PLASTER MIXES

A. Ready-Mixed Plaster Materials: Mix in accordance with manufacturer's instructions.

B. Finish: Smooth trowel finish suitable for paint.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing conditions are satisfactory before starting work.

3.02 INSTALLATION - GYPSUM LATH AND ACCESSORIES

A. Install gypsum lath in accordance with ASTM C841.

3.03 PLASTERING APPLICATION

A. Apply gypsum plaster in accordance with ASTM C842 and manufacturer's instructions.
   1. Do not deviate more than plus or minus 1/8 inch in 10 feet from a true plane in finished plaster surfaces when measured by a 10-foot straightedge placed on surface.
   2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
   3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.

B. Base-Coat Plaster: Over expanded-metal lath.
   1. Brown Coat: Lightweight-gypsum ready-mixed plaster.

C. Finish Coats:
   1. Smooth-Troweled Finishes: Gypsum ready-mixed finish plaster.

D. Finish Texture: Trowel to a consistent and smooth finish.

END OF SECTION

SECTION 09 30 00
TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tile for floor applications.

B. Tile for wall applications.

C. Metal trim.

1.02 RELATED REQUIREMENTS

A. Section 07 92 00 - Joint Sealants: For sealing of expansion, contraction, control, and isolation joints in tile surfaces and adjacent construction and fixtures.

B. Section 09 05 61 - Common Work Results for Flooring Preparation: Concrete slab moisture and alkalinity testing and remediation procedures.

C. Section 09 21 16 - Gypsum Board Assemblies: Tile backing panels.

1.03 REFERENCE STANDARDS

A. ANSI A108/A118/A136 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2024.

B. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive; 2021.

C. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2023.

D. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2021.

E. ANSI A137.3 - American National Standard Specifications for Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs; 2017.

F. ANSI A326.3 - American National Standard Test Method for Measuring Dynamic Coefficient of Friction of Hard Surface Flooring Materials; 2017.

G. ASTM C373 - Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products; 2018 (Reapproved 2023).

H. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

I. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation, 2020.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturer's product data sheet for each type of product, including tile, mortar, grout, and accessories.

C. Shop Drawings: Indicate locations of each type of tile, tile layout, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.

D. Samples: Full size units of each type and composition of tile and for each color and finish required, illustrating pattern and color variations. Submit samples in conjunction with product data. Architectural folders and printed samples are not acceptable.

E. Installer's Qualification Statement:

F. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods. Submit in conjunction with product data and samples.

1.05 QUALITY ASSURANCE

A. Maintain one copy of and ANSI A108/A118/A136 and TCNA (HB) on site.

B. Installer Qualifications:
   1. Company specializing in performing tile installation, with minimum of five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.

B. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

C. Protect materials from freezing or overheating in accordance with manufacturer's instructions.

1.07 FIELD CONDITIONS

A. Do not install solvent-based products in an unventilated environment.

B. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials or as recommended by manufacturer.

PART 2 PRODUCTS

2.01 TILE

A. Ceramic Wall Tile, Type CT-1: Glazed, ANSI A137.1 standard grade.
   1. Moisture Absorption: <20.0 percent as tested in accordance with ASTM C373.
   2. Size: 4 by 12 inch, nominal.
   3. Thickness: 5/16 inch.
   4. Surface Finish: Glossy.
   5. Color: As indicated on drawings.
   6. Products:
      a. Dal-Tile Corporation; Mythology: www.daltile.com.
      b. Substitutions: Not permitted.

B. Ceramic Wall Tile, Type CT-2: Glazed, ANSI A137.1 standard grade.
   1. Moisture Absorption: <3.0 percent as tested in accordance with ASTM C373.
   2. Size: 12 by 24 inch.
   3. Thickness: 5/16 inch.
   4. Surface Finish: Glossy.
   5. Color: As indicated on drawings.
   6. Products:
      a. Dal-Tile; Luminique: www.daltile.com.
      b. Substitutions: Not permitted.

C. Porcelain Floor Tile: ANSI A137.1 standard grade.
   1. Moisture Absorption: <0.5 percent as tested in accordance with ASTM C373.
   2. Size: 12 by 24 inch, nominal.
   3. Thickness: 5/16 inch.
   4. Surface Finish: Matte.
   5. Color: As indicated on drawings.
   6. Products:
      a. Dal-Tile Corporation; Portfolio: www.daltile.com.
      b. Substitutions: Not permitted.

2.02 ACCESSORIES AND TRIM

A. Metal Trim: Satin natural anodized extruded aluminum, angle or L-shaped height to match tile and setting-bed thickness, for setting using tile mortar.
   1. Applications: As indicated on drawings.
   2. Finish: As indicated on drawings.
   3. Product:
      a. Schluter-Systems: www.schluter.com.

B. Provide floor trim profiles indicated or required to provide transition between adjacent floor finishes. Installed floor trim not to exceed ADA Standards guideline height of 1/2 inch.

2.03 ADHESIVE MATERIALS

A. Not permitted.

2.04 SETTING MATERIALS

A. Provide setting and grout materials from same manufacturer.

B. Modified Dry-Set Cement Mortar (Thin-Set): ANSI A118.4.
   1. Applications: Use with tiles less than 15 inches on all sides; interior and exterior applications.
   2. Products:
      a. Mapei Corporation; Ultraflex 3: www.mapei.com.
      b. LATICRETE International, Inc.; 253 Gold: www.laticrete.com.
      c. Custom Building Products; Prolite: www.custombuildingproducts.com.
      d. Bostik; Single Flex: www.bostik.com.

C. Large and Heavy Tile Modified Dry-Set Cement Mortar (Thin-Set): ANSI A118.4.
   1. Applications: Use with tiles greater than 15 inch on any side, or heavy tiles more than 5 lbs per square foot; interior and exterior applications.
   2. Products:
      a. Mapei Corporation; Ultraflex LFT: www.mapei.com.
      b. LATICRETE International, Inc.; 4-XLT: www.laticrete.com.
      c. Custom Building Products; Prolite: www.custombuildingproducts.com.
      d. Bostik; BAM: www.bostik.com.

2.05 GROUT MATERIALS

A. Provide setting and grout materials from same manufacturer.

B. High Performance Tile Grout: ANSI A118.7, polymer modified cement grout.
   1. Applications: As indicated on drawings
   2. Color: As indicated on drawings
   3. Products:
      a. Mapei Corporation; Ultracolor Plus FA: www.mapei.com.
      b. LATICRETE International, Inc.; PERMACOLOR Select: www.laticrete.com.
      c. Custom Building Products; Fusion Pro: www.custombuildingproducts.com.
      d. Bostik; Hydroment Vivid: www.bostik.com.

C. Epoxy Grout: ANSI A118.3, water-cleanable.
   1. Applications: As indicated on drawings.
   2. Color: As indicated on drawings.
   3. Products:
      a. LATICRETE International, Inc; LATICRETE SPECTRALOCK PRO Premium Grout: www.laticrete.com.
      b. Mapei Corporation; Kerapoxy CQ: www.mapei.com.
      c. Custom Building Products; CEG-Lite: www.custombuildingproducts.com.
      d. Bostik; ExPoxy EzClean: www.bostik.com.

2.06 MAINTENANCE MATERIALS

A. Grout Release: Temporary, water-soluble pre-grout coating. Type recommended by manufacturer.
   1. Use only when recommended by grout manufacturer.

2.07 ACCESSORY MATERIALS

A. Tile Leveling Clip System: Ensures proper leveling of tile by eliminating lippage.
   1. Application: Use with tiles greater than 15 inch on any side.
   2. Products:
      a. Raimondi; R.L.S. Tile Leveling System: www.raimondispa.com.
      b. Rubi; Delta LS Leveling System: www.rubi.com.

B. Uncoupling Membrane: ANSI A118.10, high-density polyethylene membrane.
   1. Application: Use under all floor tile.
   2. Provide 1/8 inch (3 mm) thick, orange, high-density polyethylene membrane with grid structure of 1/2 by 1/2 inch square cavities, each cut back in a dovetail configuration, and a polypropylene anchoring fleece laminated to underside.
      a. Products:
         1) Schluter Systems; Schluter-DITRA: www.schluter.com.
   3. Provide waterproofing seaming membrane material 0.004 inch (4 mil) thick, orange polyethylene membrane, with polypropylene fleece laminated on both sides.
      a. Products:
         1) Schluter Systems; Schluter-KERDI-BAND: www.schluter.com.

C. Movement Joints:
   1. Provide rounded back-up strip and sealant for movement joints in accordance with TCNA EJ171 and ASTM C920.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108/A118/A136 for installations indicated.

B. Verify that required floor-mounted utilities are in correct location.

C. Verify location of movement joints, where required.

3.02 PREPARATION

A. Protect surrounding work from damage.

B. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

C. Install backer board in accordance with ANSI A108/A118/A136 and board manufacturer's written instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

3.03 INSTALLATION - GENERAL

A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.20, manufacturer's instructions, and TCNA (HB) recommendations.

B. Provide movement joints as indicated on Drawings, or if not indicated, Contractor shall locate joints in conformance with TCNA EJ171 Movement Joint Guidelines for Ceramic, Glass, and Stone, Guidelines recommendations, subject to Architect Engineer's approval.

C. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D. Lay tile to pattern indicated on drawings. Do not interrupt tile pattern through openings, unless noted otherwise.

E. Cut and fit tile closely to penetrations, leaving sealant joint space. Form corners neatly. Align floor, base, and wall joints, unless noted otherwise.

F. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

G. Install metal trim in accordance with manufacturer's instructions at locations indicated on drawings.

H. Sound tile after setting. Replace hollow sounding units.

I. Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles. Keep movement joints free of mortar and grout.

J. Prior to grouting, allow installation to completely cure; minimum of 48 hours, or as recommended by manufacturer

K. Grout tile joints unless otherwise indicated.

L. At changes in plane and tile-to-tile movement joints, use flexible caulk as recommended by ANSI and TCNA that meets ASTM C920, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding. Color match flexible caulk to grout in tile assembly.

3.04 INSTALLATION - INTERIOR FLOORS (THIN-SET)

A. General: Final assembly to comply with ADA Standards for 1/2 inch maximum height difference between flooring materials.

B. On-ground concrete substrate with cementitious bond coat and epoxy grout, install in accordance with TCNA Method F115.
   1. Install uncoupling membrane under all floor tile per manufacturer's written instructions.

C. On-ground concrete substrate with cementitious self-leveling underlayment, install in accordance with TCNA Method F205.
   1. Install uncoupling membrane under all floor tile per manufacturer's written instructions.

D. Above-ground concrete substrate with cementitious bond coat and epoxy grout, install in accordance with TCNA Method F115A.
   1. Install uncoupling membrane under all floor tile per manufacturer's written instructions.

E. Above-ground concrete substrate with cementitious self-leveling underlayment, install in accordance with TCNA Method F205A.
   1. Install uncoupling membrane under all floor tile per manufacturer's written instructions.

3.05 INSTALLATION - INTERIOR WALL TILE (THIN-SET)

A. Wood or metal studs with gypsum board and cementitious bond coat in dry areas, install in accordance with TCNA Method W243.

B. Wood or metal studs with coated glass mat water-resistant gypsum backer board, install in accordance with TCNA Method W245.

C. Wood or metal studs with cement backer board, install in accordance with TCNA Method W244C, with waterproof membrane.

D. Masonry or concrete substrates, install in accordance with TCNA Method W202I, with or without waterproof membrane.

3.06 ADJUSTING AND CLEANING

A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.

B. Clean all tile surfaces, accessories and trim so they are free of foreign matter. Use only cleaners recommended by tile and grout manufacturers.

C. Protect metal surfaces and plumbing fixtures from effects of cleaning.

D. Do not use bleach, ammonia, or vinegar on sanded grout.

3.07 PROTECTION

A. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

END OF SECTION

SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Suspended metal grid ceiling system.

1.02 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 09 84 30 - Sound Absorbing Wall and Ceiling Units.

1.03 REFERENCE STANDARDS

A. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2019 (Reapproved 2025).

B. 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; 2024a.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Do not install acoustical units until after interior wet work is dry.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on suspension system components and acoustical units.

C. Samples: Submit two samples each, 6 inches long, of suspension system main runner, cross runner, and perimeter molding.

D. Certifications: Manufacturer's certifications that products and assemblies comply with specified requirements, including laboratory reports showing compliance with specified test, codes, and standards.

E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

F. Provide manufacturer's standard material warranty.

1.06 QUALITY ASSURANCE

A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 FIELD CONDITIONS

A. Maintain uniform temperature and maximum humidity as directed by manufacturer, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.01 SUSPENSION SYSTEM

A. Manufacturers:
   1. Armstrong World Industries, Inc: www.armstrongceilings.com.
   2. Certainteed Architectural: www.certainteed.com/ceilings-and-walls.
   3. Rockfon: www.rockfon.com.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 SYSTEM AND ACCESSORIES

A. See Section 09 84 30 for acoustical units installed in suspension system.

B. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

C. Hanger Wire: 12 gauge, 0.08 inch galvanized steel wire.

D. Perimeter Moldings: Same metal and finish as grid.

E. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

3.02 PREPARATION

A. Install after major above-ceiling work is complete.

B. Coordinate the location of hangers with other work.

3.03 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C636/C636M and ASTM E580/E580M and as supplemented in this section.

B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

C. Lay out system to a balanced grid design as indicated on drawings..

D. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
   1. Use longest practical lengths.
   2. Overlap and rivet corners.

E. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

I. Do not eccentrically load system or induce rotation of runners.

J. Form expansion joints as detailed. Form to accommodate plus or minus 1 inch movement. Maintain visual closure.

3.04 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION

SECTION 09 65 00
RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Resilient base.

B. Resilient stair accessories.

C. Installation accessories.

1.02 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 09 05 61 - Common Work Results for Flooring Preparation: Removal of existing floor coverings, cleaning, and preparation.

1.03 REFERENCE STANDARDS

A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2019a, with Editorial Revision (2020).

B. ASTM F1861 - Standard Specification for Resilient Wall Base; 2021.

C. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2019.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on specified products and accessories, describing physical and performance characteristics; sizes, patterns and colors available; and installation instructions.

C. Samples: Submit one for each exposed product and for each color, texture, and pattern specified, in manufacturer's standard size, but not less than, 6 by 6 inch. Printed material will not be accepted as samples. Submit concurrently with product data.

D. Certification: Prior to installation of flooring, submit written certification by flooring and adhesive manufacturer that condition of sub-floor is acceptable.

E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Flooring Material: 5 percent of each type and color, and rounded up to nearest full carton.
   3. Extra Wall Base: 5 percent of each type and color, and rounded up to nearest full carton.

G. Warranty: Provide manufacturer's warranty information on material and adhesive.

H. Closeout Submittals: See Section 01 78 00 Closeout Submittals for additional information.
   1. Manufacturer's commercial warranty information on all products.
   2. Manufacturer's recommended maintenance procedures for all products.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing specified flooring with minimum three years documented experience.

B. Installer Qualifications: Company specializing in installing specified flooring with minimum three years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, and quantity.

B. Store all materials off of the floor in an acclimatized, weather-tight space.

C. Maintain temperature in storage area between 55 degrees F and 90 degrees F, or as recommended by manufacturer.

D. Protect roll materials from damage by storing on end.

E. Do not double stack pallets.

1.07 WARRANTY

A. Manufacturer's full system warranty, including flooring material defects and adhesion, when installed and maintained according to manufacturer's written recommendations.

1.08 FIELD CONDITIONS

A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F, or as recommended by manufacturer.

PART 2 PRODUCTS

2.01 STAIR ACCESSORIES

A. Stair Nosings: 3 inch horizontal return, 2 inch vertical return, full width of stair tread in one piece.
   1. Manufacturers:
      a. Johnsonite, a Tarkett Company: www.commercial.tarkett.com.
      b. Substitutions: Not permitted.
   2. Material: Rubber.
   3. Nominal Thickness: 0.125 inch.
   4. Color: As shown on drawings.

2.02 RESILIENT BASE

A. Resilient Base: ASTM F1861, Type TP, rubber, thermoplastic; top set Style D, Sculptured.
   1. Manufacturers:
      a. Johnsonite, a Tarkett Company; Millwork: www.commercial.tarkett.com.
      b. Substitutions: Not permitted.
   2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648, NFPA 253, ASTM E 648, or NFPA 253.
   3. Height: 4 1/4 inch.
   4. Sculptured Profile: As indicated on drawings
   5. Thickness: 0.25 inch.
   6. Length: Coiled 8 foot sections.
   7. Color: As indicated on drawings.
   8. Corners: Job formed; mitered.

2.03 ACCESSORIES

A. Comply with Section 09 05 61 - Common Work Results for Flooring Preparation.

B. Subfloor Filler: White premix latex type recommended by adhesive material manufacturer and flooring manufacturer to suit resilient flooring and substrate conditions.

C. Adhesives: Water-resistant type recommended by flooring manufacturer to suit substrate conditions.

D. Moldings and Edge/Transition Strips: Rubber or vinyl, color as indicated on drawings.
   1. Flammibility (ASTM E648): Class 1

2. Static Coefficient of Friction (ASTM D2047): ≥08.
3. Material to Floor Height: 1/4 inch.
4. Depth: 1 1/2 inch.
5. Manufacturers:
   a. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.

3.02 INSTALLATION - GENERAL

A. Starting installation constitutes acceptance of subfloor conditions.

B. Install in accordance with manufacturer's written instructions.

C. Adhesive-Applied Installation:
   1. Spread only enough adhesive to permit installation of materials before initial set.
   2. Fit joints and butt seams tightly.
   3. Set flooring in place, press with heavy roller to attain full adhesion.

D. Loose-Laid Installation: Set flooring in place in accordance with manufacturer's instructions.

E. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.

F. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.

G. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

H. Spread adhesive and back roll. Installations with trowel marks that telegraph through flooring are not acceptable and flooring will be rejected.

3.03 INSTALLATION - RESILIENT BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.

C. Install base on solid backing. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

D. Scribe and fit to door frames and other interruptions.

3.04 INSTALLATION - STAIR COVERINGS

A. Install stringers configured tightly to stair profile.

B. Tightly adhere to substrates throughout length of each piece.

3.05 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's written instructions.

3.06 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 09 68 13
TILE CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Modular carpet tile, fully adhered.

1.02 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 09 05 61 - Common Work Results for Flooring Preparation: Removal of existing floor coverings, cleaning, and preparation.

1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2016 (Reapproved 2021).

C. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2019a, with Editorial Revision (2020).

D. CRI 104 - Standard for Installation of Commercial Carpet; 2015.

E. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2019.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, including carpet tile, adhesive, and accessories, describing physical and performance characteristics; sizes, patterns, colors, and method of installation.

C. Concrete Moisture Test Report: Submit a copy of the moisture and pH test reports. See Section 09 05 61 - Common Work Results for Flooring Preparation for testing requirements.

D. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected. To be submitted concurrently with product data.

E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

F. Operation and Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

G. Manufacturer's Warranty: Provide manufacturer's standard material warranty.

H. Closeout Submittals: See Section 01 78 00 for additional information.
   1. Manufacturer's commercial warranty information on carpet tile and adhesives.
   2. Manufacturer's recommended maintenance procedures.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.

B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

1.06 FIELD CONDITIONS

A. Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.

B. Store materials in area of installation for minimum period of 24 hours prior to installation, or as recommended by manufacturer.

1.07 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: 10 years from date of Substantial Completion.
   2. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.

PART 2 PRODUCTS

2.01 MATERIALS

A. Carpet Tile: Tufted, manufactured in one color dye lot.
   1. Size: 24 by 24 inch, nominal.
   2. Pile Thickness: 0.080 inch for finished carpet tile.
   3. Color and Pattern: As indicated on drawings.
   4. Fiber Content: 100 percent nylon 6, 6.
   5. Critical Radiant Flux Classification: Minimum of 0.22 watts/sq cm according to ASTM E648 or NFPA 253.
   6. Surface Flammability Ignition: Pass ASTM D2859 "pill test".
   7. Total Weight: 111.7 oz/sq yd for finished carpet tile.
   8. Primary Backing: Manufacturer's standard composite materials.
   9. Products:
      a. Tarkett; 2ndPower II: www.commercial.tarkett.com.
      b. Substitutions: Not permitted.

B. Walk-off Carpet Tile: Tufted, manufactured in one color dye lot.
   1. Color and Pattern: As indicated on drawings.
   2. Critical Radiant Flux Classification: Minimum of 0.22 watts/sq cm according to ASTM E648 or NFPA 253.
   3. Surface Flammability Ignition: Pass ASTM D2859 "pill test".
   4. Primary Backing: Manufacturer's standard composite materials.
   5. Manufacturers:
      a. Tarkett: www.commercial.tarkett.com.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer

B. Edge/Transition Strips: Profile and width as indicated on drawings, of height required to protect exposed edge, and of maximum lengths to minimize running joints. Final assembly height not to exceed ADA Standards guideline height of 1/2 inch.

C. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.

B. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to subfloor surfaces.

C. Concrete Slabs: Verify that substrates are dry enough and ready for flooring installation by testing for moisture vapor emissions, relative humidity in the slab, and slab pH.
   1. Moisture Testing: Test in accordance with Section 09 05 61 - Common Work Results for Flooring Preparation, and as recommended by flooring and adhesive manufacturers.
   2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.
   3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Prepare floor substrates for installation of flooring in accordance with Section 09 05 61 - Common Work Results for Flooring Preparation, and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.

B. Vacuum clean substrate.

3.03 INSTALLATION

A. Starting installation constitutes acceptance of subfloor conditions.

B. Installation Method: Glue down; install with full-spread, releasable, pressure-sensitive adhesive.

C. Installation Pattern: As indicated on drawings.

D. Install carpet tile in accordance with manufacturer's written instructions.

E. Blend carpet from different cartons to ensure minimal variation in color match.

F. Cut carpet tile clean. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

G. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

H. Complete installation of edge/transition strips, concealing exposed edges.

3.04 CLEANING

A. Remove excess adhesive without damage, from floor, base, and wall surfaces.

B. Clean and vacuum carpet surfaces, per manufacturer's written instructions.

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 09 72 00
WALL COVERINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation and prime painting.

B. Wall covering.

1.02 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 09 21 16 - Gypsum Board Assemblies: Finish Level 5 of substrate surfaces.

1.03 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026a.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on wall covering and adhesive.

C. Shop Drawings: Indicate wall elevations with seaming layout.

D. Samples: Submit two samples of wall covering, 12 inch in size illustrating color, finish, and texture.

E. Samples: Submit two samples of wall covering, memo size, illustrating color, finish, and texture.

F. Test Reports: Indicate verification of flame and smoke ratings, when tested by UL.

G. Manufacturer's Installation Instructions: Indicate special procedures.

H. Maintenance Data: Submit data on cleaning, touch-up, and repair of covered surfaces.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.

B. 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. Inspect roll materials at arrival on site, to verify acceptability.

B. Protect packaged adhesive from temperature cycling and cold temperatures.

C. Do not store roll goods on end.

1.07 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the adhesive or wall covering product manufacturer.

B. Maintain these conditions 24 hours before, during, and after installation of adhesive and wall covering.

PART 2 PRODUCTS

2.01 WALL COVERINGS

A. General Requirements:
   1. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84.

B. Wall Covering:
   1. Comply with ASTM F793/F793M, Category V, Type II.
   2. Fire Rating: Class A.
   3. Roll Width: 48 inches.
   4. Color: As indicated on drawings.
   5. Vertical Repeat: 39 inches.
   6. Horizontal Repeat: 22 inches.
   7. Manufacturers:
      a. Koroseal/RJF International; Reatec Architectural Film: www.koroseal.com/#sle.
      b. Substitutions: Not permitted.

C. Adhesive: Type recommended by wall covering manufacturer to suit application to substrate.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are prime painted and ready to receive work, and comply with requirements of wall covering manufacturer.

B. Measure moisture content of surfaces using an electronic moisture meter. Do not apply wall coverings if moisture content of substrate exceeds level recommended by wall covering manufacturer.

C. Verify flatness tolerance of surfaces does not vary more than 1/8 inch in 10 feet nor vary at a rate greater than 1/16 inch/ft.

3.02 PREPARATION

A. Wash impervious surfaces with tetra-sodium phosphate, rinse and neutralize; wipe dry.

B. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.

3.03 INSTALLATION

A. Apply adhesive and wall covering in accordance with manufacturer's instructions.

B. Apply adhesive to wall surface immediately prior to application of wall covering.

C. Use wall covering in roll number sequence.

D. Razor trim edges on flat work table. Do not razor cut on gypsum board surfaces.

E. Apply wall covering smooth, without wrinkles, gaps or overlaps. Eliminate air pockets and ensure full bond to substrate surface.

F. Butt edges tightly.

G. Horizontal seams are not acceptable.

H. Do not seam within 2 inches of internal corners or within 6 inches of external corners.

I. Install wall covering before installation of bases and items attached to or spaced slightly from wall surface.

J. Do not install wall covering more than 1/4 inch below top of resilient base.

K. Remove excess adhesive while wet from seam before proceeding to next wall covering sheet. Wipe clean with dry cloth.

3.04 CLEANING

A. Clean wall coverings of excess adhesive, dust, dirt, and other contaminants.

B. Reinstall wall plates and accessories removed prior to work of this section.

3.05 PROTECTION

A. Do not permit construction activities at or near finished wall covering areas.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 09 84 30
SOUND-ABSORBING WALL AND CEILING UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sound-absorbing panels.

B. Sound-absorbing ceiling baffles.

C. Mounting accessories.

1.02 RELATED REQUIREMENTS

A. Section 06 41 00 - Architectural Wood Casework.

B. Section 09 51 00 - Acoustical Ceilings: Ceiling suspension system.

1.03 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026a.

PART 2 PRODUCTS

2.01 SOUND-ABSORBING UNITS

A. General:
   1. Prefinished, factory assembled fabric-covered panels.
   2. Surface Burning Characteristics: Flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.

B. Ceiling Baffles:
   1. Material: PET felt, 1005 polyester fiber.
   2. Battle Height: 7 inches.
   3. Spacing: As indicated on drawings.
   4. Felt Color: As indicated on drawings.
   5. Absorption: 1.4 NRC.
   6. Fire Rating: ASTM E84 Clase A.
   7. Mounting Hardware: Cable mounting as recommended by manufacturer.
   8. Products:
      a. MPS Acoustics; JOIST Felt Ceiling Baffles: www.mpsacoustics.com.
      b. Substitutions: Not permitted.

C. Ceiling Grid Tiles:
   1. Material: PET felt, 100% polyester fiber.
   2. Tile Size: 24 by 24 inches.
   3. Tile Depth: 8 inches.
   4. Tab Depth: 6 inches.
   5. Felt Color: As indicated on drawings.
   6. Absorption: 0.85 to 1.30 NRC.
   7. Fire Rating: ASTM E84 Class A.
   8. Mounting: See Section 09 51 00 for suspension system.
   9. Products:
      a. MPS Acoustics; JOIST Felt Ceiling Baffles: www.mpsacoustics.com.
      b. Substitutions: Not permitted.

D. Wall Panel System:
   1. Material: PET felt, 100% polyester fiber
   2. Panel Size: 23 by 119 inches.
   3. Thickness: 3/8 inches.

4. Profile: Standard.
5. Felt Color: As indicated on drawings.
6. Absorption: 0.32 NRC.
7. Fire Rating: ASTM E84 Class A.
8. Edge Finish: None.
9. Mounting: Screw mounting using manufacturers backer panel.
10. Products:
    a. MPS Acoustics; Trak Felt Wall Panel: www.mpsacoustics.com.
    b. Substitutions: Not permitted.

E. Ceiling Panel System:
1. Material: PET felt, 100% polyester fiber.
2. Panel Size: 23 by 119 inches.
3. Thickness: 3/8 inches.
4. Profile: Standard.
5. Felt Color: As indicated on drawings.
6. Absorption: 0.32 NRC.
7. Fire Rating: ASTM E84 Class A.
8. Edge Finish: None.
9. Mounting: Screw mounting using manufacturers backer panel.
10. Products:
    a. MPS Acoustics; Trak Felt Ceiling Panel: www.mpsacoustics.com.
    b. Substitutions: Not permitted.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates for conditions detrimental to installation of acoustical units. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install acoustical units in locations as indicated, following manufacturer's installation instructions.

B. Install mounting accessories and supports in accordance with shop drawings.

C. Suspend ceiling baffles at locations and heights as indicated.

D. Install acoustical units to construction tolerances of plus or minus 1/16 inch for the following:
1. Plumb and level.
2. Flatness.

3.03 CLEANING

A. Clean sound-absorptive panels upon completion of installation from dust and other foreign materials, following manufacturer's instructions.

B. Clean fabric facing upon completion of installation from dust and other foreign materials, following manufacturer's instructions.

3.04 PROTECTION

A. Provide protection of installed acoustical panels until Date of Substantial Completion.

B. Replace panels that cannot be cleaned and repaired to satisfaction of the Architect Engineer.

END OF SECTION

SECTION 09 90 00
PAINTING AND COATING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints and stains.

C. Scope: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished, and unless otherwise indicated.

D. Do Not Paint or Finish the Following Items:
   1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
   5. Non-metallic roofing and flashing.
   6. Stainless steel, anodized aluminum, bronze, terne, and lead items.
   7. Marble, granite, slate, and other natural stones.
   8. Floors, unless specifically so indicated.
   9. Ceramic and other tiles.
   10. Brick, architectural concrete, cast stone, integrally colored plaster and stucco.
   11. Exterior insulation and finish system (EIFS).
   12. Glass.
   13. Concrete masonry in utility, mechanical, and electrical spaces.
   14. Acoustical materials, unless specifically so indicated.
   15. Concealed pipes, ducts, and conduits.

1.02 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; Current Edition.

B. ASTM D523 - Standard Test Method for Specular Gloss; 2014 (Reapproved 2018).

C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2020 (Reapproved 2025).

D. GreenSeal GS-11 - Standard for Paints, Coatings, Stains, and Sealers; 2025.

E. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; Current Edition.

F. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.

G. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).

H. SSPC-SP 2 - Hand Tool Cleaning; 2018.

I. SSPC-SP 3 - Power Tool Cleaning; 2018.

1.03 DEFINITIONS

A. MPI Gloss Level 1: Matte or Flat Finish; Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.

B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.

C. MPI Gloss Level 3: Eggshell Finish; 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.

D. MPI Gloss Level 4: Satin Finish; 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.

E. MPI Gloss Level 5: Semi-Gloss Finish; 35 to 70 units at 60 degrees, according to ASTM D523.

F. MPI Gloss Level 6: Gloss Finish; 70 to 85 units at 60 degrees, according to ASTM D523.

G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of all products to be used, with the following information for each:
   1. Manufacturer's name, product name and 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.
   4. Manufacturer's preparation requirements and application instructions.

C. Samples for Verification: Submit one sample on rigid backing, 8 inch square, for each system and in each color and gloss level specified.

D. Samples: Submit one paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
   1. Where sheen is specified, submit samples in only that sheen.
   2. Allow 30 days for approval process, after receipt of complete samples by Architect Engineer.
   3. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as masonry, have been approved.

E. Certification: By manufacturer that all paints and coatings comply with VOC limits specified.

F. Manufacturer's Instructions: Indicate special surface preparation procedures.

G. Maintenance Data: Submit data on color, cleaning, touch-up, and repair of painted and coated surfaces.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Paint and Coatings: 1 gallon of each color; store where directed.
   3. Label each container with color in addition to the manufacturer's label.

1.05 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 five years experience.

C. Material Safety Data Sheets: At project site maintain file of MSDS sheets for each product used; become familiar with and follow manufacturer's stated application and safety requirements.

1.06 MOCK-UP

A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.

B. Provide panel, 10 feet long by 10 feet wide, illustrating paint coating color, texture, and finish.

C. Provide door and frame assembly illustrating paint coating color, texture, and finish.

D. Locate where directed.

E. Approved mock-up may remain as part of the work.

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. Store paint materials 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 Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

D. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.

B. Standard Paints: Subject to compliance with requirements, provide products by one of the following:
   1. Benjamin Moore & Co: www.benjaminmoore.com.
   2. PPG Paints: www.ppgpaints.com.
   3. Sherwin-Williams Company: www.sherwin-williams.com.
   4. Farrell-Calhoun: www.farrellcalhoun.com.

C. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PAINTS AND COATINGS - GENERAL

A. MPI (APSM) Standards: Provide products that comply with the MPI standards indicated but that are not necessarily listed in its MPI (APL) Approved Products List.

B. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
   1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
   3. Supply each coating material in quantity required to complete entire project's work from a single production run.
   4. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.

C. Primers: Where the manufacturer offers options on primers for a particular substrate or color, use primer tinted to the shade and categorized as "best" recommended for that color or substrate by the manufacturer.

D. Volatile Organic Compound (VOC) Content:

1. Provide coatings that comply with the most stringent requirements specified in the following:
   a. 40 CFR 59, Subpart D, National Volatile Organic Compound Emission Standards for Architectural Coatings.
   b. Architectural coatings VOC limits of the State in which the Project is located.
2. Use adhesives, sealants, paints, and coatings, that comply with the specified limits for VOC content when calculated according to SCAQMD Rule #1168. Minimum of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
   a. Flat Paints and Coatings: 50 g/L.
   b. Nonflat Paints and Coatings: 150 g/L.
   c. Dry-Fog Coatings: 400 g/L.
   d. Primers, Sealers, and Undercoaters: 200 g/L.
   e. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
   f. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
   g. Pretreatment Wash Primers: 420 g/L.
   h. Floor Coatings: 100 g/L.
   i. Shellacs, Clear: 730 g/L.
   j. Shellacs, Pigmented: 550 g/L.
3. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified; commercial quality.
4. Patching Material: Latex filler.
5. Fastener Head Cover Material: Latex filler.

2.03 PAINT SYSTEMS - GENERAL

A. Provide Premium Grade systems, as defined by MPI (APSM), except as otherwise indicated.

B. Where a specified paint system does not have a Premium Grade, provide Custom Grade system.

C. Provide two top coats and one primer coat unless noted otherwise indicated. Provide primer as recommended by manufacturer of top coat.

D. Colors: As indicated on drawings, or as selected by Architect Engineer.

2.04 PAINT SYSTEMS - EXTERIOR

A. Exterior Concrete, Vertical and Overhead Surfaces:
   1. High Build Latex: High Build Latex, low gloss.
   2. Approved Products:
      a. PPG
         1) Primer: Primer as recommended by manufacturer;
         2) Two Coats: 4-22 Perma Crete High Build 100% Acrylic Topcoat.
      b. Sherwin Williams
         1) Primer: Loxon Concrete & Masonry Primer LX2W50;
         2) Two Coats: ConFlex XL Elastomeric Smooth CF11W51 Series.
      c. Benjamin Moore
         1) Primer: As recommended by manufacturer;
         2) Two Coats: Coronado 162-1 Elastite 100% Acrylic Elastomeric Waterproofing.
      d. Farrell-Calhoun (Green)
         1) Primer: #697 100% Acrylic Bonding Masonry Primer;
         2) Two Coats: #2300 100% Acrylic Elastomeric Coating (or) Tuff-Crete #17-200 Smooth HB Acrylic Waterproofing Coating.

B. Exterior Concrete and Masonry (CMU), Opaque, Latex:

1. One coat of block filler.
2. Use two coats of block filler if smooth finish is required by Architect.
3. High Build Latex: Two coats, low gloss.
4. Approved Products:
    a. PPG
        1) Block Filler as recommended by manufacturer;
        2) Two Coats: 4-22 Perma Crete High Build 100% Acrylic Topcoat.
    b. Sherwin Williams
        1) Block Filler: Preprite Block Filler B25W25;
        2) Two Coats: A-100 Acrylic Latex Flat/Satin/Gloss A6/A82/A8 Series.
    c. Benjamin Moore
        1) Block Filler as recommended by manufacturer;
        2) Two Coats: Coronado 162-1 Elastite 100% Acrylic Elastomeric Waterproofing.
    d. Farrell-Calhoun (Green):
        1) Block Filler: #470A Interior/Exterior Acrylic Latex Masonry Block Filler;
        2) Two Coats: #2300 100% Acrylic Elastomeric Coating (or) Tuff-Crete #17-200 Smooth HB Acrylic Waterproofing Coating.

C. Exterior Ferrous Metals, Primed, Latex:
1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
2. Quick Dry Enamel: Q.D. Primer, Q.D. Enamel, Semi-Gloss.
3. Approved Products:
    a. PPG
        1) Primer: MultiPrime 4160;
        2) Two Coats: 7-844 Industrial Semi-Gloss Oil.
    b. PPG (Green)
        1) Primer: Pitt-Tech Plus 90-912, Interior/Exterior DTM Acrylic Primer;
        2) Two coats: Pitt-Tech Plus 4216 HP Interior/Exterior Semi-Gloss DTM Industrial Enamel.
    c. Farrell-Calhoun
        1) Primer: Tuff-Boy 1024/1069 Quick Dry RustStop Primers;
        2) Two Coats: Tuff-Boy 800 Line Interior/Exterior Industrial Gloss Enamel.
    d. Sherwin Williams
        1) Primer: Pro Industrial Pro-Cryl Universal Metal Primer B66-1300 Series;
        2) Two Coats: Pro Industrial Acrylic Semi-Gloss B66-650 Series.
    e. Benjamin Moore
        1) Primer: Corotech Universal Metal Primer V131;
        2) Two Coats: DTM Alkyd Semi-gloss (or) Corotech Quick Dry Gloss Alkyd Enamel V230 (or) Corotech Rapid Dry High Gloss Alkyd Enamel V220.

D. Exterior Galvanized Metals, not chromate passivated:
1. Latex: Cementitious Primer, Latex, semi-gloss.
2. Approved Products:
    a. PPG
        1) Primer: Pitt-Tech Plus 90-912, Interior/Exterior DTM Acrylic Primer;
        2) Two Coats: Speedhide 6-610, 100% Acrylic, Semi-Gloss.
    b. Sherwin Williams
        1) Primer: Pro Industrial Pro-Cryl Universal Primer B66-1300 Series;
        2) Two Coats: Pro Industrial Acrylic Semi-Gloss B66-650 Series.
    c. Benjamin Moore
        1) Primer as recommended by manufacturer;
        2) Two Coats: Ultra Spec EXT, Semi-Gloss
    d. Farrell-Calhoun

1) Primer: 5-56 100% Acrylic All Purpose Metal Primer.
2) Two Coats: Tuff-Boy 8000 Line, Waterborne 100% Acrylic DTM Enamel.

E. Exterior Aluminum , Unprimed, Alkyd, 3 Coats: One coat etching primer, two coats enamel finish.
1. Latex: Q.D. Primer, Semi-gloss.
2. Approved Products:
a. PPG
1) Primer: Multiprime 4160;
2) Two Coats: Speedhide 6-900, 100% Acrylic Latex, Semi-Gloss.
b. PPG
1) Primer: Pitt-Tech 90-712, Interior/Exterior DTM Acrylic Primer;
2) Two Coats:Speedhide 6-900, 100% Acrylic Latex, Semi-Gloss.
c. Benjamin Moore
1) Primer: Super Spec HP Acrylic Metal Primer P04;
2) Two Coats: Ultra Spec EXT, Semi-Gloss
d. Sherwin Williams
1) Primer: Pro Industrial Pro-Cryl Universal Metal Primer B66-1300 Series;
2) Two Coats: Pro Industrial Acrylic Semi-Gloss B66-650 Series.
e. Farrell-Calhoun
1) Primer: 5-56 100% Acrylic All Purpose Metal Primer;
2) Two Coats: Tuff-Boy 8000 Line, Waterborne 100% Acrylic DTM Enamel.

2.05 PAINT SYSTEMS - INTERIOR

A. Interior, Concrete Masonry Units:
1. One coat block filler and two coats Waterbased Epoxy.
2. Use two coats of block filler if a smooth finish is required by Architect.
3. Approved Products:
a. PPG
1) Block Filler: 6-15Xl Speedhide Latex Block Filler;
2) Two Coats: 98-1 Series Aquapon WB Water-Based Epoxy.
b. Sherwin Williams (Green) (Wet Areas)
1) Block Filler: Preprite Block Filler B25W25;
2) Two Coats: Pro Industrial Water-Based Catalyzed Epoxy Gloss/Eg-Shel, B73-300 Series.
c. Sherwin-Williams (Green)
1) Block Filler: Preprite Block Filler B25W25;
2) Two Coats: Pro Industrial Pre-Catalyzed Water Based Epoxy Egshel/Semi Gloss K45/46W151.
d. Benjamin Moore
1) Block Filler: Ultra Spec Block Filler 0244;
2) Two Coats: Corotech Waterborne Amine Epoxy V440.
e. Farrell-Calhoun (Green)
1) Block Filler: #470A Interior/Exterior Acrylic Latex Masonry Block Filler;
2) Two Coats: Tuff-Boy #1270/1260 Eggshell/Semi-Gloss Line Waterborne Pre-Cat Acrylic Epoxy.

B. Interior, Structural Steel and Metal Fabrications:
1. Quick Dry Enamel: Q.D. Primer, Q.D. Enamel, Semi-Gloss.
2. Approved Products:
a. PPG
1) Primer: PMC MultiPrime 4160;
2) Two coats: MPI #81, 7-844 Series Int. Industrial Semi-Gloss Oil.

b. PPG (Green)
   1) Primer: 90-712 Series Pitt-Tech Plus Interior/Exterior DTM Acrylic Primer;
   2) Two coats: HPC 4216 HP Pitt-Tech Plus Interior/Exterior SG DTM Industrial Enamel.
c. Sherwin Williams
   1) Primer: Pro Industrial Pro-Cryl Universal Metal Primer B66-1300 Series;
   2) Two Coats: Pro Industrial WB Alkyd Urethane Enamel Semi-Gloss B53-1150 Series.
d. Sherwin Williams (Green)
   1) Primer: Pro Industrial Pro-Cryl Universal Metal Primer B66W310;
   2) Two Coats: Pro Industrial Acrylic Semi-Gloss B66-650 Series.
e. Benjamin Moore
   1) Primer: P04 Super-Spec HP Acrylic Metal Primer;
   2) Two Coats: P24 DTM Alkyd Semi-gloss.
f. Farrell-Calhoun
   1) Primer: #1024/1069 Tuff-Boy Quick Dry Rust-Stop Primers;
   2) Two Coats: #800 Line Tuff-Boy Interior/Exterior Industrial Gloss Enamel.
g. Farrell-Calhoun (Green)
   1) Primer: #5-56 100% Acrylic All Purpose Metal Primer;
   2) Two Coats: #8000 Tuff-Boy Waterborne 100% Acrylic DTM Enamel.

C. Interior, Medium Duty Door and Trim: For surfaces subject to frequent contact by occupants, including metals, wood, and metals and woods:
   1. Two top coats and one primer coat.
   2. Latex: W.B. Primer, Latex, gloss level 5.
   3. Approved Products:
      a. PPG
         1) Primer: HPC 4020 Pitt-Tech Plus Interior/Exterior DTM Acrylic Primer;
         2) Two Coats: 6-4510 Speedhide Zero Interior Latex Semi-Gloss.
      b. Sherwin-Williams (Green) (Metals)
         1) Primer: Pro Industrial Pro-Cryl Universal Metal Primer B66-1300 Series;
         2) Two Coats: Pro Industrial WB Alkyd Urethane Enamel Semi-Gloss B53-1150 Series.
      c. Sherwin-Williams (Green) (Woods)
         1) Primer: Premium Wall & Wood Interior Latex Primer, B28W8111;
         2) Two Coats: ProMar 200 Waterbased Acrylic-Alkyd Semi-Gloss, B34W8251.
      d. Benjamin Moore
         1) Primer: P04 Super Spec HP Acrylic Metal Primer (or) HP25 Ultra Spec DTM Acrylic Low Lustre;
         2) Two Coats: N540 Ultra Spec 500 Interior Gloss.
      e. Farrell-Calhoun (Green)
         1) Primer: #5-56 100% Acrylic All Purpose Metal Primer;
         2) Two Coats: #600 Line 100% Acrylic Interior Semi-Gloss Latex Enamel

D. Interior, Aluminum:
   1. Applications include but are not limited to frames, sash, sills, flashing, handrails, railings, and posts.
   2. Two top coats and one primer coat.
   3. Latex: Q.D. Primer, Latex, gloss level 3.
   4. Approved Products:
      a. PPG
         1) Primer: PMC MultiPrime 4160;
         2) Two Coats: 6-3511 Speedhide Interior Satin Acrylic Latex.

b. PPG (Green)
1) Primer: HPC 4020PF Pitt-Tech Plus Interior/Exterior DTM Acrylic Primer;
2) Two Coats: 6-3511 Speedhide Interior Satin Acrylic Latex.
c. Sherwin Williams (Green)
1) Primer: Pro Industrial Pro-Cryl Universal Metal Primer B66-1300 Series;
2) Two Coats: Pro Industrial Acrylic Semi-Gloss B66-650 Series.
d. Benjamin Moore
1) Primer: P04 Super-Spec HP Acrylic Metal Primer;
2) Two Coats: N538 Ultra Spec 500 Eggshell.
e. Farrell-Calhoun (Green)
1) Primer: #5-56 100% Acrylic All Purpose Metal Primer;
2) Two Coats: #8000 Tuff-Boy Waterborne 100% Acrylic DTM Enamel.
5. Primer(s): As recommended by manufacturer of top coats.

E. Paint I-TR -W - Interior Wood, Transparent Finish:
1. Stain: Semi-Transparent Stain for Wood; MPI #90;
2. Top Coat(s): Polyurethane Varnish, Oil Modified; MPI #56, 57.
3. Approved Products:
a. Sherwin Williams
1) 1st Coat: Minwax Performance Series Tintable Inerior Stain 7150/7151;
2) 2nd Coat: Minwax Performance Series Fast-Dry Sanding Sealer 81580;
3) 3rd Coat: Minwax Performance Series Fast-Dry Varnish 9150-9151 Series.
b. Sherwin Williams (Green)
1) 1st Coat: Sherwood Water Reducible Wiping Stain S64 Series;
2) 2nd Coat: Kem Aqua Water Reducible Sealer T65F520;
3) 3rd Coat: Kem Aqua Water Reducible Finish T75F528.
c. Farrell Calhoun
1) Stain: Wood Kraft Penetrating Wiping Stains 1110/1400 Line;
2) Varnish: Wood Kraft Polyurethane Varnishes 1120 (Gloss)/1122 (Satin).
d. Farrell Calhoun (Green)
1) Stain: Wood Kraft Waterborne Penetrating Wiping Stains 1500;
2) Varnish: Wood Kraft Interior Waterborne Acrylic-Polyurethane Varnish 1190.
e. PPG
1) 1st Coat: Deft Fast Dry Stain DFT 570;
2) 2nd Coat: Deft Sanding Sealer DFT 60;
3) 3rd Coat: Deft Interior Poly DFT 127.
f. PPG (Green)
1) 1st Coat: Deft Water Based Stain DFT 300;
2) 2nd Coat: Deft Sanding Sealer DFT 61;
3) 3rd Coat: Deft Interior Acrylic Poly DFT 159.

F. Interior Wood, Opaque, Alkyd:
1. Latex: Oil/Alkyd Primer, Latex, gloss level 5.
2. Approved Products:
a. PPG
1) Primer: 17-941NF Seal Grip Int. Alkyd Enamel Undercoater;
2) Two Coats: 6-4510Xl Speedhide Zero Interior Latex Semi-Gloss.
b. Sherwin Williams
1) Primer: Premium Wall and Wood Primer B28W8111;
2) Two Coats: Promar 200 Waterbased Acrylic-Alkyd Semi-Gloss B34W8251.
c. Benjamin Moore
1) Primer: C245 Super Spec Alkyd Enamel Undercoater & Primer Sealer;
2) Two Coats: Benjamin Moore N540 Ultra Spec 500 Gloss.

d. Farrell Calhoun
1) Primer: 599 Interior Oil-Based Enamel Undercoater
2) Two Coats: Farrell-Calhoun 500 Line Interior Semi-Gloss Alkyd Enamel (or) 580 Interior High Gloss Alkyd Enamel.

G. Interior Wood, Opaque, Latex:
1. Latex: Latex Primer, Latex, gloss level 5.
2. PPG (Green)
a. Primer: 6-4900 Speedhide Zero Interior Latex Sealer;
b. Two Coats: 6-4510 Speedhide Zero Interior Latex Semi-Gloss.
3. Sherwin Williams (Green)
a. Primer: Premium Wall and Wood Primer B28W8111;
b. Two Coats: Promar 200 Waterbased Acrylic-Alkyd Semi-Gloss B34W8251.
4. Farrell-Calhoun
a. Primer: 599 Enamel Undercoater;
b. Two Coats: 600 Line 100% Acrylic Interior Semi-Gloss Latex Enamel.
5. Farrell-Calhoun (Green)
a. Primer: 699 Waterborne 100% Acrylic Enamel Undercoater;
b. Two Coats: 600 100% Acrylic Interior Semi-Gloss Latex Enamel.

H. Interior Gypsum Board, Latex-Acrylic:
1. Latex: Latex Primer Sealer, Latex, gloss level 3.
2. Approved Products:
a. PPG
1) Primer: 6-4900 Speedhide Zero Interior Latex Sealer;
2) Two Coats: 6-3511 Speedhide Interior Satin Acrylic Latex.
b. Sherwin Williams .
1) Primer: ProMar 200 Zero VOC Interior Latex Primer B28W2600;
2) Two Coats: Promar 200 Zero VOC Latex Flat/Egshel/Semi Gloss B30/20/31W2251.
c. Sherwin Williams (Green)
1) Primer: Promar 200 Zero VOC Latex Primer B28W02600;
2) Two Coats: Promar 200 Zero VOC Latex Flat/Egshel/Semi Gloss B30/20/31 Series.
d. Benjamin Moore
1) Primer: N534 Ultra Spec 500 Latex Primer;
2) Two Coats: N538 Ultra Spec 500.
e. Farrell-Calhoun (Green)
1) Primer: 380 Perfik-Seal Interior Latex Primer/Sealer;
2) Two Coats: 300/370/670 Line Interior Latex Flat/Eggshell/Satin Enamel.

I. Interior Gypsum Board, Epoxy:
1. Epoxy, W.B.: Latex Primer Seal, Epoxy; Gloss.
2. Approved Products:
a. Sherwin-Williams
1) Primer: Preprite Hi Build Primer B28W8601;
2) Two Coats: Water Based Catalyzed Epoxy Semi Gloss/Gloss B70W211/B60V25/15.
b. Sherwin-Williams (Green)
1) Primer: ProMar 200 Zero VOC Primer B28W2600;
2) Two Coats: Pro Industrial Pre-Catalyzed Epoxy Egshel/Semi Gloss K45/46W0151.
c. Sherwin-Williams (Green) (Wet Areas)
1) Primer: Promar 200 Zero VOC Latex Primer B28W2600;

2) Two Coats: Pro Industrial Water-Based Catalyzed Epoxy Gloss/Eg-Shel, B73-300 Series.

d. Sherwin-Williams
   1) Application: High abuse areas; wet areas; chemical areas.
   2) Primer: Promar 200 Zero VOC Latex Primer B28W2600;
   3) Two Coats: Pro Industrial Zero VOC Catalyzed Epoxy B73 Series.

e. PPG
   1) Primer: 6-4900 Speedhide Zero Interior Latex Sealer;
   2) Two Coats: PMC AquaPon WB EP 98E-X/ 98E100.

f. Benjamin Moore
   1) Primer: Aqua Lock Primer Sealer;
   2) Two Coats: Corotech V342 Pre-Catalyzed Waterborne Acrylic Epoxy.

g. Farrell-Calhoun (Green)
   1) Primer: 380 Perfik-Seal Interior Latex Primer/Sealer;
   2) Two Coats: Tuff-Boy 1270/1260 Line Eggshell/Semi-Gloss Waterborne Pre-Cat Acrylic Epoxy.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin application of coatings until substrates have been properly prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

D. If substrate preparation is the responsibility of another installer, notify Architect Engineer of unsatisfactory preparation before proceeding.

E. Test shop-applied primer for compatibility with subsequent cover materials.

F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
   1. Gypsum Wallboard: 12 percent.
   2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
   3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
   4. Concrete Floors and Traffic Surfaces: 8 percent.
      a. Measure the ph factor of concrete, masonry, and mortar before starting any finishing process, using the method specified in MPI Architectural Painting Manual.
         1) Report results in writing to Architect Engineer before starting work.
         2) If results of test indicates need for remedial action, provide written description of remedial action. If a different primer or paint systems is required, state the total cost of the change. Do not proceed with remedial action or change without receiving written authorization from Architect Engineer.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to coating application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
   1. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before preparation and finishing.
   2. After completing painting in each space or area, reinstall items removed using workers skilled in the trades involved.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

F. Aluminum Surfaces to be Painted: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.

G. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

H. Corroded Steel and Iron Surfaces to be Painted: Prepare using at least SSPC-SP 2 (hand tool cleaning) or SSPC-SP 3 (power tool cleaning) followed by SSPC-SP 1 (solvent cleaning).

I. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.

J. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.

K. Interior Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

L. Interior Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

3.03 APPLICATION

A. Apply products in accordance with manufacturer's instructions.

B. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

D. Apply each coat to uniform appearance.

E. Sand wood and metal surfaces lightly between coats to achieve required finish.

F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

G. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

I. Use applicators and methods best suited for substrate and type of material being applied and according to manufacturer's instructions.
   1. Brush Application: Use brushes best suited for the type of material applied; use brush of appropriate size for the surface or item being painted; produce results free of visible brush marks.
   2. Roller Application: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
   3. Spray Application: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.

4. Where application method is listed in the MPI Manual for the paint system that application method is required; otherwise any application method recommended by manufacturer for material used and objects to be painted is acceptable.

J. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate; provide total dry film thickness of entire system as recommended by manufacturer.
   1. Number of coats and film thickness required are the same regardless of application method.
   2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance.
   3. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive dry film thickness equivalent to that of flat surfaces.

K. Apply finish to completely cover surfaces with uniform appearance without brush marks, runs, sags, laps, ropiness, holidays, spotting, cloudiness, or other surface imperfections.
   1. Before applying finish coats, apply a prime coat of material recommended by manufacturer, unless the surface has been prime coated by others; where evidence of suction spots or unsealed areas in first coat appear, recoat primed and sealed surfaces to ensure finish coat with no burn through or other defects due to insufficient sealing.
   2. Apply first coat to surface that has been cleaned, pretreated, or otherwise prepared as soon as practical after preparation and before subsequent surface deterioration.
   3. Do not apply succeeding coats until the previous coat has cured as recommended by manufacturer.
   4. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat will not cause the undercoat to lift or lose adhesion.
   5. If manufacturer's instructions recommend sanding to produce a smooth, even surface, sand between coats.
   6. Before applying next coat vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

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 finished coatings until completion of project.

B. Touch-up damaged coatings after Substantial Completion.

END OF SECTION

SECTION 10 14 00
SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Room and door signs.

B. Interior directional and informational signs.

1.02 RELATED REQUIREMENTS

A. Section : Exit signs required by code.

1.03 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

B. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.

C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.

1. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
2. When content of signs is indicated to be determined later, request such information from Owner through Architect Engineer ; upon request, submit preliminary schedule.
3. Submit for approval by Owner through Architect Engineer prior to fabrication.

D. Samples: Submit , of size similar to that required for project, illustrating sign style, font, and method of attachment.

E. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.

F. Mockup Sample using colors from drawings.

G. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package signs as required to prevent damage before installation.

B. Package room and door signs in sequential order of installation, labeled by floor or building.

PART 2 PRODUCTS

2.01 SIGNAGE

A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.

B. Room and Door Signs: Provide a sign for every doorway, whether it has a door or not, not including corridors, lobbies, and similar open areas.
   1. Sign Type: Flat signs with engraved panel media as specified.
   2. One piece, one material, construction. Photopolymer characters (added on) are not acceptable.
   3. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.
   4. Application: As indicated on drawings.
   5. Background Color: As selected.
   6. Character Color: Contrasting color, to comply with ADA, as selected.
   7. Products:
      a. Fusion Interior Signage; Dose Collections: www.takeform.net
      b. Substitutions: Not permitted.

C. Interior Directional and Informational Signs:
   1. Sign Type: Same as room and door signs.
   2. Sizes: As indicated on drawings.

D. Retractable Belt Bariers:
   1. Material: Heavy-duty steel or aluminum frame matching the post finish.
   2. Mount Type: Post-top adapter cap that locks securely onto the stanchion head, preventing spinning or unauthorized removal.
   3. Belt Width: 2 inches.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install neatly, with horizontal edges level.

C. Locate signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.

D. Protect from damage until Date of Substantial Completion; repair or replace damaged items.

END OF SECTION

SECTION 10 21 13.17
PHENOLIC TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Phenolic toilet compartments.

B. Phenolic urinal screens.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Blocking and supports.

1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026a.

C. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Shop Drawings:
   1. Indicate plans, elevations, and dimensions. Include door swings, toilet fixture centerlines, and floor drains on plans.

C. Samples:
   1. For Verification: Submit two samples of partition materials, 3 by 3 inches in size, indicating color.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, handle materials and products in accordance with manufacturer's instructions, recommendations, and industry standards.

B. Store products indoors in manufacturer's or fabricator's original containers and packaging, with labels clearly identifying product name and manufacturer. Protect from damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design Manufacturer: ASI Accurate Partitions: www.asi-accuratepartitions.com/#sle.

B. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PHENOLIC TOILET COMPARTMENTS

A. Toilet Compartments: Black core phenolic.
   1. Maximum Privacy-96; floor-anchored, overhead-braced mounting.

B. Urinal Screens: Black core phenolic, wall hung.

C. Fabrication:
   1. Fabricate toilet compartment components to sizes indicated.
   2. Coordinate requirements and provide cutouts for through-partition toilet accessories and solid blocking within panel where required for attachment of toilet accessories.
   3. Provide shoes and caps at pilasters and posts to conceal anchorage, supports, and leveling mechanisms.
   4. Provide manufacturer's standard corrosion-resistant supports, leveling mechanisms, anchors, and anchoring assemblies for pilasters and posts.
   5. Floor-Anchored, Overhead-Braced Units: Provide supports, leveling mechanisms, Easy-Stall shoes, and anchors at pilasters to suit floor conditions.

2.03 COMPONENTS

A. Doors, Panels, and Pilasters: Phenolic-resin impregnated, wood-based product core with melamine-impregnated decorative surface papers and transparent, protective topcoat; NEMA LD 3 Compact Laminate.
   1. Finish: Matte.
   2. Black Core Phenolic Color: As selected from manufacturer's color card.
   3. Privacy: Provide interlocking doors and pilasters with integral Zero-Sightline System routed edges.

B. Standard Door and Panel Dimensions:
   1. Door Thickness: 3/4 inch.
   2. Maximum Privacy: Floor mounted overhead braced.
      a. Door Panel Height: 84 inches.
      b. Overdoor Valance: 12 inch.
      c. Door Height above Floor: 1 inch.
   3. Panel Thickness: 1/2 inch.
   4. Urinal and Entrance Screen Panel Height: 48 inches.
   5. Urinal and Entrance Screen Panel Height above Floor: 12 inches.

C. Urinal or Entrance Screen Post: Manufacturer's standard post design of square aluminum tube with satin finish 1-3/4 inches, with shoe matching pilaster shoe.

2.04 MATERIALS

A. Phenolic Panels: Monolithic core of phenolic resin, reinforced with cellulose fibers, manufactured under high pressure and at high temperatures, with melamine-impregnated decorative surface papers; NEMA LD 3, Compact Laminate.

2.05 HARDWARE AND ACCESSORIES

A. Standard Door Hardware: Brushed stainless steel:
   1. Hinges: Brushed stainless steel vault hinges, gravity type, adjustable for door close positioning; two per door.
   2. Latch and Keeper: Brushed stainless steel Alpaco latch with occupancy indicator
   3. Coat Hook: Manufacturer's standard coat hook with rubber bumper; one per compartment, mounted on door.

B. Attachments, Screws, and Bolts: Stainless steel, tamper-resistant type.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that field measurements are as indicated.

C. Verify correct spacing of and between plumbing fixtures.

D. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's written instructions.

B. Attach panel brackets securely to walls using anchor devices.

C. Attach panels and pilasters to brackets. Locate head rail joints at pilaster centerlines.

D. Field touch-up of scratches or damaged finish not permitted. Replace damaged or scratched materials with new materials.

3.03 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.

B. Adjust adjacent components for consistency of line or plane.

3.04 CLEANING

A. Clean partition and screen surfaces with materials and cleansers in accordance with manufacturer's recommendations.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 10 26 00
WALL AND DOOR PROTECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Corner guards.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Blocking for wall and corner guard anchors.

1.03 REFERENCE STANDARDS

A. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics; 2024.

B. ASTM D543 - Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents; 2020.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026a.

D. ASTM F476 - Standard Test Methods for Security of Swinging Door Assemblies; 2023.

E. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Indicate physical dimensions and adhesive.

C. Shop Drawings: Include plans, elevation, sections, and attachment details.

D. Samples: Submit two samples of corner guards, 6 inches long illustrating color and finish.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver wall and door protection items in original, undamaged protective packaging. Label items to designate installation locations.

B. Store products in either horizontal or vertical position, in compliance with manufacturer's instructions.

1.06 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 PERFORMANCE CRITERIA

A. Impact Strength: Unless otherwise noted, provide protection products and assemblies that have been successfully tested for compliance with applicable provisions of ASTM D256 and/or ASTM F476.

B. Chemical and Stain Resistance: Unless otherwise noted, provide protection products and assemblies with chemical and stain resistance complying with applicable provisions of ASTM D543.

C. Fungal Resistance: Unless otherwise noted, provide protection products and assemblies which pass ASTM G21 testing.

2.02 PRODUCT TYPES

A. Corner Guards - Surface Mounted:
   1. Material: Homogeneous composition vinyl polymer.

2. Surface Burning Characteristics: Provide assemblies with flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
3. Width of Wings: 3/4 inches.
4. Corner: Square.
5. Color: As indicated on drawings.
6. Length: 8 foot.
7. Mounting: Adhesive.
8. Products:
   a. Tarkett North America; Resilient Vinyl Corner Guards: www.tarkettna.com
   b. Substitutions: Not permitted.

B. Adhesives and Primers: As recommended by manufacturer.

2.03 FABRICATION

A. Fabricate components with tight joints, corners and seams.

2.04 SOURCE QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Provide wall and door protection systems of each type from a single source and manufacturer, unless noted otherwise.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces for adhered items are clean and smooth.

3.02 INSTALLATION

A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to supporting construction.

3.03 TOLERANCES

A. Maximum Variation From Required Height: 1/4 inch.

B. Maximum Variation From Level or Plane For Visible Length: 1/4 inch.

3.04 CLEANING

A. Clean wall and door protection items of excess adhesive, dust, dirt, and other contaminants.

END OF SECTION

SECTION 10 28 00
TOILET ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Commercial toilet accessories.

1.02 REFERENCE STANDARDS

A. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2025.

B. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.

C. ASTM C1036 - Standard Specification for Flat Glass; 2025.

D. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2024.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

C. Samples: Submit two samples of each accessory, illustrating color and finish.

D. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

PART 2 PRODUCTS

2.01 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.

B. Keys: Provide two keys for each accessory to Owner; master key lockable accessories.

C. Stainless Steel Sheet: ASTM A666/A666M, Type 304.

D. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.

E. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.

F. Adhesive: Two component epoxy type, waterproof.

G. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

2.02 COMMERCIAL TOILET ACCESSORIES

A. Soap Dispenser: Liquid soap dispenser, deck-mounted on vanity, with polyethylene container concealed below deck; piston and 4 inch spout of stainless steel with bright polished finish; chrome-plated deck escutcheon.

B. Mirrors: Stainless steel framed, 1/4 inch thick annealed float glass; ASTM C1036.
   1. Annealed Float Glass: Silvering, protective and physical characteristics in compliance with ASTM C1503.
   2. Size: As indicated on Drawings.
   3. Frame: 0.05 inchangle shapes, with mitered and welded and ground corners, and tamperproof hanging system; matte black finish.

C. Grab Bars: Stainless steel, smooth surface.
   1. Standard Duty Grab Bars:
      a. Push/Pull Point Load: 250 pound-force, minimum.

b. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, exposed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
c. Finish: Satin.
d. Length and Configuration: As indicated on drawings.

D. Combination Sanitary Napkin/Tampon Dispenser with Disposal: Stainless steel, surface-mounted.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

C. Verify that field measurements are as indicated on drawings.

3.02 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

3.03 PROTECTION

A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

SECTION 10 44 00
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire extinguishers.

B. Fire extinguisher cabinets.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Wood blocking.

B. Section 09 90 00: Painting and Coating.

1.03 REFERENCE STANDARDS

A. NFPA 10 - Standard for Portable Fire Extinguishers; 2017, with Errata (2018).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide extinguisher operational features.

C. Manufacturer's Instructions: Indicate special criteria and wall opening coordination requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fire Extinguishers:
   1. Activar Construction Products Group, Inc. - JL Industries; Cosmic Extinguisher - Multipurpose Chemical: www.activarcpg.com/#sle.
   2. Kidde, a unit of United Technologies Corp: www.kidde.com/#sle.
   3. Oval Brand Fire Products; Oval Dry Chemical Fire Extinguisher - Multipurpose ABC: www.ovalfireproducts.com/#sle.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Fire Extinguisher Cabinets and Accessories:
   1. Activar Construction Products Group, Inc. - JL Industries; Ambassador Series: www.activarcpg.com/#sle.
   2. Larsen's Manufacturing Co: www.larsensmfg.com/#sle.
   3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 FIRE EXTINGUISHERS

A. General Requirements: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.

B. Multipurpose Dry-Chemical-Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
   1. Class: 4A:80B:C.
   2. Size: 10 lb.
   3. Temperature Range: Minus 65 to 120 degrees F.

2.03 FIRE EXTINGUISHER CABINETS

A. Cabinet Construction: Non-fire rated.

B. Cabinet Configuration: Semi-recessed type.
   1. Projected Trim: Returned to wall surface, with 3-inch projection, and 2-inch wide face.

C. Cabinet Mounting Hardware: Appropriate to cabinet, with predrilled holes for placement of anchors.

D. Fabrication: Weld, fill, and grind components smooth.

E. Finish of Cabinet Exterior Trim and Door: Baked enamel, color as selected by Architect.

F. Finish of Cabinet Interior: White colored enamel.

2.04 ACCESSORIES

A. Cabinet Signage: Wall Signage.
   1. Key Features:
      a. Acrylic
      b. Triangular
      c. Measures 8.5" wide, 3.25" deep, 18" high
   2. Similar to Brady "Tall Fire Extinguisher "V" Sign Part Number SP818V

B. Lettering: FIRE EXTINGUISHER text on decal or self-adhesive vinyl, prespaced black lettering in accordance with authorities having jurisdiction.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify dimensions, tolerances, and interfaces with other work.

B. Verify substrate and site conditions for product installation are in accordance with manufacturer's written instructions.

C. Verify rough openings for cabinet are sized and located in accordance with manufacturer's written instructions.

D. Notify Architect Engineer in writing of conditions detrimental to completion of work. Do not proceed with installation until detrimental conditions are corrected.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Secure rigidly in place.
   1. See Section 06 10 00 for in-wall blocking requirements.

C. Place extinguishers in cabinets.

3.03 MAINTENANCE

A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.

B. Provide separate maintenance contract for service and maintenance of fire extinguishers and fire extinguisher cabinets for 2 years from Date of Substantial Completion.

END OF SECTION

SECTION 11 61 33

STAGE RIGGING AND CURTAIN SYSTEMS

PART 1 GENERAL

1.01 GENERAL CONDITIONS

A. For the sake of brevity these specifications omit phrases such as "(Sub)Contractor shall furnish and install," "unless otherwise indicated or specified," etc., but these phrases are nevertheless implied. Mention of materials and operations requires the (Sub)Contractor to furnish and install such materials and perform such operations complete to the satisfaction of the Architect's Consultant. Exceptions are noted herein or shown on the drawings.

B. No representative of the Owner shall have power to waive the obligations of this contract for the furnishing of good materials or of performing good work, as herein described, in full accordance with the contract documents. The failure of any representative of the Owner to condemn any defective work or materials shall not release the obligation to at once tear out, remove, and properly replace the same at any time prior to final acceptance upon discovery of said defective work or material. When requested, however, the Owner's representative shall observe and accept or reject any material furnished. In the event the material has been accepted once by the Owner's representative, such acceptance shall be binding on the Owner unless it can be clearly shown that such material does not meet the specifications for this work.

C. All equipment and installation shall be the responsibility of a single contractor. This Contractor shall assume complete responsibility for the engineering, fabrication, transportation, and installation of the work in this Section.

D. Field-verify all sizes, measurements and finishes prior to fabrication. Coordinate with scheduled work of other trades. Immediately notify Architect's Consultant in writing of any discrepancies, conflicts, or omissions prior to the commencement of work or correct the same at Contractor's expense.

E. All equipment shall be fabricated, manufactured, and installed in accordance with applicable laws, codes, and standards, including:
   1. Rigging Manual (published by the Construction Safety Association)
   2. Wire Rope User's Handbook (published by WireCo.)
   3. Wire Rope User's Manual (published by Wire Rope Technical Board)
   4. National Electric Code (NEC)
   5. American Society of Mechanical Engineers (ASME)
   6. American National Standards Institute (ANSI)
   7. American Society for Testing and Materials (ASTM)
   8. American Institute of Steel Construction (AISC)
   9. IEEE (Institute of Electrical and Electronic Engineers)
   10. ICEA (Insulated Cable Engineers Association)
   11. National Fire Protection Association (NFPA)
   12. National Electrical Manufacturers Association (NEMA)
   13. Any and all local governmental or other applicable codes.

F. Where these Specifications call for a higher standard than the above-mentioned rules, the Specifications shall govern.

G. Nothing in these Construction Documents is to be construed to permit work not conforming to applicable Codes.

H. For all requirements not otherwise addressed by this Specification, the work shall be at a minimum compliant with the requirements of ANSI E1.4-1-2022 – Entertainment Technology - Manual Counterweight Rigging Systems and ANSI E1.6-1-2021 – Entertainment Technology – Powered Hoist Systems.

1.02 RELATED DOCUMENTS

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

B. Refer to Contract Drawings TR series for plans, graphic representations, schedules, and notations showing Stage Rigging System work.

C. Refer to work by other sections including:
   1. Structural steel.
   2. Painting and finishing.
   3. Rough carpentry.
   4. General electrical work (Division 26)
   5. Fire protection system.
   6. Stage lighting system (“E” series and “TL” series drawings)

1.03 DEFINITIONS

A. The term "Contractor" shall mean the contracting entity, also referred to herein as Stage Rigging Contractor or Manufacturer, responsible for the fabrication, assembly, installation, testing, instruction and completion of all work as covered in these Specifications and related Drawings.

B. The terms "General Contractor" is used herein to refer to organizations, individuals, and their representatives as typically defined for construction projects. These terms refer to parties other than the Rigging Contractor ("Contractor").

C. Technical terms unique to stage rigging and related work shall be construed in the following order, in accordance with:
   1. Related Drawings.
   2. Specifications
   3. Relevant usage and definitions of handbooks, guidebooks, or trade group recommendations by manufacturers' associations or professional and engineering societies, such as ASTM, ASME, ASHRAE, etc.
   4. Generally recognized theatrical usage

D. Dead load is defined as the weight of the batten, lift lines, connecting hardware, and any permanently installed equipment including electric cable management.

E. Live load is defined as the load produced by the attachment of portable equipment applied to the batten by the end user but does not include dead loads or environmental loads.

1.04 SCOPE OF WORK

A. Stage Rigging and Curtain Systems will consist of counterweight and motorized rigging in the theatre. Refer to Contract Drawings TR series for plans, graphic representations, schedules, and notations showing Stage Rigging System work.

B. Work under this section shall include the furnishing of all labor, materials, tools, transportation, services, and supervision necessary to complete the installation of the Stage Rigging System and other items as herein listed, all as described in these specifications, as illustrated on the drawings, and as directed by the Architect’s Consultant. Any question as to the installation of equipment should be cleared with the Architect’s Consultant prior to installation. Work is comprised of, but not limited to, the following principal items:
   1. Verification of dimensions and conditions at the job site
   2. Line sets, arbors, wire rope, battens, hardware, chain, blocks, etc.
   3. Stage curtains
   4. Curtain tracks and accessories
   5. Fire Curtain
   6. Motorized hoists and control

7. Wire, conduit, junction boxes and all other electrical components for motorized hoist and control
8. Installation of all cords and cables supplying electricity or control signal to any equipment supported by equipment furnished under this Section, including cable saddles, cable reels, and pantographs.
9. Miscellaneous steel for mounting equipment,
10. Miscellaneous components and parts herein specified.
11. Portable and loose equipment
12. Maintenance of a Traceability Record System for hardware used in load paths which suspend loads above people.
13. Proof of performance testing

C. Furnish and install complete Stage Rigging System with all necessary apparatus, equipment, wiring, etc., required to ensure complete systems in excellent working order as specified herein and on the attached diagrams.

D. Consistent with the detailed information contained herein and on the drawings, provide functional and complete overall systems. Verify complete parts lists, the accuracy of the type numbers, and the overall suitability of the equipment to produce complete functional systems coordinated and interfaced with related work.

E. Minor items of equipment needed in order to meet the requirements stated above, even if not specifically mentioned herein or on the drawings, shall be provided in quality equivalent to other conditions on the project with no claim for additional payment.

F. Coordinate with related work provided under other sections, including but not limited to the following:
1. Fire protection systems
2. Stage lighting system
3. Lighting plugging devices
4. Building structure and catwalks
5. Smoke vents and roof hatches
6. General electrical work
7. Concert Enclosure System (Orchestra shell)
8. Ductwork

1.05 JOB CONDITIONS

A. Coordinate layout and installation of rigging with other adjacent work, including structural, light fixtures, HVAC equipment, plumbing, and fire-suppression elements.

B. Verify all conditions on job site applicable or pertaining to this work. Coordinate with scheduled work of other trades. Notify Architect’s Consultant in writing of discrepancies, conflicts, or omissions prior to commencement of work or correct the same at Contractor's expense.

C. The drawings show diagrammatically the arbors, sheaves, running lines, controls, etc. So far as possible the drawings show arrangement of equipment that will fit into the spaces available without interference. If conditions exist at the job site that make it impossible to install work as shown, prepare and submit drawings to the Architect’s Consultant for approval showing how the work may be installed, and, on approval, install the work without additional cost to the Owner.

D. Contractor shall take care not to damage any equipment or to disconnect any wiring other than as required to interface new system. Any contractor-damaged equipment shall be repaired or replaced by the Contractor at no additional cost to the Owner. Return any systems disturbed during work to found condition.

E. Deliver materials to the job site such that they will be protected from damage. Store all materials at building site under cover.

1.06 APPROVED FABRICATORS

A. The hoists, motors, hardware and related components specified herein shall be fabricated by the following:
   1. Electronic Theatre Controls, Inc., 3031 Pleasant View Rd, Middleton, WI 53562
      www.etcconnect.com
   2. I Weiss, 815 Fairview Avenue #10, Fairview, NJ 07022
      www.i-weiss.com
   3. Protech, 3431 N. Bruce St., North Las Vegas, NV 89030
      www.protechlv.com
   4. Steeldeck Hall Stage Limited, Unit B, 203-207 Manor Road, Erith, Kent DA8 2AA, UK
      www.hallstage.com
   5. Texas Scenic Company, 8053 Potranco Rd, San Antonio, Texas, 78251
      www.texasscenic.com
   6. Thern Stage Equipment, 5712 Industrial Park Rd, Winona, MN 55987
      www.thernstage.com
   7. Tiffin Scenic Studios, Inc., 146 Riverside Drive, Tiffin, Ohio 44883
      www.tiffinscenic.com
   8. Wenger Corp/J. R. Clancy, Inc., 7041 Interstate Island Road, Syracuse, New York, 13209
      www.jrclancy.com

B. The draperies and related components specified herein shall be fabricated by the following:
   1. I Weiss, 815 Fairview Avenue #10, Fairview, NJ 07022
      www.i-weiss.com
   2. J B Martin Corporation, 645 5th Avenue, Suite 400, New York, NY 10022
      www.jbmartin.com
   3. KM Fabrics, Inc., Box 7379, Branwood Station, Greenville, SC 29610
      www.kmfabrics.com
   4. Rose Brand, 4 Emerson Lane, Secaucus, New Jersey 07094
      www.rosebrand.com
   5. Stage Decoration & Supplies, Inc., 3519 Associate Drive, Greensboro, NC 27405
      www.stagedec.com
   6. Syracuse Scenery & Stage Lighting Co., Inc., 101 Monarch Drive, Liverpool, NY 13088
      www.syracusescenery.com
   7. Texas Scenic Company, 8053 Potranco Rd, San Antonio, Texas, 78251
      www.texasscenic.com
   8. Tiffin Scenic Studios, Inc., 146 Riverside Drive, Tiffin, Ohio 44883
      www.tiffinscenic.com

C. The track, track hardware, and related components specified herein shall be fabricated by the following:
   1. Automatic Devices Company, 2121 South 12th Street, Allentown, PA 18103

      www.automaticdevices.com

   2. I Weiss, 815 Fairview Avenue #10, Fairview, NJ 07022

      www.i-weiss.com

   3. Steeldeck Hall Stage Limited, Unit B, 203-207 Manor Road, Erith, Kent DA8 2AA, UK

      www.hallstage.com

   4. Texas Scenic Company, 8053 Potranco Rd, San Antonio, Texas, 78251

      www.texasscenic.com

1.07 RIGGING CONTRACTOR QUALIFICATION

A. Qualified rigging contractors shall have been actively engaged in the sales and installation of theatrical rigging systems and equipment for a minimum of 5 years. In addition, the qualified contractor shall have completed a minimum of 3 projects of similar scope and magnitude within the last 5 years. Contractors not demonstrating this minimum experience at the time of bid submission will not be considered qualified to perform the work specified in this section.

B. Contractor shall employ only experienced stage riggers to direct the installation of work of this Section. A competent supervisor shall be maintained on this Project during the entire installation. The Contractor shall employ a qualified theatre rigger to review installation of the system as it related to attachment to the Theatrical Rigging System and to building structure.

C. All equipment and installation shall be the responsibility of a single contractor. This Contractor shall assume complete responsibility for the engineering, fabrication, transportation, and installation of the work in this Section.

D. Approved contractors may, at their option, arrange for sub-contract field and special shop work to be done by others. Bid submissions must identify such subcontractors and indicate the work they are to do.

E. Approval indicates approval of the manufacturer only and not approval of specific products. The Contractor shall be required to provide equipment that will meet or exceed the intent of these specifications.

1.08 SUBSTITUTIONS

A. Notwithstanding any reference in the specifications to any article, device, product, materials, fixtures, form, or type of construction by name, make, or catalog number, such reference shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. The Contractor in such cases, may at his option use any article, device, product, material, fixture, form or type of construction which in the judgment of the Architect's Consultant expressed in writing, is equivalent to that specified.

B. All materials and equipment specified herein have been determined to provide an overall physical appearance and background of proven operation desired by the Owner, and therefore, to establish a standard of quality required for this project. If equipment or material other than that specified is proposed to be furnished, this Contractor shall be required to furnish the Architect's Consultant with such samples as he requires, the same to be submitted by the Architect's Consultant to an independent testing laboratory selected by the Owner for tests to determine the actual equality of the proposed substitute items. All costs and charges incurred by these tests shall be borne by the Contractor. Should such tests prove the substitute materials and equipment equal and acceptable, the Contractor shall be so advised. However, the Owner reserves the right to examine, and where necessary, to have additional tests made by the same independent testing laboratory of the actual equipment delivered to the job site to insure that the delivered equipment is equal in fact to that specified. Should such secondary tests prove the equipment is satisfactory, the Owner will pay the cost for such tests. Otherwise, the Contractor shall pay for the test and shall proceed to remove unacceptable equipment from the job site and to provide that specified. The Architect's Consultant's decision, based on this test, will be final.

C. The plans and specifications are based on specific equipment, accessories, processes and arrangements as indicated herein. Acceptance of the shop drawing submittal indicates only the acceptance of the manufacturer and quality and assumes that the specific requirements and arrangements are in compliance with the intent of the plans and specifications. The Contractor shall, at no additional cost to the Owner, furnish all accessories, layouts, equipment, etc., and shall perform all work necessary for proper functioning and to fit the substitute items to the intent and arrangement indicated in the specifications.

D. If a substitute system is selected, the Contractor, at no additional cost, shall provide any changes in architectural, electrical, or structural systems required as a result of the alternate system to the Owner. The decision of the Architect's Consultant as to the compliance of the proposed system based on the submitted data and demonstrated system shall be final.

1.09 SHOP DRAWINGS AND SAMPLES

A. Shop drawings and equipment data sheets shall be submitted to the Architect's Consultant in accordance with the requirements of these specifications within 90 days after award of the contract. Failure to comply with this 90-day requirement shall be cause for disqualification of the Contractor and cancellation of the contract without cost to the Owner on the basis that the Contractor has not demonstrated the ability or intention to comply with the Contract Documents.

B. Prepare all shop drawings and field changes under the supervision of a professional structural engineer so licensed by the state of the installation. As a courtesy, the first shop drawing submission does not require a Professional Engineer's stamp. Contractor shall issue a final shop drawing submittal with stamp prior to manufacture. All as-built drawings shall be stamped and certified by professional engineer. Structural Engineer's review shall include, but not be limited to, all elements related to overhead lifting, structural support of elements and all suspended elements provided under this section, including field modifications.

C. Acceptance of submitted equipment shall be obtained prior to equipment purchasing or fabrication. If shop drawings are rejected, correct and resubmit in the manner as specified. All shop drawing information shall be submitted at the same time; no partial submittals will be reviewed. Review is for conformance with design intentions only. Review does not relieve contractor of responsibility to verify field conditions; nor does it relieve the contractor of responsibility for errors, omissions, or deviations in submittals.

D. The Contractor assumes responsibility for the accuracy of all dimensions and quantities.

E. Shop drawings shall be performed at a scale of not less than 1/4" = 1'-0" for plans and sections and 1" = 1'-0" for details. Drawings and catalogs shall be marked to show the name of project, date, Owner, Architect's Consultant, Contractor and/or manufacturer and supplier.

F. Drawings: Submit complete sets of drawings for review in Portable Document Format (PDF). Drawings shall indicate complete details and dimensions of all work to be performed. PDF shall include a Table of contents and bill of materials. Document shall also contain PDF bookmarks to plans, sections and major system details. Include all equipment types and locations, clearances required, guides, chains, line sets, contractor-fabricated equipment and all other details required to describe work to be performed. Shop drawings shall contain at least the following details:
   1. Groove details for all sheaves and drums
   2. Complete rigging schematics with weights of all equipment
   3. Elevations of each rigging and curtain set type
   4. Complete hanging/attachment details
   5. Complete hardware details including the load ratings of all load bearing components including, but not limited to, bearings, blocks, trim chain, wire rope, and purchase lines.
   6. Certification by a recognized independent testing laboratory that all steel cable and rope meets the ASTM standards referenced in this Section.
   7. Weights of all equipment
   8. Schematic diagrams of all electrical work including motorized hoists
   9. Manufacturer’s data sheets
   10. Indication of all variances from contract drawings

G. Catalog Sheets: Submit copies of catalog data sheets (8-1/2" x 11"), neatly organized in sets with title page, table of contents, space for submittal stamps, and bookmarks between sections. Additional copies of this set of data sheets are required with as-built drawings. Shop drawing submittal shall contain data sheets in proper order with part or model number clearly indicated on all equipment proposed. Provide a complete list of proposed equipment with reference to its corresponding specification section/paragraph number or equipment title. Denote all deviations from specified equipment on the list.

H. Fabric Samples: Submit a minimum of 2 sets of samples of all curtain materials with full range of colors and patterns available.

I. Finished Curtain Samples: Submit 2 finished samples of each of curtain type. Each sample should be approximately 3' x 3' and consist of all details that will be included in the complete finished curtain less the hanging hardware. The traveler sample may have 4-inch hems (sample only) with specified fullness and other specified features. All other samples shall have specified hems, webbing, grommets, tie line and pipe pocket. Samples shall include but not limited to:
   1. Main Curtain and Valance
   2. Travelers
   3. Legs/Borders
   4. Cycloramas

1.10 RECORDS FOR OWNER

A. Drawings: Maintain a full record set of drawings on the job to show the actual installation of the work performed. All as-built drawings shall be stamped and certified by Professional Engineer, and reflect field modifications. Submit 4 hard copy sets of drawings and 4 USB drives of electronic copy in PDF format showing 'as installed' work to the Architect’s Consultant for initial review. If 'as installed' documents are rejected, correct and resubmit in the manner specified.

B. Manuals: At the time of project closeout, submit 4 sets of each of the following manuals to the Architect’s Consultant for review. Manuals (8-1/2" x 11") are to be neatly bound and include title page with the name of the project, date, Owner, Architect’s Consultant, Contractor, Contractor and/or Manufacturer and Supplier. The manuals to be supplied are as follows:
   1. Operation and Instruction Manual, including:
      a. Table of contents

b. Brief description of the operation of each system, (descriptions shall be written such that new personnel may read the manual and be able to set-up and operate the system).
c. Manufacturer's operation instructions for all user-operated equipment.
d. Small scale, clear laminated plan(s) showing the location of all equipment.

2. Maintenance Data Manual, including:
   a. Table of contents
   b. A list of all equipment supplied by this contract with manufacturer's name, model and part number.
   c. A listing of equipment manufacturer's/supplier's addresses for all equipment covered by this contract.
   d. All equipment warranties and guarantees including contractor's guarantee. Explain the limits of the warranty, and whom to contact for service, etc.
   e. Manufacturer's owner and service manuals on all equipment under this contract.
   f. Replacement parts lists of all major items and equipment indicating specific part ordering numbers.
   g. Approved shop drawing catalog data sheets.
   h. All test results required under these specifications. Videos shall be submitted in electronic format on USB drive.
   i. Any and all other data and/or drawings required during construction.

1.11 TESTS AND OBSERVATIONS

A. The complete job shall be, during and after construction, subject to the following tests, observations, and checkout:
   1. By Architect’s Consultant observations, tests, and checkout conducted by or for Consultant in Consultant’s presence. Upon notice, Contractor shall furnish not to exceed 2 persons (one to be the job foreman) and tools to assist for a reasonable amount of time to make such tests and observations as are requested by the Architect’s Consultant.
   2. By any Government or local authority.
   3. Operation and visual examination of all manual and motorized components.
   4. Contractor shall demonstrate for Architect’s Consultant, full load testing of all motorized sets that suspend loads. Test weight shall be equal to the live load listed on the Drawings. Contractor shall arrange for delivery, mounting, and de-mounting of weight on motorized sets, and removal of test weight from project site. Testing shall include the following:
      a. Full range of travel in all axes of movement, directed by the installed control system.
      b. Both controlled stop and emergency stop conditions.
      c. Variable speed sets shall be tested at a minimum of 3 speeds: creep, 60%, and maximum specified. Tests shall be performed at each speed for the full range of travel.
      d. For all sets, a test with the weight uniformly distributed across all lift lines shall be performed.
      e. For 10 percent of each set type, but not less than one per type, a test with the weight eccentrically distributed shall be performed. Test weight shall be equal to the capacity of the set and distributed so that one lift line shall carry the maximum load per lift line as shown in the Drawings.
      f. Testing must be video-recorded with audio and submitted with written certification for each set. Certification shall indicate: lineset, date, motor serial number, speed 1, load 1, limit locations 1, speed 2, load 2, limit locations 2, general conditions: (temperature, humidity, and time of day), and E-stop/emergency release.
      g. Motorized curtain sets where the curtains are intended to be easily removable (legs, borders, etc.) shall be tested prior to curtain installation.

h. Motorized curtain line sets where the curtain is intended to be permanently mounted (bi-parting travelers, proscenium reduction curtains, etc.) shall have the required curtain and hardware installed prior to the full load testing.
i. Cable management systems on stage electrics, along with required plug strip, plug box, etc., must be installed and operating normally during the test.

5. Simulated failure test of mechanical over-speed brakes. Test shall be simulated so as not to compromise the integrity of the installed components. Test does not need to be performed on site but must be video-recorded and submitted. In lieu of this test, manufacturer may supply written certification of a successful test of representative samples.
6. Verification and fine-tuning of all hoist limit switch settings (initial and ultimate).
   a. Line sets intended for masking curtains shall be tested prior to curtain installation.
7. Fire curtain checkout shall include the following:
   a. Testing of all initial and ultimate hard limits.
   b. Testing of all manual emergency release mechanisms:
      1) Pull stations
   c. Testing of all automatic emergency release mechanisms:
      1) Resettable electro-magnetic release, if applicable
      2) Resettable electro-thermal link release, if applicable
      3) Rate of rise heat detectors
   d. A minimum of three tests shall be performed to confirm emergency activation closing speed meets the required codes. A minimum of 1 test shall be with the stage house roof vents open
   e. Testing of non-emergency operation controls
   f. Testing of the emergency stop function while moving in both the down and up directions.

B. After completion of installation and preliminary tests by the Contractor, checkout of the work shall be performed by the Architect's Consultant.
   1. The Contractor shall certify in writing to the Architect that the work is complete and ready for checkout.
   2. System checkout shall be supervised by a knowledgeable representative of the Contractor.
   3. In order for the Architect's Consultant to conduct system checkout, the following elements must be in place:
      a. Rigging system must be complete, and curtains installed. See exception for curtains on motorized line sets in paragraph A above.
      b. Rigging control system must be operational.
      c. All electrical components must be operating on permanent building power.
      d. Preliminary initial and ultimate hard limit positions set.
      e. Stage electric line sets complete with plug strips, plug boxes, or other distribution devices as required along with complete cable management required for the device(s).
      f. Complete access to areas where the rigging systems are installed, including the stage house, control panels, motors, and other system components.
      g. Stage floor installation complete.
   4. Contractor is to provide any equipment that may be necessary to access system components, including personnel lifts and/or ladders.
   5. Contractor shall provide 2 personnel to operate equipment during checkout. These technicians must be familiar with safe operating procedures for this equipment and be knowledgeable of the adjustment of soft and hard limits for the motorized equipment specified within this Section.

C. The cost of periodic trips to the job site for observations and final checkout by the Architect's Consultant has been provided for in the Architect's Consultant's contract. The cost of any additional trips to the job site due to delays, omissions, or mistakes by the Contractor shall be borne by the Contractor.

D. The Contractor shall make any adjustments or modifications necessary from the punch list to bring the work into conformance with established Contract requirements and shall then certify that all work is complete.

1.12 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver curtains until spaces to receive them are clean, dry, and ready for their installation. Ship to jobsite only after roughing-in, painting and other finishing work has been completed, installation areas are ready to accept work. If curtains are installed before dust-generating work is complete, curtains shall be appropriately protected from damage.

B. Handle and install materials to avoid damage.

1.13 WARRANTY

A. All labor and materials provided under this contract, unless otherwise noted, shall be warrantied for a period of 1 year following the date of final acceptance of the installation.

B. The following equipment provided under this contract shall be warranted for a period of 2 years following the date of final acceptance of the installation
   1. Motorized gear/motor/brake assemblies.
   2. Motorized hoist control system.
   3. Index striplight – LED and controls.

C. All equipment with factory warranties greater than one year shall have their warranties under the Owner's name.

D. All defects occurring in labor or materials within the guarantee period shall be rectified by replacement or repair. Contractor shall, within this warranty period, be required to answer all service calls within a 24-hour period and repair or replace any faulty item within 48 hours after the initial service call without charge to the Owner.

PART 2 PRODUCTS

2.01 GENERAL

A. All materials shall be new and of first quality.

B. State-of-the-art assurance: No products shall be accepted if they have been discontinued or superseded at the time of shipment. For such items, the manufacturer shall make products of comparable function to the specification available to the project at no additional cost. Should the manufacturer have developed a later model of specified units, the latest developed unit shall be provided without additional cost to the Owner. Should the manufacturer develop products of comparable function above and beyond the specification of the listed product, the manufacturer may offer the newly developed product for use on the project. The manufacturer shall notify the Architect's Consultant of any developments to the specified products and shall note any change in the requirements of building infrastructure(s) to support the developments. The Architect and Architect's Consultant shall then determine whether upgraded products shall be accepted.

C. All load bearing rigging components shall be rated for overhead lifting; capable of supporting design loads as shown and shall be of, or treated with, corrosion resistant materials. Where not specifically called out in this Section, rope and wire rope shall be selected using a minimum design factor of
8 to 1. All chain, shackles, and other hardware shall be selected using a minimum design factor of 5 to 1.

D. Operating parts of all equipment shall be machine finished, and tolerances, finishes, fit, etc., where not specified, shall conform to good trade practices.

E. All items necessary for a complete, operational, and safe system shall be provided, including bolts, nuts, washers, fittings, anchors, supports, hinges, and all other items required for completeness and operational safety. Where not specified elsewhere in this Section, all bolts shall be Grade 5 or better.

F. The rigging products of certain manufacturers are specified by catalog number for establishing a standard of quality. Items equal in quality and performance by manufacturers other than those specified will be permissible upon acceptance by the Architect's Consultant.

G. Equipment quantities are "as required" or "as shown on drawings" or "as specified elsewhere" unless otherwise noted.

H. Provide all guards and other protective devices required to ensure protection of individuals who may be near or adjacent to equipment and devices during normal operation.

I. Loading capacity of systems is defined as the live load exclusive of the dead load.

J. Dead load is defined as installed infrastructure such as pipe battens, truss battens, sandbags, hooks, plug strips, etc.

K. Should the Contractor choose to suggest alternate methods that require heavier dead loads, the Contractor shall be responsible for increasing the capacities of the individual components, including the arbor capacities, accordingly. Any alternate methods must be approved specifically by the Architect's Consultant and when necessary, by the base building structural engineer.

2.02 ENGINEERING RESPONSIBILITY

A. The engineering of all equipment, devices, machinery, and systems shall have the following considerations:
   1. Safety to personnel during operation, use, and maintenance.
   2. Adequate load supporting capability and fail-safe design.
   3. Proper consideration of all systems and elements, including electrical insulation levels, interrupting capacities, protective relays, impact strength, breaking strength, emergency stopping distances, acceleration and decelerations rates, and normal working stress capabilities of equipment and all components.
   4. Reliability, with consideration for special or unusual requirements of the unit or installation.
   5. Ease of operation and maintenance.
   6. System operating sequences, including accounting for simultaneous as well as sequential operation of systems and sub-systems.
   7. Coordination with associated and/or adjacent systems provided by others.
   8. Quiet operation.

2.03 MISCELLANEOUS COMPONENTS AND SUPPLEMENTAL SUPPORT

A. Additional supplemental support structure not furnished under other sections and other fittings required for installation, support, bracing and/or operation of Stage Rigging System components are the responsibility of this Section. Provide all supplementary support necessary for safe and proper static and dynamic conditions of all systems and components required for the work of the Specifications. All attachments, anchorages, connections, and miscellaneous supplemental support shall be designed, supplied, and installed by the Contractor and reviewed by the Architect's Consultant.

B. Special components may be required for muling around structural components to meet wire rope fleet angle requirements, supporting hoisting cable, or dropping lines through structure to battens. These special components shall meet or exceed comparable equipment specified herein. Idler blocks, pivot blocks, structural support for these blocks, etc., required to make all lines fully operable, whether such components are specifically named or not, shall be furnished without claim for additional payment.

C. Additional mounting components, such as miscellaneous steel, wood blocking, and fittings, required for installation, support, bracing, and operation of equipment under this Section shall be provided without claim for additional payment. These components shall be coordinated with other trades.

D. Patented channel type structural steel shall accommodate the required load but shall equal Unistrut Series P1000 at minimum.

E. Flame cutting is not acceptable.

F. Miscellaneous steel shall be of suitable types and sizes. All straps, rods, anchors, clip anchors, clip angles, and other hardware necessary for the attachment shall be supplied.

G. This Contractor shall coordinate these locations and requirements with the General Contractor.

H. All methods of connection and imposed loads resulting from the Contractor's work shall be submitted to the Architect's Consultant prior to fabrication.

2.04 ARBOR GUIDE SYSTEM

A. T-track system shall be 1-1/2" x 1-1/2" x 3/16" steel or 2" x 2" x 1/4" aluminum tees, or jays, spaced as shown on the Drawings. Tees shall be Clancy type 1500 with appropriate number of Type 215 or 315 U Plates. All spreader U plates shall be bolted to continuous angle wall battens. 1-3/4" x 1-3/4" x 3/16" steel angle wall battens shall be mounted 5'-0" apart vertically over the entire area of the arbor guide battery. Both legs of the wall battens shall be slot punched to provide for any alignment of the tees made necessary by irregularities in the wall. The tee bar shall also be slot punched in order to provide for vertical alignment of the guide system. Tees shall extend upward to underside of head block beams.

B. Top and bottom stops of hardwood bumpers with steel angle backing shall be provided to control limits of arbor travel. The top and bottom stop battens and the floor batten shall be secured to the tee bar, and the 3" x 6" floor batten shall be secured to the floor by means of 3/8" x 2" lag screws.

C. Provide adjustable stops on tees, or jays, to limit upward travel of tension blocks.

D. Any splices in T-track must be smooth and free from any burns, or notches that could catch arbor shoe.

2.05 ARBOR – FRONT LOADING

A. Arbor
   1. The arbor shall be a front-loading type. The arbor shall restrain the counterweight bricks on 3 sides.
   2. The arbor shall have a spring-activated, self-closing front lock bar or cover to prevent bricks from sliding out the front of the arbor. The lock shall engage and lock in the slot or indentation at the front of the counterweight bricks in the event the bricks slide forward in the arbor.
   3. The arbor shall have shelves fixed in place no more than 24-inches apart. Arbors requiring spreader plates are not acceptable. Arbors without shelves are not acceptable. The arbor shelves shall impose an angle on the counterweight bricks causing them to be slanted toward the back of the arbor.
   4. The arbor shall not have bolt heads, bolt shanks or nuts protruding from the sides of the arbor.
   5. The arbor shall be single purchase and shall have tie off points for up to 10 loft lines and for one hand line matching the diameter indicated in the schedules.
   6. The arbor shall be sized to accommodate enough counterweights to balance the pipe batten and related equipment when the batten is carrying its rated live load as indicated in the Rigging Schedule. Arbors shall be designed to smoothly operate on 8-inch" centers.
   7. Arbors shall utilize chain compensation to balance the transfer of lift line weight from arbor to batten between low and high trim.

8. Paint line set number on backbone of arbor in yellow paint 2-inch tall and on arbor side plate for visibility from side.
9. Provide yellow pipe weight marker to indicate counterweights needed to balance empty batten.
10. Arbor shall have a bull ring on the bottom of the arbor.

B. Approved Equipment:
   1. Thern Stage Equipment - Brickhouse
   2. Wenger /J.R. Clancy - FrontLoader

C. Quantity: One per counterweight line set.

2.06 ARBOR GUIDE

A. At each end of the arbor there shall be a ball bearing roller guide assembly. Each assembly shall consist of the following: Two 3-1/2-inch Nylatron GS guide wheels; 6-3/8” x 3" x 3/16" steel back-up plates. Each guide assembly shall be secured to the tie-plate and the top and bottom of the arbor by means of at least two 3/8-inch grade 5 bolts and nuts.

B. Approved Equipment:
   1. J.R. Clancy, Inc. 007-TBRG
   2. Texas Scenic Company, H&H Products, Model 991RG

2.07 LOCKING RAIL

A. Locking rails for the arbor guide system shall be fabricated as shown on drawings and shall consist of the required steel angles, braces, etc., to facilitate the mounting of one rope lock for each line set. Provide adjustable stops for tensioning floor blocks on the tees, or jays, to limit upward travel of each take-up block. Provide a 2" x 2" hardwood arbor stop mounted to the top back steel angle. The locking rail shall be designed and installed in such a way as to resist a maximum uplift of 500 pounds per linear foot of locking rail as mounted to the floor. This shall be accomplished by use of an expansion or adhesion anchor into the concrete floor installed per anchor manufacturer’s instruction. When unable to anchor to concrete, anchor in manner which shall meet the loads specified above.

B. Locking rail index card
   1. Provide an index card permanently attached to the lock rail at each rope lock.
   2. Index card to be lamicoid or heavy gauge plastic. Card shall contain the following information permanently adhered to the card:
      a. Line set number in upper left corner
      b. Space to write identifying equipment placed on the line set.

C. At stage level, provide a reaction bar for use with a portable capstan winch.

D. Where locking rails are located on floor edges, rail shall include a min. 3-inch kickplate and expanded mesh between stanchions to within 6-inch of the underside of locking rail.

E. Approved Equipment:
   1. Floor mount
      a. JR Clancy Series 011-538xx
      b. Texas Scenic Company, H&H Products, model 578

F. Quantity: As shown on drawings

2.08 ROPE LOCK

A. Rope lock shall be positive locking, quick-release type with thumbscrew adjustment for rope size. Body shall be fabricated of heavy-duty ductile iron. Jaws shall be fabricated of gray iron and sized to fit specified arbor control line.

B. Rope lock shall have 9-inch steel handle encased in plastic. Rope lock ring shall also be encased in plastic. Rope lock and rope lock handle shall be smooth finished and free of all cast flashing and sharp edges.

C. Provide rubber bumper for the handle to land on when opened and spring washers between the dogs and the house to provide silent operation.

D. Rope lock shall be capable of being secured (padlocked) in closed position.

E. Approved Equipment:
   1. J.R. Clancy, Inc. Model No. 533R
   2. Texas Scenic Company, H&H Products, Model No. 576-9

F. Quantity: One per counterweight line set per locking gallery.

2.09 FLOOR BLOCK

A. Floor block on T-track for tensioning arbor control line. Sheave shall be 10" with 5/8" SAE Grade 2 or better steel shaft and sealed precision ball bearings. Bottom half of sheave shall be completely enclosed in block assembly. T-track guide assembly shall consist of 2 steel shoe guides and one spacer. Each line set shall be installed with respective floor block on the T-track at 1/2 way up their total travel to allow for stretch of arbor control line. Tension blocks will be re-adjusted, as needed, before final checkout. Rope groove shall be sized for specified arbor control line, smooth finished and free of all cast flashing. Minimum weight of block shall be 40-pounds.

B. Sheave Diameter:
   1. 10-inches for 3/4-inch purchase line
   2. 12-inches for 1-inch purchase line

C. Approved Equipment:
   1. J.R. Clancy, Inc. Model No. 1015
   2. Texas Scenic Company, H&H Products, Model No. 70

D. Quantity: 1 per counterweight line set.

2.10 HEAD BLOCKS

A. Head blocks shall have one sheave of sufficient width to accommodate required number of wire rope grooves and 1 arbor control line. Sheave shall conform to cable manufacturer's recommendation on depth and design of grooves and shall have 1/64-inch tolerance. Pitch diameter from any wire rope groove to any other shall not vary by more than .001-inch. Head blocks shall be equipped with life-time lubricated Timken tapered roller bearings. The shaft shall be SAE Grade 8 steel bolt with head keyed to prevent shaft rotation. Insert steel sleeve into bore to provide bearing surface for roller bearings. Head blocks shall be equipped with at least 3 spacers of 1/2-inch pipe to prevent jumping of wire rope from the grooves. Side plates shall be at least 10 gauge securely welded to base frame with a continuous staggered weld. Provide base angles and auxiliary base angles as necessary for support to structure. Fasteners shall be SAE Grade 5 or better.

B. Sheave Material: Nylatron GSM

C. Sheave Diameter:
   1. Standard Rigging: 12-inches

D. Minimum Shaft Diameter:
   1. Standard Rigging: 1-inch

E. Approved Equipment:
   1. J.R. Clancy, Inc. Series 55
   2. Texas Scenic Company, H&H Products, Series 50

F. Quantity: 1 per counterweight line set

2.11 LOFT BLOCKS AND MULE BLOCKS

A. Loft blocks and mule blocks shall have one sheave (mules may require more than one sheave) of sufficient width to accommodate required number of wire rope grooves. Sheave shall conform to cable manufacturer's recommendation on depth and design of groove and shall have a 1/64" tolerance. Pitch diameter from any groove to any other shall not vary by more than .001". Blocks shall be equipped with life-time lubricated, sealed bearings as specified below. The shaft shall be SAE Grade 8 steel bolt with head keyed to prevent shaft rotation. Blocks shall be equipped with at least 2 spacers of 1/2-inch pipe to prevent jumping of cable from the grooves. Side plates shall be at least 10 gauge securely welded to base frame with a continuous staggered weld. Provide base angles as necessary for support to structure. Fasteners shall be SAE Grade 5 or better.

B. Provide idlers on each block with sufficient number of sheaves to support passing wire rope on each loft block.

C. Provide a multiline sheave for the first loft block (line 1) on each counterweight set.

D. Approved Sheave Material:
   1. NYLATRON GS
   2. ZYTEL GRZ

E. Sheave Diameter:
   1. Standard Rigging: 8-Inch

F. Bearings:
   1. Standard Rigging Loft Blocks - Precision Ball Bearings
   2. Standard Rigging Mule Blocks with 2 or less lines - Precision Ball Bearings
   3. Standard Rigging Mule Blocks with 3 or more lines - Sealed Timken Tapered Roller Bearings

G. Minimum Shaft Diameter:
   1. Standard rigging: 5/8-inch

H. Approved Equipment:
   1. Upright Loft Block: Texas Scenic Company, H&H Products, Series 840N25
   2. Underhung Mule Block: Texas Scenic Company, H&H Products, Series 81NS

I. Quantity: Refer to drawings and as required

2.12 SAG BARS

A. Sag bars shall be min. 2 in. x 2 in. rock maple, oak, or UHMW, reinforced with steel channel. All wood edges shall be radiused and sanded smooth.

B. Sag bars shall be provided as required. They shall be designed and installed such that they prevent the lift line cables from coming into contact with the structure or other components.

2.13 WIRE ROPE

A. Wire rope shall be first quality, galvanized carbon steel, and impregnated with a dry lubricant. Wire rope shall meet the ASTM A1023 Standard. All wire rope shall be lot traceable to the manufacturer.

B. All cable ends shall be neat, seized and smoothed to prevent scratching and catching. Wire rope shall be terminated with cable thimbles and utilize one of the following termination methods:
   1. Nicopress oval copper sleeves properly sized for the wire rope as manufactured by National Telephone Supply, applied in conformity with manufacturer's instructions. Nicopress stop sleeves shall be copper as manufactured by National Telephone Supply.
   2. Forged wire rope clips as manufactured by The Crosby Group, Inc. (Crosby® Clips), applied in conformity with manufacturer's instructions.

C. Wire Rope Diameter:

1. Minimum wire rope sizes are indicated below.
    a. Standard Rigging: 1/4-inch
    b. Motorized Rigging: 1/4-inch
    c. Fire Curtain Hoist: 1/4-inch
    d. Fire Curtain Guide: 1/4-inch

D. Approved Equipment:
1. Hoist and Rigging –7 x 19 Utility Cable
2. Guide –7 x 7 Non-Flexible Utility Strand

2.14 LIFT LINE TERMINATION ASSEMBLIES - WIRE ROPE

A. Batten connection:
1. Type 1 – Wire rope shall be terminated as specified elsewhere or as shown on drawings and fitted with 36-inch long trim chain. Trim chain shall be connected through the cable thimble and terminated as specified elsewhere. Chain shall make at least one full wrap around the pipe batten. Type 1 terminations will be installed on all single batten line sets unless otherwise noted
2. Type 2 – Wire rope shall be as specified elsewhere or as shown on drawings and fitted with rated jaw-jaw turnbuckles. Type 2 terminations will be installed on all double batten line sets unless otherwise noted.

B. Arbor terminations - Wire rope shall be terminated as specified elsewhere and fitted with an appropriately sized screw pin shackle attached to the arbor top. Mouse shackle with wire after installation.

2.15 CHAIN

A. Dead hanging battens and batten termination assemblies (trim chains).
1. Each chain shall be 36-inches long fabricated from 1/4-inch alloy Theatrical Chain, specifically designed for theatrical overhead lifting applications.
2. The chain shall have a minimum breaking strength of 13,000 pounds.
3. The chain shall be compatible with industry-recognized chain hardware. Individual link size shall match the National Association of Chain Manufacturers, Welded Steel Chain Specifications for Grade 30 Proof Coil Chain.
4. Each link of the chain shall be stamped with the manufacturer’s identifying mark.
5. The chain shall be lot traceable, with a coded date stamp on every tenth link of chain.
6. Chain shall have a black finish.

B. Approved product:
1. Wenger/J.R. Clancy Alpha Chain
2. Texas Scenic Company, Theatrical Chain
3. Peerless Theatrical Rigging Chain

2.16 CHAIN TERMINATIONS

A. A shackle shall be used for termination of dead hanging chain and lift line terminations (trim chains). Shackles shall be “moused” shut with wire, after proper installation

B. Quick link for termination of certain special components. Quick links may only be utilized when specifically indicated herein or on drawings.
1. Approved equipment: Cooper Group Rapid Link load rated at 880 lbs.

2.17 SHACKLES

A. General:
1. Shackles shall be screw pin anchor shackle unless otherwise noted, and shall be forged, quenched and tempered with alloy pins.
2. Shackles shall meet requirements of ASME B30.26, Federal Specification RR-C-271H, Type IVA, Grade A, Class 2.

3. Shackle shall have size and working load limit (WLL) in tons permanently marked on shackle body.
4. Shackles shall be black baked or powder coat finished.
5. Shackles shall be fatigue rated to 20,000 cycles at 1.5 times the rated working load limit (WLL).
6. Shackles shall be lot traceable to the manufacturer.
7. Shackles shall be moused after installation to prevent loosening.

B. Approved equipment:
1. Crosby Group, S-209T Theatrical shackle
2. Columbus McKinnon (CM), Theatrical shackle
3. Crosby Group, 209 Carbon Screw Pin Anchor Shackle
4. Columbus McKinnon (CM), Carbon Screw Pin Anchor Shackle
5. Chicago Hardware, Drop Forged Anchor Shackle
6. Approved equal

2.18 TURNBUCKLES

A. General
1. Turnbuckles shall be drop forged and galvanized, and conform to ASTM F-1145 Type 1, Grade 1 standard. End fittings shall be quenched and tempered or normalized, bodies shall be heat treated by normalizing.
2. Turnbuckles shall be fatigue rated to 20,000 cycles at 1.5 times the rated working load limit (WLL).
3. Turnbuckles shall be lot traceable to the manufacturer.
4. Turnbuckles shall be moused after adjustment to prevent loosening.

B. Approved equipment:
1. Crosby Group, HG Series Turnbuckle
2. Columbus McKinnon (CM), Forged Turnbuckle
3. Chicago Hardware: Drop Forged Turnbuckle
4. Approved equal

2.19 BATTEN PIPE CLAMPS

A. Full Pipe Clamps:
1. Pipe clamps shall be made of 2 strips of 12 Ga. (2.780 mm) by 2-inch (50.8 mm) hot rolled steel formed to encompass and clamp the pipe batten to prevent its rotation. Corners shall be rounded.
2. There shall be a 3/8” x 1” (9.525 mm x 25.4 mm) hex bolt with lock nut above and below the batten. A 5/8-inch (15.875 mm) hole in the top of each clamp half allows the attachment of cable, chain, or other fittings.
3. Full pipe clamps shall have a manufacturer's rated working load limit of at least 1400 lbs.

2.20 BATTENS

A. Pipe battens shall be nominal 1-1/2-inch black steel pipe (1.9-inch O.D.) ASTM A53/A Strong (Schedule 40), stripped and painted with at least one coat of black primer and one coat of flat black paint free of surface irregularities, in lengths as indicated on rigging schedule.

B. Splices shall be close-fitting internal steel sleeves with a wall thickness of not less than 0.1875-inch, and min. 24-inches long. Both sides of the splice shall be held in place with a minimum of 2 plug welds per side. Splices may also be bolted with 2 bolts evenly spaced on each side of the splice. Bolts shall be oriented 90° off access from adjacent bolts. Bolt length shall not extend more than 3 threads beyond the properly tightened nut.

C. Battens shall be engineered and installed for straight installation.

D. All battens shall have bright yellow end caps on each end for visibility in the loft. End caps shall be a minimum of 6-inches long and provide a smooth surface to the batten end. Line set number shall be stenciled on each end of each batten inside of the end caps, in contrasting color paint, such that the number is readable from the floor when the pipe is flown out and from position upstage of the batten when the pipe is flown in. In lieu of end caps, battens can be painted for 24-inches on each end with bright yellow enamel.

E. Paint on every batten a white, 1-inch-wide strip around the circumference of the batten at center stage of the batten.

2.21 REMOVABLE PIN RAIL

A. The pin rail shall be manufactured from two 3-1/2-inch I.D. black steel pipe, ASTM A53/A Strong (Schedule 40), with 4-inch channel legs coped and welded to the pipe on 4-foot centers maximum. The pipes shall be offset vertically and horizontally and shall be 3’-9” to 4’-0” above the floor. Holes for belaying pins shall be on 12-inch centers.

B. Legs shall end at a bracket with pre-drilled holes appropriate for attaching the rail to the floor in a manner suitable to the design load.

C. Install appropriately rated stage inserts into floor so that the pin rail can be securely fastened when in place but removed without damage to the stage floor.

D. Pin rail shall be 6-feet in length.

E. Quantity: 1

F. Approved Equipment:
   1. J.R. Clancy, Inc. Double Pin Rail
   2. Approved Equal

2.22 SAND BAGS

A. For counterweight of hanging plug boxes.

B. Provide clean, dry, non-toxic sand with each bag in quantity to counterweight each plug box.

C. Attach bag utilizing an endless loop sunday fabricated of 4-feet of specified flexible wire rope.

D. Approved Equipment: J.R. Clancy #1096

E. Quantity: 6 sand bag assemblies.

2.23 FIBER ROPE

A. Fiber rope shall be a synthetic rope consisting of combination filament and staple/spun polyester wrapped around fibrillated polyolefin.

B. Fiber rope diameter:
   1. Grand Drape: 1-inch
   2. All other counterweight sets: 3/4-inch
   3. Spot Lines: 5/8-inch
   4. Hanging plug boxes: 5/8-inch

C. Approved Equipment:
   1. Counterweight sets: New England Ropes, 3-Strand Composite Multiline II, 3 STML-689. Color: White.
   2. Spot line: New England Ropes, Stage Set-X. Color: Black.
   3. Hanging plug boxes: New England Ropes, Multiline II, Color: Black.

D. Quantity:
   1. Counterweight: As required by drawings.
   2. Spot line rope for hanging plug boxes: provided in length to allow plug box to extend full length of SO electrical cable and still make 3 wraps on the pin rail.

2.24 FIBER ROPE BLOCKS

A. Block shall be designed for a dynamic load of 300 pounds.

B. Sheaves shall be machined from Nylatron or ASTM A48-83 Class 30 gray iron castings having a minimum tensile strength of 30,000 PSI and a Brinell Hardness of at least 187. Sheaves shall have an outside diameter of at least 8-inches. and shall be lathe turned and grooved for lift line diameters as shown in the Drawings.

C. Hubs shall be minimum 2-inch diameter, machine faced, bored for and press-fitted with double sealed precision ball bearing assemblies.

D. Shafts shall be minimum 1/2-inch diameter cold finished steel shafting. One end shall be locked to the side plate by a keeper pin; the other end shall be threaded and drilled for a castellated lock nut and cotter pin. A locking nut shall also be acceptable.

E. Side plates shall be minimum 12-gauge cold rolled steel plate. Side plates shall be attached by at least 6 minimum 5/16-inch bolts through un-grooved pipe spacers sized to space side plates for proper sheave clearance.

F. Blocks shall include a minimum of 3 spacers between side plates to prevent rope from escaping the sheave.

G. Attachment, location, and quantity as shown in the Drawings.

2.25 BELAYING PINS

A. Hardwood pin, 21-inch long by 1-5/32-inch diameter.

B. Approved Equipment: JR Clancy 015-249.

C. Quantity: 1 for each hole in each pin rail.

2.26 COUNTERWEIGHT

A. Front loading counterweight shall be first quality mild steel bar stock. An opening on one end of the counterweigh shall serve as a handle. All edges shall be ground free of burrs and rough or sharp edges.

B. Weights shall be 6-inches in width. Contractor shall provide weights in 2 thicknesses that correspond to approximately 30-pounds and 15-pounds.

C. Provide balance weight for all line sets using primarily 30-pound weights. Balance weights shall be painted red and seized to the arbor bottom with 2 bands of standard mechanically locked steel strapping. On the front face of the top dead weight, paint the set number in white, using stenciled numerals not less than 1/2-inch high.

D. After balancing, provide additional weight equal to 60% of the total arbor capacity of all installed line sets. Additional weight shall consist of the following percentages, by weight:
   1. 30 pound: 75%
   2. 15 pound: 25%

E. Additional weight shall be delivered to the Loading Gallery.

2.27 FIRE SAFETY CURTAIN

A. GENERAL
   1. Fire safety curtains shall comply with the current version of ANSI E1.22 – Fire Safety Curtains, and NFPA 80. Ensure that all aspects of materials and installation are in accordance with applicable codes in every respect.
   2. Components of fire curtain shall be as shown on Drawings and as indicated herein.

B. Smoke pocket
   1. Fire safety curtain shall be provided with a smoke pocket on each side of the proscenium opening. Smoke pocket height and location shall meet all code requirements.
   2. Smoke pockets shall be constructed of steel forms and shapes and rigidly mounted to structure, and overlap the fire safety curtain by a minimum of 12-inches.

3. Existing smoke pockets to remain.

C. Stay chain.
   1. The curtain shall be provided with safety anchor chains of a size and strength to safely support the weight of the curtain with design factor herein specified. There shall be one more chain, in number, than the number of hoist lines and they shall be located centered between the hoist lines and at each end of the top batten or frame.
   2. Stay chains shall be fastened to pipe clamps on the top batten of an unframed fire safety curtain. For framed curtains, stay chains shall attach to steel angle along the top of the frame with rated and properly sized shackles. Mouse shackles after adjustments are completed.
   3. The stay chains shall be so adjusted that they support the curtain when it is in its lowered position and the bottom of the yield pad, over entire width of curtain, is in continuous contact with the stage floor.
   4. Stay chains shall be fastened to the gridiron, building structural steel, or proscenium wall. Connection points shall be sized for the shock loads imposed.
   5. Approved Equipment:
      a. Crosby 3/8-inch SAE Grade 4 high test

D. Curtain fabric
   1. Existing fire curtain to remain.

E. Hoisting system
   1. Fire safety curtain shall be suspended from motorized hoisting system. Curtain shall be capable of either motorized or non-motorized emergency operation. Emergency operation shall be by release of motor brake to allow fire curtain to lower itself at a controlled, and adjustable, rate of speed.
   2. Fire safety curtain motor shall be equipped with a hydraulic gear pump to decelerate fully the free-falling fire curtain. Adjustable metering valve shall control rate of flow of hydraulic fluid which, in turn, controls speed of falling curtain.
   3. When in the raised position, the bottom of the curtain shall not be visible from any seat in the first row of auditorium.
   4. Non-emergency hoist control
      a. The fire safety curtain hoist control shall be a stand-alone control panel. The panel shall contain the following elements:
         1) Steel housing and faceplate. Color red.
         2) Hold to run push buttons for raise and lower
         3) Emergency stop push button
         4) Key switch for ON/OFF
         5) Engraved labeling for each element in contrasting white fill.

F. Emergency Release
   1. Emergency operation of the curtain shall be effected by gravity, with the release of the motor brake by a release line connected to an electro-magnetic or electro-thermal link, triggered by rate of rise heat detectors. .
   2. Fire Curtain Emergency Release Pull Boxes shall be located each side of the proscenium opening on the stage side. Verify mounting location on the proscenium wall.
   3. Emergency release line shall be routed from the Fire Curtain Release Boxes vertically up the proscenium wall then horizontally across the face of the proscenium wall above the gridiron.

4. An emergency release “pull box” shall be located on the upstage side of the proscenium wall, with one box located to each side of the proscenium opening. Each box shall be clearly identified with the action required to initiate an emergency release of the fire safety curtain. Activation shall be by a quick release mechanism that requires the pulling of a pin or handle that releases the emergency control line. If a pin is used as the release mechanism, it shall remain permanently connected to the pull box via a 1/8-inch wire rope of sufficient length to allow for proper release and resetting of the emergency control line. Each pull box shall have a hinged clear plexiglass cover with appropriate handle for ease of opening.
5. Emergency release shall also be initiated via rate-of-rise heat detectors at the roof of the stage house. Rate-of-rise heat detectors shall trigger an electro-mechanical device in line with the emergency release line, allowing the curtain to descend without applied electrical power.
6. Curtain, when released, shall close within applicable code requirements.

G. Signage
1. Manual emergency operation devices shall have signage specific to the action necessary to activate the manual emergency release device. Signs shall be white lettering on red background and located within 2-feet of each emergency release device.
2. A sign shall be mounted adjacent to each non-emergency fire safety curtain control station stating the following:

NON-EMERGENCY FIRE SAFETY CURTAIN OPERATION ONLY

H. Existing fire curtain
1. Fire curtain batten termination - Wire rope shall be terminated as specified elsewhere and fastened to the top batten by means of Clancy #026-21 pipe clamp or equal.

2.28 MOTORIZED RIGGING COMPONENTS

A. All motors, hoisting cables, chain, sheaves, hardware, etc., shall be rated for overhead lifting; capable of supporting design loads as shown in the contract documents and shall be of, or treated with, corrosion resistant materials.

B. Motors
1. General
a. All motors shall be properly sized for the application and not more than 1.25 times the combined live load and dead load at the specified speed.
b. Motors shall be totally enclosed and fan cooled.
c. Except as otherwise specified, all motors shall have minimum Class A winding insulation in accordance with current NEMA Standard MG 1-12.40 rated for 15 to 20 minute intermittent duty cycle.
d. All motors shall be equipped with sealed bearings.
e. Conduit connection box shall be watertight, of cast iron, aluminum, or wrought iron construction, with neoprene gasket. A tapped hole shall be provided for conduit entrance and connection box shall be oriented and coordinated with associated equipment to provide full access to internal connections. Corrosion resistant, high melting point, non-flammable sealing compound shall be used around motor leads where they pass through the motor frame.
2. AC Motors
a. All AC motors shall be squirrel-cage type, of NEMA torque design B, with medium starting torque, normal breakdown torque, low slip, and low starting current.
b. All AC motors shall be TEFC (totally enclosed, fan cooled) enclosures as defined by NEMA Standard MG 1-12.21.
3. For all fixed speed winches, the gear reducer shall incorporate a high inertia flywheel at the motor stage for "soft start" and "soft stop" capability.

C. Gear Reducers
   1. General
      a. The output shaft shall be supported by 2 tapered roller bearings. The gears shall run in an oil bath. The shaft bearings shall be provided with double lip oil seals to prevent leakage.
      b. 2 removable, threaded lubrication plugs shall be furnished for each gearbox. Upper plug opening shall be for lubricant entrance, and lower plug opening shall permit simultaneous purging of spent lubricant from the bearing.
      c. Provide a drain plug in the bottom of the frame on the bearing brackets so as to permit periodic drainage of any possible accumulation of moisture.
      d. Provide full drip pan under motor and reducer assembly.
   2. Right Angle and Helical Bevels
      a. Each right-angle bevel or spiral bevel gear drive shall be selected to transmit twice required torque, horsepower, and impact. All ratings shall be AGMA mechanical ratings for load classification service factor equal to 2.0, except as otherwise noted.
      b. Each right-angle bevel gear drive unit shall consist of the following:
         1) One housing made of high tensile nickel cast iron, properly reinforced at all strain points for maximum rigidity, with precisely located gear set bearing supports. Each housing shall have sufficient capacity for lubricant, and surface area for adequate heat dissipation.
         2) Pinions, gears, and gear shafts manufactured from chromium, molybdenum alloy steel (AISI C-4150) and heat-treated to 32 Rockwell "C" scale minimum core hardness.
         3) Pinion and gear shafts supported by tapered roller or precision ball bearings of adequate capacity, properly mounted, and furnished with oil seals.
         4) All shaft diameters precisely ground, stepped, and radiused to minimize stress concentrations.
   3. Helical Worm
      a. Gear reducers shall be combination helical-worm reducer, directly flange-mounted to the motor/brake assembly. The reducer shall have 2 gear stages; the first stage shall be helical and the second stage shall consist of a worm and worm wheel. The worm shaft shall be milled, hardened, and ground to ensure maximum efficiency and long life.
      b. Gear reducers shall be enclosed in high-strength gray cast iron housings with precisely located gear set bearing supports. Each housing shall have sufficient capacity for lubricant, and surface area for adequate heat dissipation.
      c. Gear reducer shall incorporate a high inertia flywheel at the motor stage for "soft start" and "soft stop" capability.
      d. Gear reducers shall be SEW-Eurodrive "Helical-Worm Gear" or approved equal.
      e. Gear reducers shall be of the worm gear type with compound helical bevel to single envelopment worm or double enveloping worm gears. Single stage 'Spirol' gearing is not acceptable equipment provided for the work of this Specification.
      f. Worm gear reducers shall be selected to safely transmit specified torque and horsepower. Capacity and type shall be as required. Design of the power transmission train shall provide for gearing ratios of the worm gear stage to be greater than 40:1 wherever practical. Ratios less than 40:1 shall require approval of the Architect's Consultant. All ratings shall be AGMA Class 2 mechanical ratings with a load classification service factor equal to 1.3, except as otherwise noted or approved.
      g. Each worm gear reducer shall consist of essentially the following:
         1) One housing made of high tensile nickel cast iron, properly reinforced at all strain points for maximum rigidity, with precisely located gear set bearing supports. Each housing shall have sufficient capacity for lubricant, and surface area for adequate heat dissipation.

2) Worm gears manufactured from gear bronze with minimum tensile strength of 40,000 PSI and properly keyed or splined to the gear shaft. Gear shafts shall be manufactured from chromium, molybdenum alloy steel (AISI C-4150).
3) Worm and worm shaft manufactured from chromium, molybdenum alloy steel (AISI C-4150) and heat- treated to 32 Rockwell "C" scale minimum core hardness.
4) Each worm gear and shaft supported by 2 tapered roller bearings of adequate capacity, properly mounted, and furnished with oil seals.
5) All shaft diameters precisely ground, stepped, and radiused to minimize stress concentrations.

D. Primary Brake
1. Automatic power failure braking shall provide fail-safe stopping in the event of power loss.
2. Except where indicated otherwise, all brakes shall operate from single-phase AC, and shall be electrically released/spring applied, designed to conform to applicable NEMA standards for intermittent duty. All brakes shall be furnished with means for manual release.
3. Brakes shall have drip-tight NEMA type 2 enclosures.
4. All brakes shall stop and hold a minimum of 200% of motor full torque capacity.
5. Any required brake conditioning (for example burn-in) shall be completed prior to system checkout.
6. Brake noise shall comply with the noise requirement as outlined in this specification.

E. Secondary brakes
1. All motors shall incorporate one of the secondary brake methods described below.
a. Centrifugal overspeed
1) Brakes shall be a fully mechanical overspeed brakes, directly mounted to the drum shaft or sprocket drive shaft.
2) The overspeed brake shall engage automatically when the set exceeds the maximum specified speed by 10%.
3) It shall be possible to preset the brake tension to adjust the stopping distance, so that it brings the load to a controlled stop without shock.
4) The secondary brake shall stop and hold 200% of the full load torque.
b. Pneumatic-release disk brakes
1) Brakes shall be spring-applied, pneumatically released disk brakes, directly mounted to the sprocket drive shaft in 2 locations.
2) The brakes shall engage automatically when the set exceeds the maximum specified speed by 10%, E-stop is engaged, or the control system detects a fault.
3) Each secondary brake shall stop and hold 130% of the full load torque.
c. Drive-through brakes
1) The brake shall be a continuously applied, automatic load brake with a retarding torque matching the load on the hoist.
2) The brake shall be selected and designed to accommodate the heat produced during normal operation without undue wear.
d. Redundant gear/motor/brake assemblies
1) When redundant gear/motor/brake assemblies are used as the secondary braking mechanism, at least 2 assemblies shall be required to move to the load, while any 1 shall be able to stop and hold the full torque load.
2) The gear/motor/brake assemblies shall be located on the extents of the drive train so that either gear/motor/brake can stop and hold the full load.
3) The brakes shall engage automatically when the load exceeds the maximum specified speed by 10%, E-stop is engaged or the control system detects a fault.
2. A redundant motor brake on a single motor shaft shall not be used as a secondary brake.
3. The secondary brake shall not apply more than 300% of the full load torque to the system.

4. Any required brake conditioning (for example burn-in) shall be completed prior to system checkout.
5. Brake noise shall comply with the noise requirement as outlined in this specification.

F. Frames & Guards
1. All motors and associated gearboxes shall be installed on built-up frames, which contain all elements of the lifting system. Frames shall be securely attached to structure.
2. All motor units shall have durable, leak-proof drip pans to contain leakage of oil from motor, gearbox and/or pillow blocks.
3. All exposed moving equipment, devices, and ropes within 7-feet of a working surface shall be guarded in a manner to prevent accidental contact with other machinery, devices, lines, or personnel. Guards shall not impede the operation of the protected device or adjacent devices.
   a. Sheaves, drums, shaft assemblies, and ropes moving at the line set load speed on a hoist limited to no greater than 30 feet per minute and located at the gridiron(s), attic, rigging pit, and catwalks may not require this guarding if both the following conditions are met:
      1) “Authorized Personnel Only” signage is provided at access points to these areas, per the Drawings.
      2) Clearances are provided around the equipment such that people need not contact components to access any part of the gridiron/catwalk.
   b. Guard construction shall be sufficient to resist incidental impact without deforming. When located underfoot, guards shall be capable of supporting a 310-pound person.
      1) Guard material for custom assemblies shall be open metal mesh with openings not to exceed 1/2-inch unless otherwise noted in the Drawings.
      2) Shrouds for packaged hoists, as engineered by the hoist manufacturer, may act as guards, provided all other provisions of this Section are met.
      3) Guards for curtain machines may be sheet metal, provided all other provisions of this Section are met.
   c. Guards shall be removable for maintenance.
   d. Guard construction and attachment shall not produce additional noise when the motor is in operation.
   e. Guard construction must be designed so as to not impede cooling.

G. Grooved Wire Rope Drums
1. Drums shall be grooved welded steel, properly annealed. Minimum tread diameter shall be at least 30 times the diameter of the wire rope employed.
2. Drums shall have integral hubs with properly sized shafts for the transmission of loads and torque. Drums shall be connected to the hub using a key to prevent relative rotation. All driving hubs must have a minimum of 2 set screws.
3. All wire rope drums shall have sufficient capacity in a single layer for maximum travel plus a minimum of 3 dead wraps for each wire rope connection. 1 hole shall be drilled through the root of the groove for each rope end. This hole shall have an axis which, in section, is angled 45° from a radial line drawn from the shaft to the center of the hole. Hole shall be chamfered, free of burrs, and of correct size to retain stop sleeve cable retainer.
4. Drums shall be grooved for wire rope and sized as noted in Drawings. Grooves shall be lathe turned and machined to the proper size for the rope used, with groove diameters sized to fit rope closely and prevent rope from assuming an oval or elliptical shape under load. Groove diameter shall be no greater than 10% larger than rope diameter for ropes smaller than 3/8-inch diameter, and 8% larger for ropes 3/8-inch diameter and larger. Minimum groove depth shall be 40% of the rope diameter.
5. Steel rod or pipe keepers shall be provided to prevent cable from jumping out of grooves. These elements shall be located so that they do not bear on the cable when the cable is correctly seated in the groove.
6. Fleet angles shall not exceed ± 1-1/2°.

7. Shafts through drums shall be supported on both ends by bearing blocks to minimize bending stresses in the shaft. Drum blocks shall utilize self-aligning, 4-bolt, flange-mount style, cast iron housings with ball bearings, equal to Peer UCF-200 series. Multi-line drum blocks shall utilize self-aligning, 2-bolt, pillow block style, cast iron housings with tapered roller bearings, equal to Peer UC 00 series. Each bearing shall be selected to support at least 3 times the total load of the respective drum.

H. Shafts, Keys and Couplings
1. All shafting shall be designed and proportioned in accordance with the "Code for Design of Transmission Shafting" of the ANSI to safely transmit all applied loads and torques and their combinations with proper allowance for impact.
2. All shafting shall be designed to satisfy critical speed and torsional deflection criteria.
3. All shafting shall be of AISI C-1018 steel minimum, unless otherwise specified.
4. All keys and keyways shall be designed to safely transmit all applied loads and shall be proportioned according to ANSI standards.
5. All stepped down shaft corners shall be properly radiused.
6. Shaft couplings shall maintain the proper alignment and load rating of the shaft. System design shall employ the fewest number of couplings possible.

I. Electrical Enclosures and Panels
1. Recessed panels shall be contained within code gauge, formed, and welded, steel back boxes or rack mount style enclosures. The operating panels shall be minimum 16-gauge steel or 6061-T6 aluminum plate, recessed within the back box to a depth sufficient to permit a locking hinged door to completely cover the panel without affecting any device within the enclosure. The front surface of the cabinet cover shall be flush with the finished wall surface.
2. Surface mounted enclosures shall be code gauge steel back boxes, with all seams and joints continuously welded and ground smooth. Surface mounted cabinets shall conform to NEMA ICS 6-1993 R200, Type 3; type shall be appropriate to the location. Operating panel shall be mounted per the drawings, on the front cover of the enclosure or recessed within the back box to a depth sufficient to permit a locking hinged door to completely cover the panel without affecting any device.
3. Rack mounted panels shall be contained within a NRTL-listed rack. Surface mounted cabinets shall conform to NEMA standards. The operating panels shall be minimum 16-gauge steel or 6061-T6 aluminum plate, recessed within the rack to a depth sufficient to permit a locking hinged door to completely cover the panel without affecting any device within the enclosure.
4. Internal components shall be protected by a locking mechanism to prevent unauthorized access. An integral device shall be provided to hold the operating panel open for service. Complete accessibility to internal components shall be provided when opened. Internal bracing shall be provided where required by panel size to prevent flexing of the panels.
5. All steel shall be zinc-phosphate treated, primed with a coat of zinc chromate, and finish painted with baked enamel. All aluminum panels shall be anodized and then be painted with a thermo setting epoxy paint. All finish colors shall be as selected by the Architect’s Consultant.
6. All labels and legends shall be permanently engraved directly into the faceplate. Engravings shall be filled with contrasting color enamel. Micarta, lamicoid, and other types of engraved plastic labels shall not be used unless permanently, mechanically attached. Dry transfer, decals, plastic "Dymo," or other types of adhesive labels or silk screened legends shall not be used.
7. All control panel faceplates shall have beveled edges and rounded corners.
8. Panel(s) shall have a nameplate in a conspicuous location identifying the Rigging Contractor, Project and Panel Designation.

9. Each panel shall be completely factory-wired internally, with permanently identified barrier type terminal strips provided for the connection of the external wiring. All panels shall be factory tested.

J. Motor control cabinets
1. Cabinet(s) shall be of steel framed construction with applied steel side, top and bottom panels, equal to a NEMA Type 3 rating. All components shall be factory primed and painted.
2. Cabinet(s) shall have a locking front door with an integral safety-interlock, which when the door is opened shall automatically disable the main electrical feed to the panel.
3. Cabinet(s) shall contain all motor control system electronics, starters, and power.
4. All wires inside the cabinet(s) shall be identified at the jacket with separate numbers.
5. An engraved Lamicoid label shall be bolted or riveted to the front of each cabinet, to read:

(Name of Rigging Motor Control Cabinet)
(Axis Name #1)
(Axis Name #2)
(Etc.)

Schuler Shook Theatre Planners, Dallas, TX
(Name, Location, and Phone Number of Rigging Contractor)
(Year of Commissioning)

6. Install where shown in the Drawings.

K. Limit Switches
1. All linear motion monitoring switches shall be furnished with rotary lever arm, cam, or plunger style operators. All adjustable linear motion monitoring limit switches shall include sufficient liquid-tight, flexible conduit and wire including grounding conductor, to permit at least 10 ft. of movement for adjustment.
2. All rotary motion monitoring limit switches shall have a minimum NEMA Type 12 or IP65 rated surface mounted enclosure with provisions for conduit fitting mounting. Each limit switch shall employ a lead screw or gear driven, ball bearing supported camshaft and associated precision, snap-action type contact assemblies. Each circuit shall be actuated by an individually adjustable cam operator.
3. All intermediate position limit switches shall provide accurate positioning regardless of direction of travel. See Drawings for intermediate preset positions.
4. All motor-operated equipment shall be equipped with normal travel limit switches to stop motion at each end of travel and redundant over-travel limits which shall remove power from the motor when actuated at each over-travel limit of travel. All over-travel limit switches, when struck, shall de-energize the corresponding motor, and all other affected motors until the assembly is manually reset. Bypass and reset over-travel limits shall be limited to authorized, trained personnel; bypass and reset shall not be possible from a user control panel.
5. Travel distance of a motorized set shall not exceed 4-inches between initial hard limit and ultimate hard limit unless otherwise noted.
6. All limit switches shall be located so as to be easily accessible following installation for adjustment and observation.
7. Exact limit settings will be verified in the field during checkout.

L. Encoders shall be used to provide position and speed data for all permanently installed motorized rigging sets with programmable presets or positional feedback, as indicated in the Drawings. These encoders shall be capable of retaining position data during emergency stop and normal power down events.

M. Safety and Protective Devices
   1. Slack line detection shall be provided for each lift line by means of a low-voltage detecting device. Lift line contact with this detector shall signal a slack condition to the control system. This requirement does not apply to fire curtain systems.
   2. Interlocks

2.29 ELECTRICAL CABLE MANAGEMENT

A. Rigging Contractor shall coordinate the installation of electrical cable management assemblies with Division 26 and Section 11 61 63.
   1. This Section shall install all multi-conductor flexible cable and hardware furnished by Section 11 61 63.
      a. Power and data cables shall hang freely for 7 days prior to electrical terminations to allow for cable to relax.
   2. Electrical power connections shall be provided by Division 26. Data connections for stage lighting controls shall be by Section 11 61 63.

B. Cable managements path of travel shall not cause the moving element to move in any direction other than vertically.

C. Cable Management Pantograph
   1. The pantograph shall provide permanent electrical connections for circuits as shown in the Drawings.
   2. The pantograph assembly shall consist of extruded aluminum wireway segments joined by robust hinged connections.
   3. Assembly shall operate without lateral movement of the device or the associated rigging element.
   4. Hinges shall be sized to maintain the required electrical cable bending radius while not damaging the cable.
   5. Segments shall be sized in cross section to carry the required quantity and size of power and data cables with internal voltage barriers as required.
   6. The length of each segment shall be based on the distance between rigging pick up cables and maximum actual travel to minimize the total number of segments.
   7. The assembly shall have an electrostatic paint finish in black.
   8. Festoon cable for non-data wiring shall be annealed stranded bare copper insulated with flame-retardant Polyvinyl Chloride (PVC) and provided in the required number of conductors and wire sizes as directed by the Electrical Contractor and Electrical Engineer.
   9. Data wiring shall comply with requirements as outlined in Section 11 61 63 and shall be able to meet the bending requirements imposed on it by this assembly.
   10. Units shall contain electrically insulated, adjustable strain relief devices to hold all cable securely in place.
   11. The pantograph shall be installed between rigging lift lines and in such as way as to prevent electrical cables from fouling with other hoisting components or mechanism.
   12. Unit shall be securely mounted to the supporting structure and associated rigging element in a manner that minimizes segment deflection and cable stress.
   13. A horizontal movement compensation trolley track shall be provided.
      a. One (1) trolley and mounting bracket shall be provided to attach extruded aluminum wireway segment to track.
      b. One (1) trolley and bracket shall be provided to manage excess cable between segments and electrical connection point.
      c. Two (2) end stop plates to be provided to prevent the trolley from exiting the track.
   14. Approved Manufacturers:
      a. Electronic Theatre Controls
      b. IWeiss
      c. SSRC
      d. Approved Equal

2.30 MOTORIZED LINE SHAFT AND RIGGING HOISTS

A. Each hoist shall have the capacity to raise and lower the specified loads at the specified speed.

B. Hoist assemblies shall consist of a self-contained winch module mounted on a common frame on the gridiron as indicated on the drawings. Frames shall be designed and engineered to resolve all lateral forces associated with normal set operation.

C. Each line shaft winch module shall contain a wire rope drum for each hoist line scheduled on Drawings, a motor/brake and gear reducer, coupled together with a common shaft. Each cable drum shall support a wire rope, which in turn supports the scheduled batten. Each cable drum shall wind in the opposite direction to the adjacent drum(s) in a manner that will prevent longitudinal movement of the batten.

D. All motors, hoisting cables, chain, sheaves, hardware, etc., shall be rated for overhead lifting; capable of supporting design loads as shown, with minimum design factor of 8 and shall be of, or treated with, corrosion resistant materials.

E. All electronic components shall be sized at 200% of nominal capacity.

F. Each hoist assembly shall have an affixed engraved name plate. The name plate shall include the following information: hoist number, lifting capacity, sustaining capacity, incoming power source (including voltage, panel number, circuit numbers and panel location) and manufacturer's name and 24-hour service phone number.

G. Hoist shall have the following performance requirements in addition to those listed above:
   1. Stopping distance of 1/2-inch at full load at full speed under normal operation
   2. Preset targets to 1/8-inch accuracy.
   3. Limit settings to 1/4-inch accuracy.
   4. Maximum distance between normal and ultimate limits not to exceed 6-inches, unless otherwise directed by Architect's Consultant.
   5. Normal travel speed of 20 feet per minute
   6. Speed regulation within 5% at full load

2.31 MOTORIZED HOIST CONTROL

A. Control System Functions
   1. The control system shall be specifically designed for the control of motorized theatrical rigging equipment. It shall provide a level of reliability, accuracy, and integrity appropriate for overhead lifting in places of public assembly.
   2. The system shall be capable of controlling all specified hoists but shall not allow more than 3 hoists to operate simultaneously. Programmed play positions trims shall be stored in non-volatile memory.
   3. The control system shall perform the functions as noted for specific elements below. This list of functional requirements describes the minimum operating parameters of the systems.
      a. Stage Electrics
         1) Operator authorization levels to ensure secure access levels and lockout levels of operation and control as noted in this Section.
         2) Axis grouping allowing multiple axes to operate simultaneously with different target positions.
         3) Programmability of target position and group.
         4) Indication of position. All position data to be acquired from positional encoders specific to each axis.

B. Fixed Speed Starters
   1. Each hoist shall include a fixed speed reversing starter. Starter assemblies shall be located in a single cabinet on the gridiron. Starter assemblies shall include a safety line contactor, reversing contactor sized for plugging and jogging, incoming power fuses, control transformer with fuses, all related safety relays and terminal blocks.

C. Emergency Stop
   1. The emergency stop system shall meet NFPA-79 (Electrical Standard for Industrial Machinery)
   2. The emergency stop circuit shall be a normally closed circuit or a supervised circuit that provides the same or greater level of reliability and security. Its operation shall not depend on software or semiconductors.
   3. Emergency Stop. There shall be a single emergency stop system that shall, when activated, stop all elements as shown in the Drawings.
      a. Emergency stop actuators shall be rear-illuminated mushroom pushbutton switches. Operation shall be PUSH to engage and TWIST to release. Color: Red.
   4. System shall function as noted below:
      a. Category 1: A controlled stop per NFPA-79 (Electrical Standards for Industrial Machinery) shall be provided. The system shall stop all motors and remove power in not less than 0.75 seconds.
      b. Engagement of the system shall remove power from the motors, but not the control system electronics.
      c. Feedback
         1) When activated all pushbuttons described in this paragraph shall be illuminated and shall flash to indicate a “STOP” condition. Buttons shall continue to flash until system has been taken out of “STOP” condition.
      d. When the system is taken out of the “STOP” condition no movement shall begin automatically.
   5. Panel design and location as shown in the Drawings.
   6. E-stops shall be located in all control panels, on the upstage right/left wall, and at the motor control center.

D. Software
   1. Motor Control
      a. The system shall provide a controller; preset creation and editing facilities; and a display of the current position and target position of each hoist. A complete display of the status of all axes, faults, and interlocks shall be provided.
   2. The system shall be capable of the following operating parameters:
      a. Jog - One axis can be selected and operated directly.
      b. Single Target – axes may be simultaneously directed to a common target height.
      c. Absolute Targets – axes can be selected, with individual target heights for each axes, and simultaneously directed to the targets.
      d. Relative Target – axes can be simultaneously directed to move a specific distance from their present position.
      e. Relative Positioning – axes can be simultaneously directed to move a set distance and maintain their preset spatial relationship to the others in the selection.
      f. Quantity of axes in motion: For parameters b through e above the system shall be able to move no more than 3 axes simultaneously.
   3. Presets
      a. Presets shall be able to be composed, stored, modified, and recalled to allow recording and re-creation of movements. Individual presets shall have the ability to contain any or all of the following features.
         1) Target position –which may be relative or absolute, or to match the present or previous target position.
      b. Multiple hoists: A single preset shall be able to control multiple hoists, each with its own target.
      c. Synchronized Groups: It shall be possible to group hoists for synchronized operation. If any hoist in a group loses synchronization the entire group shall stop and provide feedback to the user.

4. The system shall monitor and provide feedback on the following system components:
   a. Axis position
   b. Limit Switch Status
   c. Emergency Stop Status
   d. Fault condition
   e. Electrical supply status
   f. Load Sensing.
   g. Slack Line Detection
5. The system shall be able to accept control direction from a single user input device at the same time. This function shall be user-configurable to allow for different levels of axis control.
6. System Hierarchy – The system shall provide the following levels of operational access:
   a. System Administrator. User shall be able to modify all operational parameters. This level shall be password protected. The password shall be user-defined at system startup.
   b. Supervisor. User shall be able to set targets, speed, write cues, and monitor feedback parameters. This level shall be password protected. The password shall be user-defined at system startup.
   c. Operator. User shall be able to jog sets as noted above, execute cues, and monitor feedback parameters. This level shall be password protected. The password shall be user-defined at system startup.
   d. Observation Mode. User shall be able to monitor all axes positions and all feedback parameters.
   e. Manufacturer Access. Access is password protected and shall be set by the manufacturer and is not user definable. This level of access shall be equal to System Administrator level access.
7. For a period of 2 years following acceptance, the Rigging Contractor shall provide and install, at no cost to the Owner, all control system upgrades. Thereafter the Rigging Contractor shall notify the Owner of all system upgrades for the life of the control system. The Rigging Contractor shall keep system user's name and address in a database for this purpose. All upgrades shall include a full written description of operational modifications. System upgrades shall be designed so as to allow existing data to be accessed and upgraded.

E. User interface
1. The control system shall be comprised of individual control panels as shown in the Drawings. Each panel may contain one or more of the following control elements:
   a. Emergency Stop Button(s) as described in this section.
   b. One ON/OFF key switch. Provide 5 keys. Switch shall not allow removal of key when in the ON position.
   c. Movement Controls: One set of 2 momentary contact switches, labeled with the appropriate directional destination. It shall be necessary to maintain contact on the switch in order to maintain movement. A dedicated DEADMAN switch shall be acceptable as an alternative to push to run switches.
   d. Positional Readout: 1 illuminated digital readout for each winch. Readout shall at all times indicate the axes' location as related to a defined datum point. Readout shall be in feet and inches, accurate to 0.25-inch.
   e. Visual Feedback Indicators
      1) Control Power Status shall indicate when illuminated that the control panel is active and communicating with the control system/software. Color: Green
      2) Motor Power Status shall indicate when illuminated that the motor(s) in the system are energized and within the acceptable amperage range. Color: Yellow

3) Axes in Motion/Move Complete shall indicate, by flashing, that any axis is in motion. A steady illumination shall indicate that the axis is no longer in motion. Indicator shall turn off after 10 seconds following completion of movement. Color: Amber
4) Interlock faults/Error reporting shall indicate when illuminated that an error condition exists in the system. The indicator shall monitor the following conditions. Color: Red
   (a) Overtravel
   (b) Safety and Protective Devices
   (c) Load Sensor monitoring
   (d) Slack Line Detection

f. Graphic Display
1) Rear-illuminated display screen shall display information about system as defined by this Specification and the Drawings.
2) Screen size shall be a minimum of 7 in. diagonal for handheld devices and 12 in. diagonal for panel mounted devices.

2. Local Control
a. Provide local motor control in immediate proximity to each individual motor location.
b. Control at motors shall be in NEMA type 1 housings. In addition to pushbuttons for control of stop, up, down and overtravel limit bypass, control stations at motors shall include a 3-position switch for delegating control of motor to local-off-normal. All STOP functions, whether local or remote, shall function regardless of the position of the local-off-normal selector switch.
1) Maintenance pendants may be provided for local control functions provided that the connection of a fixed speed style control pendant to a variable speed unit will not result in motion or damage to the connected units or vice versa. Connectors shall equal AMPHENOL MS or 97 series. When a maintenance pendant is plugged in the unit shall automatically switch from Normal to Local mode.

3. Push Button Rigging Motor Control Panel (RMCP-X)
a. The Motor Control Panel shall be a surface mounted panel and completely wired internally. Design and configuration as shown in the Drawings.
b. The panel shall contain the following:
1) Control Panels as shown in the Drawings
2) Receptacles for Portable Control Devices.
c. Install as shown in the Drawings.

4. Portable Control Devices
a. The Portable Control Device shall be separate, totally enclosed, portable, and completely wired internally.
b. The face of the panel shall contain the control Panels as shown in the Drawings
c. Design and configuration as shown in the Drawings.
d. The Portable Control Device shall include a vinyl dust cover or case lid as appropriate, and one (1) 25 ft. multi-conductor cable terminating in a locking connector appropriate for mating with Motor Control Panels as required by the Drawings.
e. Panel shall incorporate carrying handles on the left and right sides.
f. Contractor to provide wall bracket for storage of Portable Rigging Motor Control Device and cable.

5. Computer Console
a. The following control systems shall be acceptable:
1) Spikemark Vantis pendant controller by JR Clancy
2) Pioneer I by Texas Scenic Company
3) QuickTouch Preset by ETC
4) Scout remote by Texas Scenic Company (pendant for Pioneer systems)

5) Others as approved

6. All labels and legends shall be permanently engraved into the face of the panel and filled with a contrasting paint. No surface-mounted labels or tags of any kind will be permitted. No decals or silk-screened legends will be permitted.
7. Provide vinyl dust covers for all equipment components that are not wall-mounted.

F. Safety & Protective Devices
1. Each winch set that employs slack-line detection shall create an Emergency Stop condition when a slack line is detected.
2. Each winch set that employs load sensing shall create an Emergency Stop condition when load thresholds are exceeded. The control system shall monitor the loads on the winches, first learning the characteristics of a new load, then monitoring each move for changes in the load. Load information shall be obtained from solid state load cells.
3. Secondary brake systems shall provide feedback to the control system to alert the operator(s) that the brakes have engaged.

G. Signage
1. Provide an engraved lamicoid placard at each control panel location.
2. Placard shall include the following information:
a. Name, address, and phone number of stage rigging contractor.
b. Cautionary notice:

CAUTION
HEAVY LOADS OVERHEAD.
DO NOT OPERATE STAGE RIGGING SYSTEM
WITHOUT PROPER TRAINING.

c. Notice regarding the necessity of periodic inspections.

H. All components shall be UL listed and carry UL labels.

I. Install as indicated in the Drawings.

J. Quantities as per schedule.

2.32 CURTAIN FABRICS

A. Refer to drawings for new curtain sizes and quantities. All fabrics shall be first quality. All fabrics shall be produced from one dye lot per color. Color quality shall be consistent throughout, with no visible streaking, striping, or spotting.

B. Fabric for Grand Drape and Valance curtains shall be 25-ounce combed velour. Color shall be selected by Architect. Approved fabric manufacturers:
1. KM Fabrics
2. JB Martin

C. Fabric for borders, legs, black out drapes, and traveler curtains shall be 25-ounce synthetic velour. Color shall be black. Approved fabric manufacturers:
1. KM Fabrics
2. JB Martin
3. I. Weiss

D. Fabric for cyclorama shall be seamless cotton. Color shall be bleached white. Approved Fabric:
1. Rose Brand Seamless Bleached White Muslin FR
2. Gerriets International Shirting Bleached Muslin

E. Lining. IFR blackout lining fabric, Rose Brand “Avora Lining Plus” or approved equal.

F. Webbing
1. Natural jute upholstery webbing for top of curtains: Dazian 3-1/2-inch Wide #115062
2. Heavy Weight Polypropylene. 3-inches tall, 1.7 mm thick. Rosebrand “Poly Pro Webbing” or equal. Color: Black.

2.33 STAGE CURTAIN TRACK ACCESSORIES

A. For the purposes of establishing a standard of quality desired, curtain tracks and certain other products of Automatic Devices Company (ADC), 2121 S. Twelfth St., Allentown, PA, (610) 767-6000, have been used in this specification and in the drawings.

B. Refer to Drawings and Rigging Schedule for equipment types, sizes, and quantities.

C. Channel Traveler Track Type - Silent Steel 283-R Series Track complete with all necessary accessories for manual rope pull operation. Specific track lengths are shown in the Rigging Schedule. Included equipment:
   1. 8-inch Floating Sandbag Tension Pulley: ADC No. FSBTP-8.
   2. 8-inch Live End Pulley: ADC No. 2863-A
   3. 8-inch Dead End Pulley: ADC No. 2864-A
   4. 1/2-inch Synthetic center pull cord: ADC No. 2830 Cord
   5. Single Carriers equipped with neoprene-tired ball bearing wheels: ADC No.2849
   6. Master Carriers equipped with neoprene-tired ball bearing wheels ADC No.2850
   7. Back-Pack Guide: ADC No.2833-A
   8. Rubber Bumpers ADC No. 2825
   9. Curtains shall be connected to Carriers by means of a heavy-duty steel self-closing clip at each Carrier which connects the trim chain of each Carrier to grommets located at the top of the curtains. Connection by means of S-Hook or other device requiring tools to open or close shall not be acceptable.

2.34 TRACK-MOUNTED ROTATING LEG PIPES

A. Rotating leg pipe batten shall be nominal 1-1/2 inch O.D. black steel pipe, ASTM A53/A Strong (Schedule 40), stripped and painted with at least one (1) coat of black primer and one (1) coat of flat black paint, mounted to a tracked pivot device providing indexing and a self-locking brake.

B. Pivot device shall allow for full rotation of the pipe and shall incorporate the use of large diameter Kralastic wheels. Pivot device shall be provided with pipe clamps sized to accommodate a nominal 1-1/2 inch O.D. pipe batten.
   1. Approved Products:
      a. Rotodraper #28A with optional brake, as manufactured by Automatic Devices Company.
      b. Approved equal.

C. Each track shall be one continuous piece, except where splicing clamps are required. Splicing clamps shall provide a flush, positive alignment of track sections.
   1. Approved Tracks:
      a. ADC 2800 series
      b. H & H 400 series.
      c. IWeiss Steel Channel Track
      d. Approved equal.

D. Tracks shall be supported at both ends and no more than 6'-0" O.C. in between. Coordinate suspension points with the building structure and all associated trades.

E. Brake shall be self-locking and released by a tow rope.

F. Provide and install tow ropes for pivot device and brake operation. Tow ropes shall be 3/8 inch braided cotton rope with two (2) inch diameter wood balls on the operating end, four (4) feet above stage level. Ropes and wood balls shall be black.

G. Finishes
   1. All steel components shall be painted or powder coated flat black.
   2. All aluminum components shall be anodized flat black.
   3. All plastic or nylon components shall be inherently colored black.
   4. All tow ropes shall be black.

H. Quantities, sizes, and locations as indicated on the Drawings.

2.35 BOTTOM PIPE FOR CURTAINS

A. Bottom pipe for all curtains shall be 1-inch Schedule 40 pipe with sleeved splice junction pipes with spring type button connectors to lock sections together. Pipe shall be smooth, without rough spots, burrs, or sharp edges.

B. Bottom pipe to be in 10'-0" lengths with additional shorter lengths as required to properly weight the full curtain width. Bottom pipe shall have holes to accept splice pipe spring button connector.

C. Splice connectors:
   1. Inner sleeve splice pipe shall be 3/4-inch IMC conduit 1'-0" in length, with spring snap buttons installed in sleeve pipe to lock the outer pipe sections together. All bottom pipe sections to be drilled with a 7/16-inch hole, 2-inches from the end of the pipe to accept the snap button spring connectors of the inner splice pipe. Spring snap button to be Valco B-160, McMaster Carr 94282A270 dog leg style or similar. Spring snap buttons are typically used on telescoping tubing. There shall be one inner splice pipe for each piece of bottom pipe plus 4 extra inner splice pipes complete with snap buttons. IMC conduit shall be smooth, without rough spots, burrs, or sharp edges.

D. Provide bottom pipe for the following:
   1. Borders
   2. Cyclorama

E. Quantity: As required to properly weight all curtains.

2.36 OUTRIGGER BATTEN

A. Outrigger batten shall be nominal 1-1/2-inch black steel pipe, ASTM A53/A Strong (Schedule 40), stripped and painted with at least one (1) coat of flat black paint.

B. Batten shall be supported from the T-bar battery 10 feet O.C. by brackets made of steel plate.

C. Outrigger batten shall extend the full width of the lock rail and be rigidly fastened at each end.

D. Install as shown in the Drawings.

2.37 INDEX STRIP LIGHT - LED

A. Provide Index Strip Light as shown on drawings. Fixture to be hung by chains as shown on drawings.

B. Fixture shall provide bi-color LED system mounted into a water-jet cut 1-1/2-inch I.D. ASTM 53A steel or aluminum pipe. LED colors shall be blue and white.

C. Intensity and color control shall be via remotely mounted wall enclosure with 2 sliders with LED indicator handles. Faceplate shall be black anodized aluminum laser engraved.

D. Provide all necessary mounting hardware.

E. Acceptable manufacturers:
   1. Texas Scenic - Index Striplight
   2. Approved equal

F. Locations: Stage level locking rail.

2.38 SYSTEM SIGNAGE

A. Provide placard(s), placed in conspicuous location(s) and as indicated on Drawings, visible from the operating area(s), with information on stage rigging system.

B. Sign shall be screen-printed plastic, permanently secured, filled with contrasting paint, with text as shown in the Drawings.

C. Size and quantity per Drawings.

D. Coordinate mounting location in the field with Architect's Consultant.

PART 3 EXECUTION

3.01 INSTALLATION, LABOR, AND SUPERVISION

A. Employ only fully trained stage riggers, assisted by competent common laborers, for the erection and installation of the stage equipment and related accessories herein specified. Stage Riggers shall be adequately and properly trained in the erection and installation of the style of rigging specified herein. Employ a competent superintendent on the work at all times.

B. Install all items of the stage and auditorium rigging where indicated and completely connect and make operative as specified. Install in accordance with generally accepted theatre industry practices and the following references.
   1. USITT Recommended Guidelines for Stage Rigging and Stage Machinery
   2. Wire Rope Handbook (published by WireCo WorldGroup)
   3. Wire Rope User's Manual (published by Wire Rope Technical Board)
   4. Hoisting and Rigging Safety Manual (published by Infrastructure Health and Safety Association)
   5. Rigging Manual (published by the Construction Safety Association)

C. Flame cutting of primary steel, supplementary steel, and miscellaneous metals, or other materials is not acceptable.

D. Install draperies at scheduled locations.
   1. After installation, all curtains and draperies shall be thoroughly brushed to remove all loose dust, visible dirt, fabric lint, loose threads, etc. Wrinkles will be permitted to fall out naturally.
   2. All dead-hung curtains, or draperies, shall hang level and be uniformly in contact with the stage floor along the entire width of the curtain, or drapery.

E. Install cable clips where specified in accordance with manufacturer's installation instructions with correct amount of torque on nuts. After installation, apply a load to each batten and re-check for proper torque on nuts of cable clips.

F. Battens shall be trimmed level to the horizon and parallel to the stage or auditorium floor to a tolerance of ±1/2-inch over the length of the batten. A batten shall not deviate from true straight installation by more than ±1/2-inch.

G. Maintain wire rope fleet angles at 1-1/2 degrees or less. Install Mule Blocks as required to maintain specified angles. System should run quietly in every respect when operated.

H. Install electrical devices provided under this section for proper hoisting of equipment. Install cable saddles and rigging for plug strips and hanging plug box SO cables. Cable saddles are furnished under other section and installed under this section. Electrical cables shall be installed in such a manner that the entire length of all cables is in a plane parallel to the associated set and so that, except for the terminal, no portion of the cable ever rests on or interferes with the electrical device supplied. Provide support, muling, and turning blocks as required for proper support and movement of the electrical cables and cords.

I. Install counterweight arbors so they may be loaded at the loading gallery when batten is at scheduled low trim.

3.02 FLAMEPROOFING OF FABRICS

A. Fabrics shall comply with all State and local codes and regulations including:
   1. IBC 410.3.6 and 806
   2. NFPA 701

B. All fabrics used in the fabrication of the curtains and draperies herein specified, if not inherently flame-resistant by nature and fiber content of their own construction, shall be chemically flameproofed, by immersion process with pressure rolled extraction, in a formula approved by the Bureau of Standards of the United States Department of Commerce, and the finished fabrics, after treatment shall pass such tests as required by the Fire Marshal and/or the Authority Having Jurisdiction of installation. Provide to the Architect 3 certificates of flame resistance treatment for each type and color of cloth used in the fabrication of curtains and draperies for this project for distribution to the Fire Marshal and/or Authority Having Jurisdiction. Certificates shall be furnished to the Architect before request for payment for such equipment is made. Provide 1 copy of each certificate in the Records for Owner. The certificate shall provide the following information:
   1. The name of the Rigging Contractor.
   2. The name and color of the fabric covered by the certificate.
   3. The name of the firm doing the flameproofing (chemical treatment).
   4. The date of the treatment.
   5. The date of re-treatment will be required.
   6. The name of the chemical formula used.
   7. The method of application of the chemical used.
   8. The signature of an officer of the company doing the flameproofing.
   9. The signature of an officer of the company installing the equipment, herein known as the Rigging Contractor.
   10. Both signatures shall be affixed to the certificate. A Notary Public appointed within the State where the flameproofing is done shall witness the signature of the officer of the company doing the flameproofing. The signature of the Rigging Contractor shall be notarized by a Notary Public appointed in the state of the installation or where the Rigging Contractor's office is located.

C. Mark each curtain, drape, leg, border, or other fabric item with flameproofing information as required by applicable codes.

3.03 FABRICATION OF CURTAINS

A. All fabrics shall be sewn with box-pleats to specified fullness to jute upholstery webbing. Pleats shall be spaced 12-inches on center. All thread used in sewing these curtains and draperies shall be cotton mercerized and shall be the color of the fabric on which it is used, both in the needle and bobbin. The needle thread shall not be lighter than #16 in size, and the bobbin thread shall not be lighter than #24 in size. The same size thread shall not be used in both needle and bobbin. Double rows of stitching shall be used to sew the fabrics to the webbing. Bad stitching, missed stitches, puckered seams and hems, etc., will not be acceptable. All seams shall be sewn in straight and even lines.

B. All panels of fabric shall be of a single piece for the entire height of the curtain in which it is used. No splicing of fabric to achieve a desired length of cloth will be acceptable.

C. Linings shall be sewn into the top hem with same fullness as curtain. Vertical hems shall be 1-1/2-inch and shall fall 6-inches inside the curtain size. Tack to curtain with 3/4-inch webbing on 12-inch center. Bottom hem to be 3-inches and 6-inches shorter than curtain. Tack to curtain same as sides. Webbing tacks to allow enough slack to keep from distorting curtains in any way, and to allow for stretching of curtain fabric.

D. Unless otherwise noted, all pile fabrics shall have pile running up.

E. Bottom hems of all curtains shall be 6-inches and shall be weighed with a #6 galvanized pump chain. This chain shall first be encased within a heavy canvas pocket, with the pocket being sewn inside the top half of the hem, thus keeping the chain from resting on the bottom of the hem.

1. Masking Borders:
    a. In addition to the chain pocket, the bottom hem of the curtain shall be lined with heavy canvas and the bottom hem remain open at each end to allow the hem to act as a pipe pocket.

F. Center of all curtains shall be marked clearly on the top webbing. If ties are provided with the curtain, they shall be black in color, except at center, unless otherwise noted.

G. Curtains, which are to be operated on traveler tracks, shall be equipped with black brass grommets set on 12-inch centers along the top webbing. The curtain or drapery shall be connected to the track carriers by means of a galvanized carrier-to-curtain fastener, as previously specified, at each grommet. Traveler panels shall be sewn with half-width fold-back on both leading and trailing edges.

H. Curtains, or draperies, which are to be 'dead-hung' on battens (legs and borders) shall be un-pleated and shall be equipped with No. 2, or brass grommets and 30" long tie lines made from No. 4 cotton mason's line, the grommets to be set on 6-inch centers. Vertical hems of all "dead hung" curtains and draperies shall be 6-inches.

I. Fabric cyclorama:
    1. The cyclorama curtain shall be one piece, flat with no pleats or seams. Side and top hems shall be the same as a standard curtain. The 6-inch-wide bottom hem shall include a pipe pocket, invisible from the front, with vertical slits 10’-0” on center. Vertical slits shall be reinforced with stitching around the edge. The bottom of the pipe pocket shall sit 2-inches above the bottom of the bottom hem.

J. Curtains shall have a permanent tag (no larger than 4" x 3") affixed to the top, upstage right corner of each finished panel. Each tag shall include the following information:
    1. Name of Facility.
    2. Name of company installing the equipment specified in this section.
    3. Date installed.
    4. Finished size (example 24'-0" H x 5'-0" W).
    5. Use (see Rigging Schedule).
    6. Fabric manufacturer, name, fabric weight, total panel weight, and color.

K. Main curtain and main valance
    1. Fabric pile shall run down.
    2. Front curtain height shall be determined by field measurement, to ensure that the top of curtain is not visible from any seat in auditorium. Finished height shall be this field measurement or dimension stated in curtain schedule, whichever is greater.

3.04 CLEARANCES

A. Entire rigging system and components shall, when completed, be free running and free from binding, rubbing, bumping, etc., in all respects.

B. Trim all curtains or draperies that are operated on traveler tracks at the drapery trim chain. Curtains shall be trimmed 1/4-inch above the finished floor with a tolerance of +/- 1/8-inches.

3.05 INSTRUCTION OF OWNER PERSONNEL

A. A representative of the Contractor, fully knowledgeable and qualified in Rigging Systems operation, shall provide 4 hours of instruction to the Owner designated personnel on the use and operation of this System. Designated instruction times shall be arranged through the Owner and will occur over up to 2 sessions.

B. Instruction shall be scheduled in conformance with test and instruction schedules, and availability of Owner, staff, Architect, Architect’s Consultant, and their representatives. While it may be possible to schedule the instruction session(s) to coincide with the final observation, such coincidence shall not be assumed.

3.06 CLEANING OF THE SITE

A. Remove from the site all rubbish, trash, discarded packing materials, cartons, and other debris caused by daily operations. Upon completion of work, the entire area of work shall be left in broom and mop clean condition.

END OF SECTION

SECTION 11 61 53
STAGE LIGHTING FIXTURES AND PORTABLE EQUIPMENT

PART 1 GENERAL REQUIREMENTS

1.01 GENERAL

A. General provisions of the Contract apply to work of this section.

B. All lighting fixtures specified herein shall be furnished to the jobsite new and in unopened factory shipping containers. Lamps and accessories shall be packed separate from fixtures.

1.02 GUARANTEE

A. All fixtures shall be guaranteed against defects in materials and workmanship for a period of one (1) year from the date of acceptance by the Owner and/or Architect's Consultant. Fixtures deemed defective within this period shall be replaced by the Supplier at no additional cost to the owner.

B. Quartz lamps shall be guaranteed against defects in materials and workmanship for a period of no less than 90 days from date of acceptance. Arc lamps shall have a full warranty for one-half of rated life and a prorated warranty thereafter to end of rated life. Lamps failing in this period shall be replaced with new lamps at no additional charge.

1.03 SHOP DRAWINGS

A. Shop drawings and equipment data sheets shall be submitted to the Architect's Consultant in accordance with the requirements of the Contract.

B. Acceptance of submitted equipment shall be obtained prior to equipment purchase or fabrication. If shop drawings are rejected, correct and resubmit in the manner as specified. All shop drawing information shall be submitted at the same time; no partial submittals will be accepted.

C. Submit catalog data sheets (8-1/2" x 11"), neatly bound in sets with title page, space for submittal stamps, and tabbed dividers between sections, Additional copies of this set of data sheets will be required with record drawings. Catalogs shall contain data sheets, in proper order, on all equipment proposed with part or model number clearly indicated. Provide a complete list of proposed equipment with reference to its corresponding specification section/paragraph number or equipment title. Denote all deviations from specified equipment on the list.

D. Shop drawings shall indicate complete data on fixtures and accessories including but not limited to:
   1. Specifications and all photometrics (based on specified lamp) of fixtures
   2. Lamp manufacturer(s), types, and quantities
   3. Plug and receptacle type and manufacturer
   4. Details of C-clamps, safety cable, and gel frames
   5. Details of all custom equipment and accessories

1.04 SUBSTITUTIONS

A. Other manufacturers may bid selected equipment. In order to be considered, manufacturers or suppliers other than those specified must submit to the Architect's Consultant a letter expressing their desire to bid. This letter shall be received by the Architect's Consultant not later than ten (10) days prior to date of bid opening, and shall include full details of equipment being offered. These details shall include performance data, weights, and specifications in sufficient detail to fully describe offered equipment. A statement shall accompany the substitute bid. This statement shall be by an officer of the manufacturing firm submitting the proposed substitute that the items on the bill of material are equal to those specified in quality of construction, finish, forms, function, and performance in, of, and by each item. Statements by representatives and sales agents will

not be acceptable. The decision of the Architect's Consultant as to the acceptability of the proposed alternate equipment, based on the submitted data, shall be final.

B. Product Substitutions for procedures and requirements. All materials and equipment specified herein have been determined to provide an overall physical appearance and background of proven operation desired by the Owner, and therefore, are specified to establish a standard of quality required for this project. If equipment or material other than that specified is proposed to be furnished, this Supplier shall be required to furnish the Architect's Consultant with such samples as he requires, the same to be submitted by the Architect's Consultant to an independent testing laboratory selected by the Owner for tests to determine the actual equality of the proposed substitute items. All costs and charges incurred by these tests shall be borne by this Supplier. Should such tests prove the substitute materials and equipment equal and acceptable, the Supplier shall be so advised. The Architect's Consultant reserves the right to examine, and where necessary, to have additional tests made by the same independent testing laboratory of the actual equipment delivered to the jobsite to ensure that the delivered equipment is equal in fact to that specified. Should such secondary tests prove the equipment is satisfactory, the Owner will pay the cost for such tests. Otherwise, this Supplier shall pay for the tests and shall proceed to remove unacceptable equipment from the jobsite and to provide that specified. The Architect's Consultant's decision, based on this test, shall be final.

C. The specifications are based on specific equipment, accessories, processes and arrangements as indicated therein. Acceptance of the shop drawings and/or submittals indicates only the acceptance of the manufacturer and quality, and assumes that the specific requirements and arrangements are in compliance with the intent of the plans and specifications. This Supplier shall, at no additional cost to the Owner, furnish all accessories, layouts, equipment, etc., and shall perform all work necessary for proper functioning and to fit his substitute items to the intent and arrangement indicated on the plans and in the specification.

1.05 RECORDS FOR OWNER

A. Submit four (4) sets of the following data, prepared in neat brochures or packet folders, to the Architect's Consultant.
   1. All warranties and guarantees, and manufacturer's directions on all equipment and material covered by the contract.
   2. Equipment brochures (cut sheets).
   3. Accepted shop drawings.
   4. Any and all other data and/or drawings required during construction.
   5. Repair parts list of all major items and equipment.
   6. Lamp types used in each fixture type.
   7. A list of all accessories with part numbers and data sheets.
   8. Owner shall be provided with three (3) complete sets of approved brochures.

1.06 APPROVED MANUFACTURERS

A. For purposes of establishing the quality and performance desired, products of the following companies are approved as manufacturers of the herein specified equipment:
   1. Portable lighting fixtures and accessories:
      a. Altman Stage Lighting
      b. Chauvet Professional
      c. Chroma-Q
      d. City Theatrical
      e. Elation Professional
      f. Electronic Theatre Controls, Inc.
      g. Leviton Manufacturing Company
      h. Lighting & Electronics
      i. Lycian
      j. Robert Juliat
      k. Strong Lighting
      l. Varilite

2. Quartz lamps:
   a. GE Lighting
   b. Osram Sylvania, Inc.
   c. Philips Lighting Co.
3. Arc lamps:
   a. Osram Sylvania, Inc.
   b. Philips Lighting Co.
   c. Ushio America, Inc.
4. Plugs and connectors:
   a. Bates
   b. Hubbell
   c. Leviton
   d. Lex Products
   e. Rosco Laboratories, Inc.
   f. Union Connector Co., Inc.
5. Cable assemblies:
   a. act Lighting, “Data”, Tour, and “Power” series.
   b. LEX Products, “PowerFlex” and “Data” series.
   c. TMB Associates “Pro” and “Data” series.
   d. Approved substitution.

B. Approval indicates approval of the manufacturer only and not approval of specific products. The Contractor shall provide equipment, which meets or exceeds these specifications.

PART 2 MATERIALS

2.01 GENERAL

A. Provide the herein specified lighting fixtures complete with plugs, accessories, and lamps listed.

B. Provide lamps in quantities shown in the schedule. Provide appropriate lamp type, which will cause fixture to meet or exceed specified performance.

C. Plugs and Connectors
   1. Stage pin plugs and connectors where indicated shall be equal to Union 20-2P&GMP series with lugs and clear cover unless otherwise noted.
   2. Parallel blade Edison plugs shall be NEMA 515P, equal to Hubbell HBL5266EBK unless otherwise noted.
   3. Locking 20-amp connectors for fixture power input shall be equal to Neutrik powerCON or powerCON TRUE1 TOP, as required for the specified lighting fixture.

D. Control signal protocols and connectors
   1. All control signal protocol and connector types shall comply with the following Standards:
      a. ANSI E1.11 – 2008 (R2018) / Entertainment Technology USITT DMX512 Asynchronous Serial Digital Data Transmission Standard for Controlling Lighting Equipment and Accessories.
      b. ANSI E1.17 – 2015 (R2020) Entertainment Technology Architecture for Control Networks.
      c. ANSI E1.20 –2010 Entertainment Technology –RDM Remote Device Management over DMX512 Networks.
      d. ANSI E1.31 –2018, Entertainment Technology –Lightweight streaming protocol for transport of DMX512 using ACN.
      e. ANSI E1.30 Series of Documents regarding equipment interoperability for control of commonly encountered entertainment technology devices using E1.17.
   2. All components shall be compatible within the Stage Lighting Manufacturer’s network data system.

E. All control, signal, and video connectors shall be of substantial construction and shall be of the locking or latching type. All plate-mounted connectors shall be bolted to faceplates – rivets shall not be acceptable.

F. All fixtures and accessories shall be labeled with owner-designated initials and/or words in permanent, heat resistant paint in 1/8" block letters. Label all portable cables and jumpers similarly with printed heat-shrinkable tags located at both ends. Include lengths on portable cable labels. Verify label location and lettering on shop drawings prior to engraving or printing.

G. All lighting fixtures shall meet or exceed manufacturer's published electrical, mechanical, environmental, and operational data for listed approved fixtures specified herein.

H. All lighting fixtures shall conform to the following:
   1. All fixtures will be 3-wire grounded type. The ground conductor shall be carried to the ground pin of plug. Leads shall be 36" unless otherwise noted and covered by a black heat resistant sleeve.
   2. Each fixture, electrical device, and connector shall be approved by a Nationally Recognized Testing Laboratory (NRTL) for stage and studio use; and shall, when furnished and installed, bear a factory affixed NRTL label.
   3. Fixture performance information shall be furnished on request without cost and shall be in the form and by methods approved by I.E.S./S.M.P.T.E. for such reports.
   4. Fixtures shall have a matte black high-heat resistant finish.

I. LED emitters shall be rated for a minimum nominal 50,000-hour LED life to 70% intensity unless otherwise specified.

J. Unless otherwise noted, each fixture shall include the following accessories:
   1. Heavy-duty yoke. Yoke shall be equipped with positive hand locks not requiring tools for fixture focus adjustment.
   2. Two color frames.
   3. 30" long safety cable, constructed of 1/8" utility cable with 5/16" grommeted snap hook, with black powder coat.
   4. Heavy duty C-clamp.
      a. C-clamp shall fit up to 2" (O.D.) pipe with separate adjustments for pipe size, pan, and tilt, providing 360-degree rotation on the horizontal axis.
      b. C-clamp shall be equipped with positive hand locks not requiring tools for fixture pan adjustment. C-clamp shall be equal to the ETC 400CC retrofitted with tee handle for pan adjustment.

K. Refer to Schedule for quantities.

2.02 PORTABLE LIGHTING FIXTURES

A. Profile Fixture – Type P1 – LED - Static, Fixed Beam Angle (ColorSource V)
   1. General
      a. Fixture shall be a high-output color-changing LED profile fixture with precise beam control and pattern projection.
   2. Physical
      a. Fixture shall have a die-cast all metal housing.
      b. Power supply, cooling, and electronics shall be integral to each unit.
      c. Fixture control shall be DMX/RDM via 5-pin XLR connectors in and through.
      d. Minimum of +/- 27-degree barrel rotation
      e. Four blade shutter system utilizing at least 3 planes and 20-gauge stainless steel shutters.
      f. Shutter assembly shall offer a minimum of +/-25° rotation.
      g. Accessory slot for gobo, iris, and similar theatrical accessories
   3. Optical:
      a. A minimum of RGBxL (red, green, blue, other, lime) color output shall be fully homogenized with no multiple color shadows.
      b. Dimming shall be digitally driven using high-speed pulse width modulation.

c. Control of LED levels shall be imperceptible to video cameras and shall be capable of being set via RDM to 5,000 Hz or 25,000 Hz.
d. Interchangeable lens tubes shall be available create different beam angles, including adjustable zoom lenses. Lens tubes should be manufacturer's most appropriate to LED fixtures.

4. LED Emitters
   a. LED module shall have a minimum of 50,000-hour L70 rating.
   b. Fixture shall provide a minimum of 9,400 lumens at maximum output.
5. Thermal
   a. Fixture shall be fan cooled with fan speed control via DMX channel and fan speed software to permit fixture to override DMX fan speed setting to prevent heat damage to the fixture Flicker-free operation.
6. Approved fixtures:
   a. ETC ColorSource V
   b. Approved Substitution
7. Quantities: Refer to schedule.
8. Accessories:
   a. Provide one 5' power adapter with powerCon True1 matched to the fixture, to 20A male Edison for every two fixtures.
   b. In addition to those required in paragraph 2.1, provide the following accessories with each fixture Accessories:
      i. Soft Focus filter
      ii. Smooth wash diffuser
      iii. A-size pattern holder, Quantity per schedule

B. Wash Fresnel Fixture Type WF1 – LED Fresnel ColorSource V Fresnel
1. General
   a. Fixture shall be a color-mixing, high-intensity LED illuminator with DMX control of intensity and color.
2. Physical:
   a. The unit shall be constructed of rugged, die cast and extruded aluminum, free of burrs and pits, finished in black.
   b. Unit shall be DMX-controlled and include control pass-through. Unit shall be RDM compatible.
   c. Unit shall have a pass-through for power to allow daisy-chaining multiple fixtures on one circuit. Power input shall be Neutrik PowerCon True1.
   d. The unit shall be equipped with lens frame holders with a spring-hinged retaining clip on top.
   e. Average audible noise from fixture shall not exceed 23dbA.
3. Optical
   a. Fixture shall provide homogenized, flicker-free optics for a consistent, smooth beam.
   b. Fixture shall utilize a RGBIL color system to achieve a wide range of mixed colors.
   c. White light shall be variable 3200-5000K.
   d. Lumen output shall be 5,300.
   e. Fixture shall have a motorized beam angle range of at least 13° to 44°.
4. Electrical
   a. Fixture shall have a self-adjusting power supply capable of operating on 100V to 240VAC, 50/60Hz.
   b. Fixture shall have smooth theatrical-grade dimming to 0% with no "stepping".
5. Thermal:
   a. Fixture shall be convection cooled or equipped with a controllable cooling fan.
   b. Active cooling, if any, shall provide on-demand cooling, with an option for temporary override.
   c. The fixture shall utilize advanced thermal management systems to maintain LED life to an average of 70% intensity after 20,000 hours of use.

i. Thermal management shall include multiple temperature sensors within the housing to include:
a) LED array temperatures
b) Control Board temperatures

6. Approved Unit:
a. Electronic Theatre Controls ColorSource V Fresnel
b. Approved Equal
7. Quantities: Refer to Schedule
8. Accessories:
a. Provide one 5’-0” power cable with each fixture. Edison to Neutrik powerCon True1.

C. Cyclorama Light Fixtures, Type C1 – LED (ColorSource Cyc)
1. General
a. The cyclorama fixture shall be an LED wash fixture compatible with ANSI DMX E1.11 standard.
b. Fixture shall carry an NRTL listing and be labeled upon arrival at the project site.
2. Physical
a. The fixture shall be contained in a rugged, all-metal housing, free of burrs and pits with a black powder coat finish.
b. Power supply and electronics shall be integral to each unit.
c. Housing shall have built-in spill light control.
d. Fixture shall be operable on the ground or hanging via yoke from above. Unit shall include hanging yoke and pipe clamp for pipe use and any trunnion necessary for floor use.
e. The fixture shall be convection cooled and not use a fan.
f. Fixture shall provide DMX512A 5-pin in/thru XLR connectors
g. Fixture shall provide power in/thru connectors using powerCON compatible connectors.
3. Electrical and Optical
a. The fixture shall be a color-mixing high-intensity LED illuminator with DMX control of intensity and color. Maximum lumen output shall be a minimum of 4100.
b. LED emitter shall contain at least five colors: RGBxy.
c. Light output shall produce an asymmetrical beam.
d. Fixture shall be flicker free on camera.
e. Dimming curve shall be smooth over long fades and fade smoothly to 0.1%.
f. Optical calibration for brightness and color consistency between fixtures
g. Fixtures should be able to achieve a 2-to-1 fixture-to-setback spacing ratio for smooth coverage.
4. Approved cyclorama unit:
a. Electronic Theatre Controls: ColorSource CYC
b. Approved substitution
5. Quantities: Refer to schedule.
6. Accessories:
a. Provide one (1) 5’ power input cable with powerCon to male Edison for 50% of fixtures plus one.
b. Provide the following accessories with each fixture in addition to those indicated in paragraph 2.1:
i. Provide one set of mounting hardware for batten and floor mounting with each fixture.
7. Quantities: Refer to schedule.

D. Automated Spot Fixture Type A1 – LED (Lonestar)
1. General:
a. Fixture shall be a robotic yoke LED spotlight fixture with DMX512A control of intensity, color, pan, tilt, and pattern projection. Fixture shall be compatible with ANSI RDM E1.20 standard.

b. Fixture shall carry an NRTL listing and shall be UL1573 listed for stage and studio use.

2. Physical
   a. Fixture shall consist of an aluminum and steel frame covered with a rugged plastic housing that is free of burrs and pits, and finished in a black, non-reflective coating.
   b. Covers of head and yoke shall be black ABS textured plastic and shall fasten to the head frame with captive fasteners.
   c. Fixture housing shall have a minimum IP Rating of IP-20.
   d. Fixture weight shall not exceed 50 pounds and shall be able to mount on battens, truss, or set upright on a flat, stable surface.
   e. Pan and tilt: 540°/251°, controlled via 16-bit control and absolute position encoder sensors for correct step positioning.
      i. Pan speed: < 2.4s for 360° of movement.
      ii. Tilt speed: < 1.3s for 180° of movement.
   f. Fixture shall be convection cooled or equipped with a controllable cooling fan.
   g. Active cooling, if any, shall provide on-demand cooling, with an option for temporary override.
   h. Thermal management shall be via multiple temperature sensors within the housing including at the LED array circuit board and LED driver circuits.
   i. Temperature sensors shall be viewable in real time via the LCD user interface.
   j. Fixture shall operate properly in ambient temperature range of 14°F to 104°F.
   k. Fixture shall be equipped with a user interface consisting of 6-button input panel and multi-line color LCD display for status and configuration changes.

3. Electrical and Optical
   a. Fixture shall incorporate at least 88 brightness LED emitters with a measured 15,400 lumens at 7,000°K. Emitters shall have a nominal rated life of 50,000-hour, L70 rating, and shall undergo a 12-hour factory burn-in test. Manufacturer of LED emitters shall utilize an advanced production LED binning process to maintain color consistency.
   b. The LED system shall use 16-bit DMX control techniques for high-resolution dimming. The fixture shall utilize an incandescent dimming curve. Dimming curve shall be optimized for smooth dimming over longer timed fades.
   c. Power supply, cooling, and driver electronics shall be integral to the fixture.
   d. Fixture shall have power factor correction greater than0.92 from 90VAC to 265VAC.
   e. Fixture shall use a par of rotating color wheels with 7 discrete color segments on each for subtractive color mixing. Fixture shall be capable of producing 60 different colors utilizing the color wheels.
   f. Fixture shall have light and medium diffusion with an optional heavy diffusion in prism slot.
   g. Fixture shall have nine interchangeable position plus open gobo wheel. Rotating, gobos, indexable for 360° with a 30mm diameter and 25mm image area. Gobos shall be interchangeable with glass or metal without modification to the wheels or cartridges.
   h. Fixed pattern wheel shall contain an effect pattern made up of at least nine unique and continuous breakup patterns.
   i. Fixture shall have
      i. A rotating five-facet star prism.
      ii. A motorized iris which reduces the projection area by at least 90%.
      iii. Fixtures shall have motorized zoom of 3.8°-55° field angles, and a frost system which softens the edges of the projection on a surface that applies evenly across the beam and allows for variation in insertion time without reflections or uneven distribution of diffusion.
      iv. Minimum optical properties shall be as follows:
      v. Color temperature 7,000K.
      vi. Output field lumens: 15,400

vii. PWM frequency: 2,400Hz to 16,000Hz
viii. 100-240 VAC 50/60Hz, auto-ranging
ix. Fixture shall be equipped with powerCON True One IN and THRU connectors.
x. Data connector shall be DMX-512, 5-pin XLR, with in and thru connectors

4. Approved Fixture:
   a. Electronic Theatre Controls, Lonestar.
   b. Approved substitution
5. Quantities: Refer to schedule
6. Accessories
   a. Provide 5' powerCON True One TOP power input connector with NEMA 5-20 plug for every fixture.
   b. In addition to those required in paragraph 2.1, provide the following accessories with each fixture:
   c. The Light Source" Mega-Claw clamp, Black anodized. Provide two per fixture.
   d. Provide one rolling storage case capable of storing three fixtures.

2.03 PORTABLE LIGHTING FIXTURES AND ACCESSORIES SCHEDULE

A. Fixtures Schedule:

FIXTURE	QUANTITY
PROFILE – TYPE P1: Static, fixed beam angle, LED	**SPACE A**
LED Light Engine and fixture housing	40
14-Degree Lens Tube	2
19-Degree EDLT Lens Tube	9
26-Degree EDLT Lens Tube	16
36-Degree EDLT Lens Tube	13
50-Degree EDLT Lens Tube	0
WASH FRESNEL – TYPE WF1: Static, LED	15
CYCLORAMA FIXTURE – TYPE C1:	10
AUTOMATED FIXTURE – TYPE A1:	12

B. Accessories:
1. Spare Lamps: Provide spare lamps in the quantity indicated for each lamp type. Minimum spare quantity of any lamp type shall be one.
2. DMX terminator shall be a a 5-pin male XLR connector. Contacts shall be gold plated. Termination resistance shall be 120 ohms ±10%, between pins 2 and 3. Termination power capacity shall be 2 watts and absorbing capacity shall be 500W. Transient clamp time shall be less than 5nS with transient clamp voltage of ±7 volts. Terminator shall be equal to Doug Fleenor Design, TERM, T2.
3. Pattern Holder – Provide type A pattern holders for steel patterns. Holders shall fit the specified profile units.
4. Iris assembly kit. Units shall fit specified profile units and provide smooth control of beam size. Leaves shall be tempered and heat resistant up to 1,000°F. Equal to City Theatrical Drop-In Iris.
5. Top hats shall be properly sized for specified profile fixtures. Top hat shall be made of lightweight materials capable of withstanding the heat from the fixture without compromising performance. The unit shall be matt black with the inside of the unit flocked to maximize glare reduction. Unit shall be available in full size and half size, with an overall length of 5-inches. Shall be equal to City Theatrical Standard Top Hat.

6. 4-Way barndoor for wash fixtures shall be sized for the specified fixture. Four aluminum leaves shall be attached to the housing with nylock nuts to allow for tension adjustment. Housing shall be round to allow for rotation in fixture accessory clips. Finish shall be matt black.
7. Lighting Booms:
   a. Boom pipe shall be 1.5” schedule 40 pipe, 16’ tall, threaded on both ends. Clean and degrease pipe then paint black.
   b. Base Plate: Steel base plate for boom pipe. Plate shall be 20” square and have two threaded holes for 1.5” pipe. One shall be centered on the plate, the second centered along one edge. Plate shall have slots to accept attachment of square or triangular truss from 12” to 20.5” in size. Each rounded corner of the plate shall accept 5/8”x11 threaded fasteners for bolting down plate, leveling feet, or casters. Plate shall be black. Equal to Entertainment Fabrication Ultimate Theatre Base Plate 20”.
   c. 50lbs Cast iron boom bases w/flange threaded to receive 1-1/2” Sch. 40 pipe. Equal to Altman B-50.
   d. 60lbs Steel base, 20”x20”x1”, with threaded center and edge holes to receive 1-1/2” Sch. 40 pipe. Equal to Entertainment Fabrication EF-1049.
   e. Tie-off ring for 1.5” boom pipe. Tie-off ring shall be equal to Altman 530.
   f. Side Arm, 18” with single Tee. Equal to Altman Model No. 509-18-1.
   g. Side arm, 24” with two sliding Tees. Equal to Altman Model No. 509-24-1.

C. Accessories Schedule:

ITEM	QUANTITY
DMX terminators	(1) For each (6) DMX controlled fixtures
Pattern Holders, A-size	24
Iris assembly kit	6
Top hat: Full	14
Top hat: Half	
Barn Doors	15
Lighting Booms:	
Boom Pipe	4
Base plate	4
Tie-off ring	4
Side arm - 18” with 1 tee	8
Side arm - 24” with 2 tees	

2.04 LIGHTING SUPPORT EQUIPMENT

A. Portable Power and Data Relays – Wireless
   1. General
      a. The relay shall be a wireless DMX controlled relay receiver to control power and DMX data to stage lighting fixtures. It works in concert with the wireless DMX transmitter that receives hardwired DMX512 from a control source.
      b. The transmitter wirelessly transmits DMX to the receiver to operate the power internal power relay, controlling power to the lighting fixture. The receiver also outputs DMX512 data to the fixture.
      c. The relay shall be NRTL listed and RoHS compliant and FCC approved.
      d. Relay shall support DMX512A In and Thru via five-pin XLR connectors.
      e. The wireless DMX transmitter broadcasts shall be transmitted on the 2.4GHz range using Spread Spectrum Frequency Hopping technology.
   2. Physical
      a. The relay case shall be of molded black textured plastic. The case shall include integral mounting holes in combinations for flexible mounting to fixture yokes, pipe clamp brackets, and walls or other flat surfaces.

b. The housing dimensions shall be nominally 2” x 5” x 3.5”. The unit shall weigh less than 1 pound. The adjustable antenna shall be no more than 4.5” in length.
c. Power Input and output connectors shall be PowerCon compatible.
d. Wired DMX In and Thru connections shall be made using five-pin XLR connectors.
e. Mechanical Endurance shall be no less than 1,000,000 cycles
f. The relay shall be convection cooled and rated at 16A 250V up to 40C.
g. The panel shall operate safely in an environment having an ambient temperature between 32ºF (0ºC) and 104ºF (40□C), and humidity between 5-95% (non-condensing).

3. Electrical
   a. The relays and transmitter shall be capable of supporting voltage input and performing switching at 85-250V.
   b. Switching current shall not exceed 16A connected load at 40°C ambient.
   c. Switching shall occur at zero cross to reduce the arcing effects of capacitive and inductive loads.
   d. Frequency range of the relays and transmitters shall include 47-63Hz.
   e. Relays shall enter sleep mode within 15 minutes when data is no longer being received. Upon entering sleep mode, wired DMX relays shall consume no more than ¼ Watt during and wireless relays shall not consume more than 0.6 Watts.
   f. Minimum 2500V isolation shall be provided between control and power components.
   g. Relays shall have auto sequencing turn-on delay to ensure no two relays turn on at the same time across a system.
   h. Choices of relay mode shall include: Automatic; Assignable DMX address level; or System Power Command.
   i. Electrical endurance of the relay shall be as follows:
      i. Resistive 100,000 cycles @16A; 250V
      ii. Inductive 100,000 cycles @6A; 277V
      iii. Motor 40,000 cycles @1.5HP; 250VAC
      iv. Ballast 20,000 cycles @1500W; 347V
      v. Electronic 20,000 cycles @3300W @277V (12A)
4. Wireless DMX
   a. Range of wireless transmission shall be no less than 100 meters line of site free air.
   b. Maximum numbers of receivers per transmitter shall be 32 for DMX transmission.
   c. Wireless signals shall operate in the 2.4GHz frequency band operating with Frequency Hopping Spread Spectrum for interference avoidance.
   d. Latency between transmitter and receiver shall be no more than 7mS.
   e. Power of wireless transition shall be up to 72mW ETSI broadcast.
   f. Relay receiver and transmitter shall be capable of RDM feedback on any one of five wireless I.D.’s selected via thumbwheel, and transmits DMX output to the DMX out connector on the receiver.
   g. Wireless Transmitter and receiver shall be fully compatible with City Theatrical Show DMX.
   h. Wireless ID #6 shall operate outside of the Wifi bands for interference avoidance in areas of strong Wi-Fi usage.
5. Approved Products:
   a. The ColorSource Relay, by Electronic Theatre Controls, Inc.
   b. Approved substitution.
6. Quantity:
   a. See Schedule
7. Accessories:
   a. Provide one pipe mount kit with c-clamp for reach receiver.
   b. Provide one mounting feet kit with each transmitter.

B. Portable Cables
   1. Lighting Network Cables.

a. RJ-45 connector to Category 5 cable equal to Belden 1872A to RJ-45 connector. Each cable to be Category 5 Certified.
b. Provide lengths and quantities as listed in Lighting Support Equipment Schedule.

2. DMX Control Cables.
   a. Neutrik XLR 5-pin male to DMX cable equal to Belden 1583A, to Neutrik XLR 5-pin female.
   b. Provide lengths and quantities as listed in Lighting Support Equipment Schedule.
3. Single Circuit Cables – Edison
   a. Jumper Cable – NEMA 5-20M to Type SO 12/3 cable to NEMA 5-20F
   b. Provide lengths and quantities as listed in Lighting Support Equipment Schedule.
4. Single circuit cables – powerCON
   a. Jumper Cable – Neutrik powerCON 20A female to Type SJO 14/3 to Neutrik powerCON 20A male.
   b. Provide lengths and quantities as listed in Lighting Support Equipment Schedule.
5. Single circuit cables – powerCON TRUE1 TOP
   a. Jumper Cable – Neutrik powerCON TRUE1 20A female cable connector to Type SJO 12/3 to Neutrik powerCON TRUE1 20A male cable connector.
   b. Provide lengths and quantities as listed in Lighting Support Equipment Schedule.
6. Single Circuit Cables – Stage Pin
   a. Jumper Cable - Union Connector 20-2P&GM to Type SO 12/3 to Union Connector 20-2P&GF.
   b. Twofer - Union Connector 20-2P&GM to 2 @ 36” Type SO 12/3 to Union Connector 20-2P&GF.
   c. Provide lengths and quantities as listed in Lighting Support Equipment Schedule.
7. Multiple Circuit Cables.
   a. Provide lengths and quantities as listed in Lighting Support Equipment Schedule.
   b. Jumper Cables:
      i. Cables shall be rated at 600 volts, for six circuits, with two (2) #12 minimum AWG conductors for each 20-ampere circuit required plus one #12 minimum AWG grounding conductor for every three (3) circuits.
      ii. Cables shall be "Pro Cable" as manufactured by TMB Associates, Burbank, CA or cord type NVN as manufactured by Brand Rex Cable System Division, Willimantic, CT.
      iii. Connectors shall be Veam VSC series or approved equivalent. Inline plug shall be VSC06SLM-32S-19P-F80(29), Inline receptacle shall be VSC01SLM-32S-19S-F80(29). All connectors shall provide for positive ground wire connections through the connector to the chassis of the dimmer rack or plug box providing power.
      iv. Each cable end shall be labeled six inches from each connector, with 1/2-inch-high black letters on a colored background indicating cable length and extension identification. Labels shall be sealed to the cable with clear heat shrink tubing.
   c. Break-ins:
      i. Multi-conductor connectors shall be 6-circuit, Veam VSC series, VSC 01CF-32S-19S-F80 with metal backshell and "kinky clamp” strain relief.
      ii. Pigtails shall include six (6) at 24" long and shall be cable type 12/3 SO. Pigtails shall be labeled with the circuit number (1-6) near the plug end of the cables with 1/4" high black numbers on white background and sealed with clear shrink tubing.
      iii. Plugs shall be 20 ampere plugs, 2 wire plus ground, Edison. Union Connector 2P&GM or approved equivalent.
      iv. Plugs shall be engraved (1-6) on the cover with the circuit number in numbers not less than 1/2 inch high. Engravings shall be filled with white enamel.
   d. Break-outs:
      i. Multi-conductor connectors shall be 6-circuit, Veam VSC series, VSC06CF-32S-19P-F80 with metal backshell and "kinky clamp” strain relief.

ii. Pigtails shall include two (2) at 24" long, two (2) at 48" long, two (2) at 72" long and shall be cable type 12/3 SO. Pigtails shall be labeled with the circuit number (1-6) near the receptacle end of the cables with 1/4" high black numbers on white background and sealed with clear shrink tubing.
iii. Receptacles shall be 20 ampere connectors, 2 wire plus ground, Edison type. Union Connector 2P&GF or approved equivalent.
iv. Receptacles shall be engraved (1-6) on the cover with the circuit number in numbers not less than 1/2 inch high. Engravings shall be filled with white enamel.

8. Lighting Power Outlet Jumper Cables (120/208V Single Phase – 2 hots, N & Gnd)
   a. NEMA L14-20 to Type SO 10/5 to NEMA L14-20.
   b. Provide lengths and quantities as listed in Lighting Support Equipment Schedule.

C. Cable Bundle Wraps
1. Provide 3/4" wide hook and loop tie-wraps for bundling of portable cables. Tie-wraps shall be imprinted with owner designated initials and/or words. Provide one tie-wrap of suitable length to properly bundle each high and low voltage cable listed in Lighting Support Devices Schedule.

D. Devices:

LIGHTING SUPPORT DEVICES	QUANTITY
PORTABLE CABLE TYPE	
NETWORK CABLE	
6-foot	2
10-foot	4
25-foot	4
DMX CABLE	
6-foot	32
10-foot	44
25-foot	10
50-foot	4
100-foot	1
SINGLE CIRCUIT CABLE - JUMPERS	
EDISON	
6-foot jumpers	6
10-foot jumpers	12
25-foot jumpers	4
50-foot jumpers	1
100-foot jumpers	1
36” Two-fer	
powerCON	
6-foot jumpers	4
10-foot jumpers	6
25-foot jumpers	2
50-foot jumpers	2
powerCON TRUE1 TOP	
6-foot jumpers	26
10-foot jumpers	34
25-foot jumpers	8
50-foot jumpers	2

PART 3 EXECUTION

3.01 INSTALLATION

A. Unpack fixtures, install lamps, plugs, C-clamps, and adjust all lighting fixtures to manufacturer's specified performance in presence of Owner's personnel.

B. Stage Lighting Dealer is responsible for drafting a lighting plot, including focus areas, for inclusion in the shop drawings. Stage Lighting Dealer is responsible for installation and initial focus of the lighting plot approved by the Theatre Consultant during shop drawing review. Installation of lighting plot to be reviewed by the Theatre Consultant and Owner during site observation and training.
   1. Stage Lighting Dealer to create presets for theatrical lighting plot under the direction of the Theatre Consultant.

C. Remove from the site all rubbish, trash, discarded packing materials, cartons, and other debris caused by this Supplier. Upon completion of work, the entire area of work by this Supplier shall be left in broom clean condition.

3.02 STAFF INSTRUCTION

A. The Manufacturer's supervisor shall instruct designated representatives of the Using Agency in the safe operation, servicing, care, and maintenance of all items, including storage. Minimum one 6-hour session for designated representatives.

B. The Architect/Engineer and other representatives may be present or represented.

C. Instruction shall be scheduled in conformance with test and instruction schedules, and availability of Owner. staff, Architect, Architect's Consultant, and their representatives. While it may be possible to schedule this instruction session to coincide with the final observation, such coincidence shall not be assumed.

D. Completion of staff instruction shall be verified, in writing, with the signature of an authorized Owner's Representative within 5 business days of completion. Copies will be given to the Owner, the General Contractor, the Architect and the Consultant.

3.03 ACCEPTANCE BY OWNER

A. Acceptance testing will include operation by the Architect's Consultant of each component deemed necessary. Supplier will assist as necessary in this testing and will provide test equipment as required.

B. In the event the need for further adjustment or work becomes evident during observation and/or acceptance testing, the Supplier will continue his work until equipment is deemed acceptable and at no addition to the contract price. If approval is delayed because of defective equipment or failure of equipment or installation to meet the requirements of these specifications, the supplier will pay for any additional time and expenses of the Architect's Consultant.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 11 61 63

STAGE LIGHTING POWER AND CONTROL SYSTEM

PART 1 GENERAL

1.01 GENERAL CONDITIONS

A. For the sake of brevity these specifications shall omit phrases such as "(Sub)Contractor shall furnish and install", "unless otherwise indicated or specified", etc., but these phrases are nevertheless implied. Mention of materials and operations requires the (Sub) Contractor to furnish and install such materials and perform such operations complete to the satisfaction of the Architect's Consultant. Exceptions are noted herein or shown on the drawings.

B. No representative of the Owner shall have power to waive the obligations of this Contract for the furnishing of good materials or of performing good work, as herein described, in full accordance with the Contract Documents. The failure of any representative of the Owner to condemn any defective work or materials shall not release the obligation to at once tear out, remove, and properly replace the same at any time prior to final acceptance and upon discovery of said defective work or material. However, when requested, the Owner's representative shall observe and accept or reject any material furnished; and in the event the material has been once accepted by the Owner's representative, such acceptance shall be binding on the Owner unless it can be clearly shown that such material does not meet the specifications for this work.

C. All work provided under this section shall be provided by a qualified Theatrical Lighting Contractor. The qualified Theatrical Lighting Contractor shall demonstrate the following at time of bid submission:
   1. No less than five (5) years experience installing theatrical lighting systems of similar scope and magnitude
   2. No less than ten (10) projects of similar scope and magnitude, which the dealer has installed.
   3. Maintain a showroom open to the public thirty (30) or more hours per week located in a commercially zoned area.
   4. Employ at least one full time retail salesperson.
   5. Maintain an inventory, held for resale, of at least $50,000, with the value based on the manufacturer's published net pricing.
   6. Offer for retail sales at least ten (10) lines of product purchased directly from at least ten (10) different recognized entertainment equipment manufacturers on open account.
   7. Hold a valid business license and/or resale tax permit for the location in which the work will occur.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, other General Requirement Sections, apply to work of this section.

B. All work shown on Contract Drawings TL series is provided under this section. Refer to these drawings for plans, graphic representations, schedules, and notations showing Stage Lighting Power and Control Systems work.

C. Also refer to Theatre Rigging, and E Series drawings for related work.

D. Switches, switchboards, contactors, panel boards, transformers, conduit, wire, outlets, connectors and other electrical devices specified herein or on accompanying drawings shall conform to provisions of other sections of Division 26 of the Contract Documents unless otherwise noted.

1.03 SCOPE OF WORK

A. Work under this section shall include the furnishing of all labor, materials, tools, transportation services, and supervision necessary to complete the installation of the Stage Lighting Power and Control Systems and other items as herein listed, all as described in these specifications, as illustrated on the drawings, and as directed by the Architect's Consultant. Work is comprised of, but not limited to, the following principal items:
   1. House light power and control system
   2. Stage light power, distribution and control system
   3. Control console(s) and control devices
   4. Control outlets, relays, connections, and wiring.
   5. Custom panels and equipment
   6. Work light fixtures and control
   7. Theatre stage edge protection lighting
   8. DMX-controlled relay and mini panels
   9. Theatrical transfer switches
   10. Theatrical company switches
   11. Emergency transfer equipment

B. Furnish and install complete Stage Lighting Power and Control Systems with all necessary apparatus and equipment, wiring, etc., required to insure complete systems in excellent working order as specified herein and on the attached diagrams.

C. Consistent with the detailed information contained in this specification, it is the responsibility of the Contractor to supply complete and functional overall systems. Verify complete parts lists, the accuracy of the type numbers and the overall suitability of the equipment to provide functional systems coordinated and interfaced with related work. Provide repeaters, additional switches, and similar equipment as needed for cable length limitations.

D. Minor items of equipment needed in order to meet the requirements stated above, even if not specifically mentioned herein or on the drawings, shall be provided in quality equivalent to other conditions on the project with no claim for additional payment.

1.04 JOB CONDITIONS

A. Verify all conditions on jobsite applicable to this work. Coordinate with scheduled work of other trades. Notify Architect's Consultant in writing of discrepancies, conflicts, or omissions prior to commencement of work or correct same at Contractor's expense.

B. The drawings show diagrammatically the cables, conduit, wiring, and so far as possible, the arrangement of equipment, which fit into the spaces available without interference. If conditions exist at the jobsite which make it impossible to install work as shown, prepare and submit drawings to the Architect's Consultant for approval showing how the work may be installed and, on approval, install the work without additional cost to the Owner.

C. Contractor shall take care not to damage any equipment or to disconnect any wiring other than as required to interface new system. Any contractor-damaged equipment shall be repaired or replaced by the Contractor at no cost to the Owner.

D. Approval indicates approval of the manufacturer only and not approval of specific products. The Contractor shall be required to provide equipment that will meet or exceed the intent of these specifications.

1.05 SUBSTITUTIONS

A. Notwithstanding any reference in the specifications to any article, device, product, materials, fixtures, form, or type of construction by name, make, or catalog number, such reference shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition; and the Contractor in such cases, may at his option use any article, device, product, material, fixture, form or type of construction which in the judgment of the Architect's Consultant, expressed in writing, is equivalent to that specified.

B. All materials and equipment specified herein have been determined to provide an overall physical appearance and background of proven operation desired by the Owner, and therefore, to establish a standard of quality required for this project. If equipment or material other than that specified is proposed to be furnished, this Contractor shall be required to furnish the Architect's Consultant with such samples as he requires, the same to be submitted by the Architect's Consultant to an independent testing laboratory selected by the Owner for tests to determine the actual equality of the proposed substitute items. All costs and charges incurred by these tests shall be borne by the Contractor. Should such tests prove the substitute materials and equipment equal and acceptable, the Contractor shall be so advised. However, the Owner reserves the right to examine, and where necessary, to have additional tests made by the same independent testing laboratory of the actual equipment delivered to the jobsite to insure that the delivered equipment is equal in fact to that specified. Should such secondary test prove the equipment is satisfactory, the Owner will pay the cost for such test. Otherwise, the Contractor shall pay for the test and shall proceed to remove unacceptable equipment from the jobsite and to provide that specified. The Architect's Consultant's decision, based on this test, will be final.

C. The plans and specifications are based on specific equipment, accessories, processes and arrangements as indicated herein. Acceptance of the shop drawing submittal indicates only the acceptance of the manufacturer and quality and assumes that the specific requirements and arrangements are in compliance with the intent of the plans and specifications. The Contractor shall at no additional cost to the Owner, furnish all accessories, layouts, equipment, etc., and shall perform all work necessary for proper functioning and to fit his substitute items to the intent and arrangement indicated in the specifications.

D. If a substitute system is selected, any changes in architectural, electrical, or structural systems required as a result of the alternate system shall be provided by this Contractor at no additional cost to the Owner. The decision of the Architect's Consultant as to the compliance of the proposed system based on the submitted data and demonstrated system shall be final.

1.06 SHOP DRAWINGS

A. Shop drawings and equipment data sheets shall be submitted to the Architect's Consultant in accordance with the requirements of these specifications. Contractor assumes the responsibility for the accuracy of all dimensions and quantities.

B. Acceptance of submitted equipment shall be obtained prior to equipment purchase or fabrication. If shop drawings are rejected, correct and resubmit in the manner as specified. All shop drawing information regarding this Section shall be submitted at the same time; no partial submittals will be accepted.

C. Shop drawings shall be performed at a scale of not less than 1/8" = 1'-0" for plans and 1/4" = 1" for details. Drawings and catalogs shall be marked to show the name of project, date, Architect's Consultant, Contractor and/or Manufacturer and Supplier.

D. Drawings: Submit a complete set of shop drawings in electronic Portable Document Format (PDF) for review prior to fabrication. PDF shall include a Table of contents and bill of materials. Document shall also contain PDF bookmarks to plans, sections and major system details. Drawings shall indicate complete details and dimensions of all work to be performed, including all equipment types and locations, contractor-fabricated equipment and all other details required to describe work to be performed. Shop drawings shall contain at least the following details:
   1. Control consoles, panels, and device layouts and schematic diagrams
   2. Power panel layouts and schematic diagrams
   3. Fabrication details of custom consoles, panels, devices and enclosures
   4. Wiring diagrams of all specified systems and connections between systems
   5. Riser diagrams showing conduit and wiring requirements (indicating number of conductors, type of wire, and wire installation numbers to be used in each conduit)
   6. Fully dimensioned custom panel and plate details indicating complete manufacturer part numbers for all switches, knobs, meters, connectors, engraving, etc.

7. Plugging device layouts, numbering and circuiting. Submittals with plug strip layouts not showing circuit numbers will be returned rejected.
8. Detail of small scale circuit plot.
9. Details of Work Light Fixture Assembly

E. Catalog Sheets: Submit a complete set of product data sheets (8-1/2" x 11"), neatly organized with title page, space for submittal stamps, and tabbed dividers between sections. Additional copies of this set of data sheets will be required with record drawings. Submittal shall contain data sheets, in proper order, on all equipment proposed with part or model number clearly indicated. Fixture data sheets shall include photometrics. Provide a complete list of proposed equipment with reference to its corresponding specification section/paragraph number or equipment title. Denote all deviations from specified equipment on the list.

F. The plans and specifications are based on specific equipment, accessories, processes, and arrangements as indicated herein. Acceptance of the shop drawing submittal indicates only the acceptance of the manufacturer and quality and assumes that the specific requirements and arrangements are in compliance with the intent of the plans and specifications. The Contractor shall at no additional cost to the Owner, furnish all accessories, layouts, equipment, etc., and shall perform all work necessary for proper functioning and to fit his substitute items to the intent and arrangement indicated in the specifications.

1.07 RECORDS FOR OWNER

A. Drawings: Maintain a full record set of drawings on the job to show the actual installation of the work performed.
1. Submit a complete set of drawings in PDF showing 'as installed' work to the Architect's Consultant for review. If 'as installed' documents are rejected, correct and resubmit in the manner specified.
2. Upon acceptance, provide four (4) sets of drawings and four (4) USB data storage devices with electronic copy in PDF showing 'as installed' work. to the Architect's Consultant for review. PDF files shall include cover page, table of contents, and PDF bookmarks to plans, sections, and major details.

B. Manuals: Submit four (4) sets each of the following manuals in hardcopy along with four (4) electronic copies in PDF format to the Architect's Consultant for review. Manuals (8-1/2" x 11") are to be neatly bound and include title page with the name of the project, date, Owner, Architect's Consultant, Contractor, Manufacturer and/or Supplier. PDF files shall include cover page, table of contents, and PDF bookmarks to plans, sections, and major details. The manuals are to be supplied as follows:
1. Operation and Instruction Manual, including:
    a. Table of contents.
    b. Brief description of the operation of each system, (descriptions shall be written such that new personnel may read the manual and be able to set-up and operate the systems.)
    c. Manufacturer's operation instructions for all user-operated equipment.
    d. Small scale, clear laminated plan(s) showing the location and circuit numbers for all dimmed circuit outlets and network devices and taps.
2. Maintenance Data Manual:
    a. Table of contents.
    b. A list of all equipment supplied under this contract with manufacturer's name, model and part number.
    c. A listing of equipment manufacturer's/supplier's addresses for all equipment covered under this contract.
    d. All equipment warranties and guarantees including Contractor's guarantee. Explain the limits of the warranty, and whom to contact for service, including telephone numbers answered 24 hours per day so that the Owner may obtain 24-hour service when required.
    e. Manufacturer's owner and service manuals on all equipment under this contract.

f. Accepted shop drawing catalog data sheets including fixture brochures and lamp data.
g. Replacement parts lists of all major items and equipment indicating specific part ordering numbers including lamp type replacements.
h. All test results required under these specifications.
i. Any and all other data and/or drawings required during construction.

1.08 **TESTS AND OBSERVATIONS**

A. The entire job shall be, during and/or after construction, subject to observations by:
1. Architect's Consultant: Upon notice, Contractor shall furnish no more than two (2) persons (one to be the job foreman) and tools for a reasonable amount of time to assist with tests and observations as requested by the Architect's Consultant. A technician familiar with the project and system programming shall be present.
2. Government or authority having jurisdiction.

B. After completion of installation and preliminary tests by the Contractor, observation of the work shall be performed by the Architect's Consultant. The cost of periodic trips to the jobsite for final observation by the Architect's Consultant has been provided for in the Architect's Consultant's contract. The cost of any additional trips to the jobsite due to delays, omissions, or mistakes by the Contractor shall be borne by the Contractor.
1. System commissioning shall be overseen by a knowledgeable representative of the Contractor. A technician knowledgeable with the programming of the system must be available on site for a portion of system commissioning to set and adjust presets and entry panels.
2. In order for the Architect's Consultant to observe system commissioning, the following elements must be in place:
a. Stage Lighting Power and Control system must be complete, with all components installed, energized, and initialized. All installed lighting fixtures addressed and operational.
b. Rigging control system must be operational.
c. All electrical components must be operating on permanent building power.
d. Manufacturer system turn-on complete.
e. Preliminary programming set.
f. Complete access to areas where the stage lighting systems are installed, including the stagehouse, catwalks, audience chamber, control booths, electrical rooms, and other system components.
g. Loose equipment available, with initial programming, if applicable.
3. Contractor is to provide any equipment that may be necessary to access system components, including personnel lifts and/or ladders.

1.09 WARRANTY

A. All labor and materials provided under this contract shall be guaranteed for a period of one (1) year following the date of final acceptance by the Owner. All equipment with factory warranties greater than one year shall have their warranties under the Owner's name. All defects occurring in labor or materials within the one-year guarantee period shall be rectified by replacement or repair.

B. Contractor, or entity providing warranty, within this guarantee period shall answer all service calls within a 24-hour period and repair or replace any faulty items(s) within 48-hours after initial service call without charge to the Owner.

C. Incandescent, quartz, and low voltage lamps shall be guaranteed against defects in material and workmanship for a period of ninety (90) days from date of acceptance. Lamps failing in this period shall be replaced with new lamps at no cost to the Owner.

1.10 PERMIT

A. Obtain all permits necessary for the execution of any work pertaining to the installation, and conform in all trades with all applicable codes/regulations. Obtain all permits necessary for operation of any equipment by the Owner.

PART 2 EQUIPMENT

2.01 GENERAL

A. All components and systems shall be in new condition and of first quality.

B. State-of-the-art assurance: No products shall be accepted if they have been discontinued or superseded at the time of shipment. For such items, the manufacturer shall make products of comparable function to the specification available to the project at no additional cost. Should the manufacturer have developed a later model of specified units, the latest developed unit shall be provided without additional cost to the Owner. Should the manufacturer develop products of comparable function above and beyond the specification of the listed product, the manufacturer may offer the newly developed product for use on the project. The manufacturer shall notify the Architect's Consultant of any developments to the specified products and shall note any change in the requirements of building infrastructure(s) to support the developments. The Architect and Architect's Consultant shall then determine whether upgraded products shall be accepted.

C. Where acceptable, equipment items are specified by catalog number only; device shall meet all published manufacturer's specifications. Where quantities are not given, refer to drawings. Where two or more products are listed, contractor may use either at his option. Equipment shall not be substituted without specific written approval by the Architect’s Consultant, per the substitution paragraphs of these specifications.

D. Reference to equipment by name, make, or catalog number shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition.

E. All multi-conductor connectors shall be wired in accordance with the recommended practice RP-1 as published by the United States Institute for Theatre Technology.

F. Control signal protocols and connectors
   1. All control signal protocol and connector types shall comply with the following Standards:
      a. ANSI E1.11 – 2008 (R2024) / Entertainment Technology USITT DMX-512-A Asynchronous Serial Digital Data Transmission Standard for Controlling Lighting Equipment and Accessories.
      b. ANSI E1.17 – 2015 Entertainment Technology – Architecture for Control Networks.
      c. ANSI E1.20 – 2010 Entertainment Technology – RDM Remote Device Management over DMX512 Networks.
      d. ANSI E1.31 – 2016, Entertainment Technology – Lightweight streaming protocol for transport of DMX512 using ACN.
      e. ANSI E1.30 Series of Documents level equipment interoperability for control of commonly encountered entertainment technology devices using E1.17.
   2. All control, signal, and video connectors shall be of substantial construction and shall be of the locking or latching type.
   3. All plate-mounted connectors shall be bolted to faceplates – rivets shall not be acceptable.

G. All keys for devices in each theatre (i.e. control console, entry panels, dimmer racks, etc.) shall be keyed identically. Provide a total of (2) keys for each keyed device.

2.02 APPROVED MANUFACTURERS

A. For purposes of establishing the quality and performance desired, the following companies are approved as manufacturers:
   1. Power Devices
      a. Electronic Theatre Controls, https://www.etcconnect.com/
      b. LynTec, https://lyntec.com/
      c. Vari-Lite, https://www.vari-lite.com/global
   2. Wiring devices
      a. Electronic Theatre Controls, https://www.etcconnect.com/
      b. Leviton, https://www.leviton.com/en
      c. LEX Products, https://www.lexproducts.com/
      d. SSRC, http://www.ssrconline.com/index.html
      e. Vari-Lite , https://www.vari-lite.com/global
      f. Union Connector, https://www.unionconnector.com/
   3. Control devices
      a. Electronic Theatre Controls, https://www.etcconnect.com/
      b. MA Lighting, https://www.malighting.com/
      c. Pathway Connectivity, https://www.pathwayconnect.com/
      d. Vari-Lite, https://www.vari-lite.com/global
      e. TMB, https://tmb.com/

2.03 HOUSE LIGHT CONTROL SYSTEM

A. House Light Control System shall be configured to provide controlled and dimmable house and preset stage lighting for presentations or rehearsals. System shall be controlled by a microprocessor based, user programmable device. Remote Control Stations located throughout the auditorium may address the system.

B. The system shall support no less than 32 wall stations or remote devices in any number of rooms. A minimum of 1536 dimmers may be assigned to one of 128 system control zones. A minimum of 250 presets and system events shall be provided. The system shall receive inputs from the following devices:
   1. Remote Control Stations
   2. Stage Lighting Control Console
   3. Stage Lighting System Network
   4. Ethernet based control signals
   5. PCs
   6. Contact closure stations
   7. RS232/422/485 Serial communication

C. The system shall process incoming information and distribute it to dimmer bank, building management systems, and other associated devices.

D. The system shall have the ability to connect multiple processing units in to one large system via onboard twisted pair and/or fiber optic Ethernet connections.

E. The system shall operate on the Stage Lighting System Network as a native device.

F. A configuration program shall allow the following functions:
   1. Patching dimmers to zones with proportional levels and user selectable dimmer output curves
   2. Programming presets and system events
   3. Naming of presets and channels
   4. Setting room and station assignments

G. Electrical
   1. The system shall operate from a processor unit which shall be a microprocessor based, solid-state device. Field programmable system configuration and program information shall be stored in Flash Memory, which shall not require battery backup. Systems without a simple method of backup shall not be acceptable.
   2. A DMX-512 input shall be provided for snapshot input via the dimmer bank control module. This input shall accept level information from any DMX source. The DMX-512 input shall be opto-isolated from all other electronics with the isolation exceeding 1500 V.
   3. A DMX-512 output shall be provided. This output shall transmit level information to the dimmers bank and other DMX operated devices.
   4. A control network port shall be provided for communications with control devices. The network shall utilize polarity-independent, low-voltage Class II unshielded twisted pair (UTP) wiring. The network topology may be bus, loop, home run, or any combination of these three.
   5. Operating voltage for the processor shall be provided by the dimmer bank control module. In the event of power loss, the processor shall return to its last valid state when power is restored.
   6. An Ethernet network port shall be provided for communications and linking via the Stage Lighting System Network.

H. System Functions
   1. It shall be possible to record presets, consisting of any number of zones set to any level with an associated fade time. It shall be possible to recall a preset from a pushbutton, remote input, astronomical time clock event (ATC) or macro.
   2. A macro language shall allow sequences of presets and system events to be stored and recalled. Conditional arguments may be used within a macro to check time or input states. Macros may be assigned to pushbuttons, remote inputs, and/or ATC events.
   3. An internal ATC shall allow presets and system events to be recalled at a preprogrammed time relative to sunrise or sunset or at a specific time of day. Systems not providing an internal ATC shall not be acceptable.
   4. Each system shall be able to lock out Remote Control Stations. The system shall be unlockable at any "Master Station" using a 4-digit code.
   5. Stations shall be configurable in mirrored condition so that a change in one station will effect the same change in the mirrored station.
   6. System and Stage Lighting Control Console control signals shall have the capability of operating dimmers simultaneously in pile-on mode.
   7. System shall be controllable from other such systems as a single entity across the Stage Lighting System Network.

I. System Setup
   1. A setup menu shall be provided with the processor. This menu shall be accessed using the control module input terminal of the dimmer bank control module. This menu shall provide basic setup functions.
   2. A configuration program shall be provided for setup and programming of any size system. All functions of the system may be configured and monitored using this program.
   3. Installation shall include basic programming operations as directed by the Owner or Architect’s Consultant. Programming files shall be provided to the Architect’s Consultant on USB flash drive so that the Architect’s Consultant may retain a copy for their records.

J. Acceptable House Light Control Systems:
   1. Electronic Theatre Controls, Inc.: Unison Paradigm LT
   2. Vari-Lite.: Vision.net

K. Quantities:
   1. Auditorium - Quantity: One (1)

2.04 ENTRY PANEL “EP-(X)” (HOUSE AND WORKLIGHT REMOTE CONTROL)

A. EP-1: “Entry Panel” station with one button shall have the following functions and features:
   1. Control shall be accessed through one (1) soft push button that shall be used to turn "on" and "off" one (1) user programmable preset.
   2. Shall have a LED to display when a preset is on. LED color shall be programmable.
   3. Shall mount in single-gang box.
   4. Shall have no less than one preset.

B. EP-2: “Entry Panel” station with two buttons shall have the following functions and features:
   1. Control shall be accessed through two (2) soft push button that shall be used to turn "on" and "off" two (2) user programmable presets.
   2. Each push button shall have an LED to display when a preset is on. LED color shall be programmable.
   3. Shall mount in single-gang box.
   4. Shall have no less than two (2) presets.

C. EP-3: “Entry Panel” station with three buttons shall have the following functions and features:
   1. Control shall be accessed through three (3) soft push button that shall be used to turn "on" and "off" three (3) user programmable presets.
   2. Each push button shall have an LED to display when a preset is on. LED color shall be programmable.
   3. Shall mount in single-gang box.
   4. Shall have no less than three (3) presets.

D. EP-4: “Entry Panel” station with four buttons shall have the following functions and features:
   1. Control shall be accessed through four (4) soft push button that shall be used to turn "on" and "off" four (4) user programmable presets.
   2. Each push button shall have an LED to display when a preset is on. LED color shall be programmable.
   3. Shall mount in single-gang box.
   4. Shall have no less than four (4) presets.

E. EP-5: “Entry Panel” station with 5 buttons shall have the following functions and features:
   1. Control shall be accessed through five (5) soft push button that shall be used to turn "on" and "off" five (5) user programmable presets.
   2. Each push button shall have an LED to display when a preset is on. LED color shall be programmable.
   3. Shall mount in single-gang box.
   4. Shall have no less than five (5) presets.

F. EP-F - "Fader Preset Station" shall have the following functions and features:
   1. Control shall be accessed through five (5) soft push buttons that shall be used to turn "on" and "off" one (1) each user programmable preset or master-preset.
   2. Shall have one (1) fader to control the level of one (1) programmed preset. “Off” shall trump the fader setting. “On” shall return the preset to the proportionate level set by the fader.
   3. Shall have a LED to display when a preset or divider is on.
   4. Shall mount in one-gang box.
   5. Shall have no less than three presets.
   6. See drawings for quantity of fader sliders and preset buttons and other functions to be included in the Fader Preset Station.

G. EP-K: “Entry Panel-Keyed” station shall have the following functions and features:
   1. Control shall be accessed through one (1) keyed switch which shall be used to turn "on" and "off" one (1) user programmable preset or master-preset.
   2. Key switch shall be momentary type.
   3. Shall have a LED to display when a preset is on. LED color shall be programmable.
   4. Shall mount in single-gang box.
   5. Shall have no less than one preset.
   6. See drawings for other functions such as faders or preset buttons to be included in the Entry Panel-Keyed Station

H. EP-M: "Master Station" shall have the following functions and features:
   1. A backlit liquid crystal display with a graphic touch screen user interface which shall show preset names, respective levels expressed as a percentage, operating instructions, fade times in one second increments, clock and calendar settings, lock mode status, station mirroring status, auxiliary closure names, have the ability to page or scroll up and down to reveal information, and have adjustable levels of intensity.
   2. Memory shall be stored in non-volatile electronic memory.
   3. Control shall be accessed through graphic buttons and faders. Control page will allow for the control, selecting and editing of presets.
   4. Shall be capable of displaying current date and time.
   5. Shall be capable of setting the correct time and date within the system.
   6. Shall have screen size of 7” to 18” on diagonal.
   7. See drawings for other features such as faders or preset buttons to be included in the Master Station.

I. EP-P: “Portable Master Station”
   1. A backlit liquid crystal display with a graphic touch screen user interface which shall show preset names, respective levels expressed as a percentage, operating instructions, fade times in one second increments, clock and calendar settings, lock mode status, station mirroring status, auxiliary closure names, have the ability to page or scroll up and down to reveal information, and have adjustable levels of intensity.
   2. Memory shall be stored in non-volatile electronic memory.
   3. Control shall be accessed through graphic buttons and faders. Control page will allow for the control, selecting and editing of presets.
   4. Shall be capable of displaying current date and time.
   5. Shall be capable of setting the correct time and date within the system.
   6. Shall have screen size of 18” on diagonal.
   7. Shall be a portable, plug in device with a twenty-foot (20’) cord
   8. See drawings for other features such as faders or preset buttons to be included in the Portable Auxiliary Master Station.
   9. Size per Drawings
   10. Plug-in Stations are indicated on the TL drawings as “Portable Master” and shall serve as receptacles for the Portable Master Station

J. EP-T: “Entry Panel-Touch screen” station shall have the following functions and features:
   1. A backlit liquid crystal display with a graphic touch screen user interface which shall show preset names, respective levels expressed as a percentage, operating instructions, fade times in one second increments, clock and calendar settings, lock mode status, station mirroring status, auxiliary closure names, have the ability to page or scroll up and down to reveal information, and have adjustable levels of intensity.
   2. Memory shall be stored in non-volatile electronic memory.
   3. Control shall be accessed through graphic buttons and faders. Control page will allow for the control, selecting and editing of presets.
   4. Shall be capable of displaying current date and time.
   5. Shall be capable of setting the correct time and date within the system.
   6. Size per Drawings.

K. Entry Panel LED indicator light with multi-color capacity:
   1. See drawings for LED color for various modes and conditions. If no LED color is indicated in the drawings then the following shall apply:
      a. LED amber in LOCKOUT mode
      b. LED at 50% red in OFF mode
      c. LED at 100% green in ON mode

L. Acceptable Entry Panel (House and Worklight) Remote Control Stations:
   1. Electronic Theatre Controls, Inc.: Unison Paradigm
   2. Vari-Lite: Vision.net
   3. Acceptable substitution

M. Quantity: As shown on drawings

2.05 STAGE LIGHTING CONTROL CONSOLE

A. Specifications
   1. DMX Outputs: 4096
   2. Control Channels: 32768
   3. Encoders: 4
   4. 18.5” built in touchscreens: 1
   5. Removable Media recording for show file storage
   6. 5 motorized Submaster Faders with bump buttons and status-indicating LEDs
   7. Live Real-Time Tracking Backup Processing

B. Console shall include:
   1. One (1) high-resolution 21” LCD touch screen color.
      a. Height of screen not to exceed 17.5” when installed.
   2. One (1) motorized fader wing with ten (10) faders.
   3. Two (2) Removable Media for show file storage.
   4. Gooseneck console worklight. Provide one for each receptacle.
   5. One (1) set of 25-foot control cables terminating in locking connectors appropriate for mating with the Control Receptacle Panel.
      a. Connectors shall be Neutrix EtherCon or equivalent.
   6. Vinyl dust covers for the console and video displays.

C. Acceptable products.
   1. ETC Gio @5

   No other system shall be considered unless specifically approved by the Theatre Consultant at least 10 days prior to bid date.

D. Install in the in house mix position as shown in the Drawings.

2.06 CONTROL ACCESSORIES

A. Uninterruptible power supply. Capable of sustaining operating voltage to control console and CRT(s) for up to 10 minutes in the event of a loss of power. Capable of filtering spikes, surges, and noise from power source. Conditioner shall provide continuity of earth ground from source to the console. Shall include test switch to confirm battery charge. UPS shall be sized to provide rated power supply for control console, Monitors, and any console-mounted work light.
   1. UPS shall be NRTL listed.
   2. General warrantee shall be for 3 years parts and labor. Battery shall be warrantied for a period of not less than 2 years and shall be field replaceable without the use of tools.
   3. Input power shall be 120VAC/60Hz.
   4. Output power shall be a nominal 120VAC via NEMA 5-20 receptacles.
   5. Transfer time between utility power and battery, and between battery and utility power, shall not exceed 4ms.
   6. UPS shall have the capability to be IP enabled.
   7. Maximum audible noise shall be less than 27db at 1 meter.

8. Approved manufacturers, Rack Mounted UPS:
    a. Middle Atlantic, Series UPS-1000x/2200x depending on load.
    b. Tripp-Lite, SmartPro Series, sized for load
    c. Approved substitution.
9. Approved manufacturers, Desktop UPS (provide one UPS for each console provided):
    a. Eaton, Series 5Sx, sized for load.
    b. Cyber-Power, Series AVR
    c. Tripp-Lite, SmartPro Series, sized for load
    d. Approved substitution

B. Wireless Handheld Remote. Provide one (1) Wireless Hand-held remote control. Capabilities to call up channels, adjust levels, call up cues, run cues, and perform dimmer check. Provide transmitter and all access points required for a complete and functioning system. System shall provide for continuous operation from all points within the auditorium and stagehouse including but not limited to the gridiron, stage floor, catwalks, control rooms, and auditorium.

C. Control Area Work Light
1. Littlite model L-18-LED 18" high intensity gooseneck lamp with model WB weighted base. Furnish in addition to those specified for control console(s).
2. Quantities:
    a. Auditorium: (2)

2.07 MOTORIZED BREAKER PANELS

A. Panels and Breakers
1. The panel shall be constructed of 16-gauge galvannealed steel. All panel components shall be properly treated or finished in fine-textured, scratch resistant paint.
2. Panels shall be surface mounted. Faceplates shall not extend beyond the edges of the back box.
3. Breaker Panels shall consist of a main enclosure with 24, or 48 pole breaker subpanels, integral control electronics for low voltage terminations and provision for a minimum of three accessory cards.
4. Breakers shall be available in one, two, or three poles, from 15-amp to 30-amp. Breakers shall be listed for 100% continuous use without derating. Breakers shall provide manual switching control and shall be allowed to be combined within a single panel.
5. Breaker Panels shall be UL508, UL67, and UL924 Listed, and shall be so labeled when delivered.
6. Breakers shall be UL489 listed and shall be labeled when delivered. Output lugs shall support solid or stranded 6-14 AWG class B, C, or K, copper wire.

B. User Interface
1. The user interface shall contain an LCD display with button pad to include 0-9 number entry, up, down back arrow navigation and enter.
2. Test shortcut button shall be available for local activation of preset, sequence and set level overrides.
3. The user interface shall have a power status LED indicator, a DMX status LED indicator, a network status LED indicator, and an LED indicator for errors.
4. Interface shall allow the backlight to timeout and shall provide user editable options to shut off backlight completely as well as adjust screen contrast.
5. Ethernet interface (when installed) shall default to automatic IP through link local and DHCP. Upon receiving IP address, the address of the Network Interface Card (NIC) shall display in the about menu. Static address and settings shall also be possible.
6. The control interface shall support a USB memory stick interface for uploads of configurations and software updates.

C. Functional
   1. Panel setup shall be user programmable. The control interface shall provide the following breaker setup features (per circuit):
      a. Type (1 pole, 2 pole, or 3 pole)
      b. Name
      c. Circuit Number
      d. DMX address
      e. sACN address (network enabled panels only)
      f. Space Number
      g. Circuit Modes
      h. Normal (priority and HTP based activation)
      i. Latch-lock
      j. Fluorescent
      k. DALI
      l. On threshold level
      m. Off threshold level
      n. Include in UL924 emergency activation
      o. Allow Manual
   2. Breaker panels shall support discrete addressing of each breaker. Panels that are restricted to use of start address with sequential addressing, and cannot assign each 0-10V output control to any internal circuit shall not be acceptable
   3. The panel shall be capable of switching 6 poles on or off at once, or in a user-selectable delay per breaker using a period of 0.1 to 60 seconds, in 0.1 second increments
   4. Control electronics shall report the following information per branch circuit:
      a. Breaker state (On/Off)
      b. Breaker state (Open/Closed)
      c. Current draw (In Amps)
      d. Voltage
      e. Energy usage
   5. Built in Control shall include:
      a. Ability to record up to 16 presets in each space from the control panel, connected control stations, or timed events.
      b. Presets shall be programmable by recording current levels (as set by DMX or connected control stations), by entering levels on the control panel directly, manually selecting breaker state on each breaker, or a combination of these methods. From the control panel, stations, or timed events it shall be possible to record values for up to 16 zones per space.
      c. Up to 8 spaces in a single rack for total of up to 16 spaces shall be supported per system or system subnet.
      d. Indication of an active preset shall be visible on the control panel display.
      e. One 16-step sequence per space for power up and power down routines.
      f. The panel shall have a UL924-listed contact input for use in Emergency Lighting systems. The panel shall respond to the contact input by setting included breakers to “on”, while setting non-emergency breakers “off”. Each breaker can be selected for activation upon contact input.
      g. Upon Data loss the system shall provide options to hold last look infinitely or hold for a configured time period set by the installing technician then fade/switch to the input of the next available priority.
      h. Control electronics shall respond directly to control stations for zone, preset, and sequence control. Systems that require secondary control systems for this functionality are not acceptable.
      i. After power loss, electronics shall be capable of holding the system in its previous state until new level data (DMX, architectural presets, sequences and zones, or local overrides) is received to make each breaker change state.

6. The control of lighting and associated systems via timed and Astronomical clock controls.
    a. The breaker panel shall allow the activation of presets, sequence, and zone programming of up to 50 time clock events via a built in real and astronomical time clock.
    b. System time events shall be programmable via the control panel
        i. Time clock events shall be assigned to system day types. Standard day types include: everyday, weekday, weekend, Sunday, Monday, Tuesday, Wednesday, Thursday, Friday and Saturday
        ii. Time clock events shall be activated based on sunrise, sunset, time of day or periodic event
        iii. System shall automatically compensate for regions using a fully configurable daylight saving time
        iv. Presets shall be assigned to events at the time clock
    c. The time clock shall support event override
        i. It shall be possible to override the timed event schedule form the face panel of the time clock
    d. The time clock shall support timed event hold
        i. It shall be possible to hold a timed event from the face panel of the processor
        ii. Timed event hold shall meet California Title 24 requirements
7. The panel shall receive ESTA DMX512-A control protocol. Addressing shall be set via the user interface button keypad with any circuit patched to any DMX control address
    a. 2,500V of optical isolation shall be provided between the DMX512 inputs and the control electronics as well as between control and power components
    b. The breakers shall respond to control changes (DMX or Stations) in less than 25 milliseconds. DMX512 update speed shall be 40Hz
    c. Setting changes shall be able to be made across all, some, or just one selected breaker in a single action from the face panel
    d. DMX data loss shall allow for levels/breakers to be held for ever or for a specified time before switching to a lower priority source
    e. Initial Panel setup
        i. The breaker panel shall automatically detect the type of breaker or dimmer installed in each location without need for manual configuration of the physical arrangement
        ii. Quick rack setup shall be available to apply address settings across all circuits for rack number, DMX Start Address, sACN universe, and sACN start address
        iii. Emergency Setup Menu shall provide optional delays when emergency is activated or deactivated, and option to turn off non-emergency circuits shall be available. Record function shall allow circuits that are turned on to be added to the emergency setting.
8. Electrical
    a. Breaker Panels shall be available to support power input from:
        i. 120/208V three phase 4-wire plus ground, as indicated in the drawings.
        ii. 240/277V single phase 3-wire plus ground, as indicated in the drawings.
    b. Conduit Entry:
        i. Feeders:
            a) Top or upper 6” of either side.
            b) Bottom or lower 6” of either side.
            c) Feeders shall enter through the top or bottom according to the orientation of the enclosure.
            d) Feeder entry shall be nearest to the location of the feeder lugs or main breaker.

c. Load Wiring:
   i. Load wiring shall enter through the top or bottom of the enclosure through the surface nearest to the breaker sub panel.
   ii. Load wiring may also enter through left and/or right side provided a low voltage chase is not required through the same area. If class 2 chase is required, a field installable barrier panel shall be provided upon request. The side of the panel where the barrier has been installed shall not permit load wiring.
d. Low Voltage:
   i. Top or upper 6” of either side.
   ii. Bottom or lower 6” of either side.
   iii. For low voltage conduit entry at the breaker end of the cabinet, conduits shall be located at the outer 3” of the top/bottom panel.
e. Breaker
   i. Bus connection type: Stab on
   ii. 1, 2, or three poles
   iii. UL489 listed
   iv. 15 amp, 20 amp, or 30 amp
   v. 22,000 SCCR on 120/208V breakers, and 14,000 SCCR, up to 20A, 10,000 SCCR for 30A on 240/277V breakers. 65,000A series rated with main breaker shall be available.
   vi. High inrush trip curve
   vii. Maintains trip curve through entire thermal range
   viii. Guaranteed not to trip at full load
   ix. Load lugs accept 6-14awg load wiring
   x. Multi-conductor listed output terminal
   xi. Integral mechanically held air gap relay
   xii. Manual control of relay state using breaker handle w/o power
   xiii. Integral current sensing
   xiv. Integral position and trip sensing
   xv. Control and status provided by contact pads directly at bottom of the breaker case
   xvi. No external wires or connections required for control or feedback
   xvii. The breaker shall be capable of switching up to 30A
f. The breaker panel shall support a maximum feed size
   i. 100 Amps at 12 circuits
   ii. 200 Amps at 24 circuits
   iii. 400 Amps at 48 circuits
g. Breaker panels shall support main circuit breaker options:
   i. Main breaker options shall be optional and available for purchase upon request
   ii. Main breakers shall be field installable
   iii. Main breakers shall be available in up to 100 Amps for 12 circuit panels, up to 200 Amps for 24 circuit panels, and up to 400A for 48 circuit panels at 120V.
   iv. Series SCCR ratings apply as follows with appropriate main breaker:
   v. 22,000A or 64,000 at 120/208V
   vi. Main breakers shall allow the following range of wire sizes:
   vii. Up to 300kcmil at 100A and 200A
   viii. Up to 2x250kcmil at 400A
   ix. Main Lug input shall support up to 2x250kcmil
   x. Breaker panel shall support a 500kcmil main lug option for 48-circuit panels
h. Breaker remote switching ratings
   i. Mechanical 1,000,000 cycles
   ii. 24A Resistive 100,000 cycles
   iii. 16A Ballast (HID) 75,000 cycles
   iv. 15A Electronic (LED) 100,000 cycles
   v. 15A Tungsten 45,000 cycles

vi. 30FLA; 180 LRA Motor Load 50,000 cycles
vii. Tested duty cycle: 12 operations (6 cycles) per minute
viii. Decreasing duty cycle significantly increases switch life
ix. Isolation: 4000V RMS
x. Current reporting accuracy: 5%
xi. Latching state mechanical relay

i. Breaker Panel Accessories
   i. An Ethernet option shall provide advanced control of relays over streaming ACN (sACN) and transmit status, control override, and measured energy usage per branch circuit to a web browser based or central monitoring interface
   ii. A low voltage 0-10V dimming option shall provide up to 24 0-10v control outputs that are linked to relay circuits within the panel. Each output shall support up to 400mA of current sink per output
   iii. A contact input option shall provide 24 dry contact inputs to be linked for direct or group relay control, to activate a preset, or to activate a sequence. Controller software shall allow for normally open maintained, normally closed maintained, or momentary toggle
   iv. A DALI control option shall provide 24 control loops of broadcast DALI control, with each loop controlling up to 64 DALI devices
   v. A RideThru option shall provide short-term power backup of control electronics by automatically engaging when power is lost, and recharging when normal power is present
   vi. An Isolated Ground option shall provide each circuit in the panel with a ground terminal that is electrically isolated from the equipment ground
   vii. Main Breaker options shall be available as shown in Section E.4
j. Thermal
   i. The panel shall be convection cooled.
   ii. The panel shall operate safely in an environment having an ambient temperature between 32ºF (0ºC) and 104ºF (40°C), and humidity between 5-95% (non-condensing)
k. Acceptable Products:
   i. Sensor IQ, by ETC
   ii. LCP Series, by LynTec
   iii. Approved Equal

2.08 DMX MINI CONTROL PANEL

A. Mechanical
   1. Panel shall be fine-textured with a black powder coat finish.
   2. Mounting: Wall, Surface-mount. Rated for installation in plenum air space.

B. Electrical
   1. Power: Input: 100 to 277 VAC, 50/60 Hz per circuit with support for pass thru to multiple circuits.
   2. Single Phase Sense Feed Input: 100 to 277 VAC.
   3. Supports 120 VAC and 277 AVC circuits within the same panel.
   4. Fully-Rated Bi-State Latching Relay per Output: 20 A.
   5. Control Rated: 0 to 10 VDC for up to 100 mA sink per output.
      a. Outputs 0 to 10 V: Fully isolated from ground to 2500 V RMS.
   6. Demand Response input supports Normally Open (NO) operation.
   7. UL 924 contact closure input supports normally open (NO) or normally closed (NC) operation.
   8. Onboard status indicators for controller power, DMX signal, Demand Response input, UL 924 emergency lighting control.
   9. Slide Switch Configuration For:
      a. UL 924 operation; NO/NC.
      b. UL 924 inclusion per circuit; On/Off.

C. Relays
   1. Mechanically held.

D. DMX Input Port:
   1. Integrated DMX/RDM termination.

E. Thermal
   1. Operating range limits
      a. Temperature: 32 to 122 degrees F (0 to 50 degrees C).

F. Acceptable products
   1. ETC, Foundry Mini Panel 8 zone
   2. Approved equal

G. Quantity: As indicated on UL and E series Drawings.

2.09 CONTROL WIRE

A. Control wire shall be provided in quantity required.

B. Provide the type of control wire as directed by system manufacturer(s).

C. Provide all network wiring to follow Category 5 installation guidelines and protocols as prescribed under this section.

D. Wiring methods
   1. All permanent network wiring shall terminate in receptacles in panels. All equipment shall be connected to receptacles via "patch cables" with RJ45 plugs. No installed wire shall terminate directly to network equipment. The use of male RJ45 pigtails shall not be permitted.
   2. Cable shall be pulled in conduits, meeting the minimum bending radius permitted by the cable manufacturer. All cable shall be pulled with no more than the maximum pulling tension permitted by the cable manufacturer.
   3. Riser rated or plenum rated cable shall be used where required under local codes.

E. Electrical requirements
   1. All UTP wiring segments shall be of continuous runs of not more than 250 feet. If a wiring run exceeds the noted maximum footage, manufacturer shall provide required repeaters and system elements to bring the segment wiring to the stated maximum run. Contractor shall provide and install such elements as part of the work of this Section.
   2. All cable shall meet the standards for EIA/TIA 568 TSB-36 Category 5. The Contractor shall use a current generation 100Mhz or higher, network/cable analyzer to perform testing on the cable plan and shall test all data pairs. All cable shall be tested for continuity, attenuation, near end crosstalk, mutual capacitance, cable impedance, cable resistance, cable length, structural return loss and pair mapping. All testing will be performed by certified cable technicians. As part of the final submittal, provide cable analyzer printouts of all test performed, labeled by cable number.
   3. All wiring shall meet the EIA/TIA T586B wiring standard.
   4. All cable and installation shall accommodate 100Mbs transmission rate. "Thin Net" systems shall not be used.
   5. The system shall be designed for maximum 40% traffic utilization and maximum 10% collisions within the same collision domain. The use of switches is acceptable to manage network traffic.
   6. All Layer 2 switches shall provide for IGMP Layer 3 snooping to accommodate IP multicast events.

F. Network cables and patch cables
   1. Cables shall be rated Category 5 to match wiring of installed wiring.
   2. Cables shall include RJ45 plugs at each end, for proper mating to receptacle panels and node devices. Each cable shall be protected by a rubber boot of a diameter sufficient to extend beyond the plug connection tab.
   3. Patch cables and boots shall use multiple colors to differentiate collision domains. Drop cables and boots (cables 10' long or more) shall be black.

G. Quantities sufficient to patch all receptacle panels. In addition to scheduled quantities.

2.10 CONTROL RECEPTACLE PANELS

A. The Control Receptacle Panels shall be mounted as indicated in the Drawings, dead front, and completely wired internally, with terminal strips of the proper rating for all external connections.

B. The face of the panels shall contain flush mounted receptacles. These receptacles shall be of the locking type and shall be sized for the proper number and capacity of conductors as indicated in the Drawings. Control connectors shall be equal to 4-pin or 5-pin XLR, Switchcraft D4M or D5M. All Category 5 connectors shall be RJ45 EtherCon (by Neutrik or approved equal). All fiber optic connectors shall be ST style connectors. Smaller or less substantial connectors shall not be acceptable.

C. The face of each panel shall contain receptacles as indicated in the Control Device Schedule.

D. Engraved Lamicoid labels with the following information shall be mounted beside each receptacle wired with Category 5 network wire, per the Drawings.
   1. Panel designation
   2. Title of "Lighting Network"
   3. Designation of wire destination
   4. Maximum length of patch cable permissible from the receptacle.

E. Install as shown in the Drawings.

2.11 NETWORK DATA SYSTEMS

A. The Network Data Systems shall provide for the interconnection of devices used solely for stage lighting and special effects.

B. The network shall consist of receptacle panels, connecting wiring, patch bay(s), patch cables, hub devices, routers, switches, DMX/Ethernet nodes, and receptacle panels for portable node devices.

C. All materials, components, and services necessary to provide complete network data systems indicated in this Section. Manufacturer shall be responsible for performance of the complete system.

D. All control devices shall operate as part of the network. If the manufacturer's system requires devices that are not network compatible, manufacturer shall provide all required hardware to accommodate those devices to meet the intent of this specification. Contractor shall provide and install all conductors to accommodate these devices, as part of the work of this Section.

E. The network shall provide for the connection of the following devices as well as dedicated non-network "dry lines" as noted:
   1. Control Consoles
      a. DMX: non-network dedicated lines to dimmers (Theatre network only)
      b. DMX out (network – via Ethernet)
      c. Dimmer feedback information
   2. Remote video displays
   3. Designer's remote control consoles
   4. Automated spotlights
   5. Color changers
   6. Moving yoke devices
   7. DMX-controlled special effects

F. Network capacity shall be determined by the following simultaneous usage criteria. System shall allow all the data below to be sent simultaneously, within the traffic and collision maximums noted above.
   1. Control Consoles – quantity two (2)
      a. DMX out: network usage to dimmers
      b. Dimmer feedback information
   2. Remote video displays – quantity two (2) in use, in two separate locations
   3. Designer's remote control consoles – quantity one (1)
   4. Wireless remote controls
      a. Network signal for one (1) unit
   5. Distributed DMX signal – two (2) 512-dimmer universes

G. All system elements shall be provided from a qualified network hardware manufacturer. The manufacturer shall have at least five (5) years experience in the fabrication of network hardware. Subject to the above requirements, the equipment indicated herein shall be by one of the following manufacturers:
   1. Allied Telesis
   2. Nortel
   3. Cisco Systems
   4. Hubbell Premise
   5. Panduit

H. Data Distribution Panel(s) and Signal Processing Rack(s)
   1. The System shall utilize central panel(s) for patching and distribution. The Panel(s) shall be surface wall mounted and completely wired internally. Design and configuration as shown in the Drawings.
   2. Patch panel(s) shall include sufficient patching for all network receptacles, plus six (6) spare receptacles.
   3. The Panel(s) shall be 19" equipment mounting rack(s) with a hinged front door. Panel shall include hinged “swing-away” mounting for rear access.
   4. The Panel(s) shall include wire management panel(s) as manufactured by Panduit or approved equal.
   5. All wires shall be permanently identified at the jacket at each end per Division 26 requirements.
   6. Each port in patch panels shall be labeled in a logical order with the name of the connected device as indicated in the Drawings.
   7. The Panel(s) shall include UPS protection and surge protection for all devices requiring a power source - Best Devices or approved equal.

2.12 DISTRIBUTED DMX DRIVER

A. The Control Interface Rack shall include an optically isolated distribution device capable of providing discrete DMX512 signals. The device(s) shall be rack-mounted and provide discrete DMX control lines to the indicated Control Receptacle Panels and to the dimmer racks.

B. All wires shall be identified at the jacket with separate numbers.

C. The device(s) shall use a dedicated multiplexed signal conforming to the ANSI E1.11 – 2008 (R2013) DMX512-A standard.

D. The device(s) shall provide one discrete output for each DMX output receptacle in the system plus four (4) spare outputs. Provide terminals for the connection of all DMX wiring.

E. Manufacturer: Pathway Connectivity or approved equal.

F. Install in the Signal Processing Rack.

2.13 0-10V CONTROL GATEWAY

A. General
   1. The lighting control gateway shall be a microprocessor-based unit specifically designed to provide 0-10V control for lighting systems. The gateway shall permit DMX-512 and Ethernet Data to be received and converted to 0-10V control outputs.
   2. Gateways shall communicate over DMX and Ethernet to the Theatre Lighting Control System.
   3. The gateway shall support an input for use in Emergency Systems
   4. The gateway shall be NRTL Listed, RoHS Compliant, and CE compliant.
   5. The gateway shall have a backlit display for identification (soft-labeling), status reporting and configuration.
      a. Labeling shall be user configurable using ANSI E1.17 Architecture for Control Network (ACN), or a purpose built software configuration tool.
      b. The display shall show gateway configuration and indicate the current input and output levels.
   6. Each gateway shall have power and network activity indicators on the front of the gateway

B. Processor
   1. Maximum delay time from input to output shall not be greater than one packet time (approximately 22 mSec.).
   2. A minimum DMX update rate of 40Hz shall be sustained under all conditions unless specifically configured for a slower rate for the sake of compatibility with DMX devices.

C. Electrical
   1. The gateway shall provide a minimum of (24) 0-10V outputs.
   2. Each supporting voltage source or sink
   3. Each output shall have a 50mA maximum current
   4. DMX Ports
      a. DMX Ports shall comply with the requirements of ANSI E1.11 USITT DMX512-A standards.
      b. DMX input shall be optically-isolated from the gateway electronics.
      c. DMX output shall be earth-ground referenced.
      d. DMX Port shall be capable of withstanding fault voltages of up to 250VAC without damage.
   5. Power shall be provided by a low-voltage DC power input utilizing an isolated in-line power supply capable of an operating range of between 18-28vDC.
   6. The Input for Emergency Systems shall support:
      a. A dry contact input shall provide triggering of an emergency condition
      b. A three-position switch shall set the input as Normally Open (NO) Normally Closed (NC), or Off
   7. All relevant configuration information shall be stored in non-volatile memory at each gateway. The system shall recover from a power outage without requiring reconfiguration.

D. Acceptable products:
   1. Electronic Theatre Controls: Response 0-10V Gateway
   2. Approved equal

2.14 RECEPTACLE AND WIRING DEVICES AND ACCESSORIES

A. General Requirements
   1. Each electrical device shall be approved by a Nationally Recognized Testing Laboratory (NRTL), shall be currently listed by NRTL and shall, when furnished and installed, bear a factory affixed NRTL label.
   2. All steel parts and panels shall be cleaned and primed with rust-inhibiting primer. Exterior finishes shall be epoxy resin or baked enamel anodized in matte black, on in Manufacturer's standard color where not specified
   3. All device number and letter labeling shall be provided with matching character fonts.

4. 20-ampere pigtails shall be 12-3 type S cord, length per Drawings, secured by cushioned strain reliefs or nylon "Heyco" bushings.
5. 50-ampere pigtails shall be 6-3 type S cord, length per Drawings, secured by cushioned strain reliefs or nylon "Heyco" bushings.
6. Connectors for circuits other than standard 20-amp stage circuits shall have covers that correspond to the label color.
7. Device labeling
   a. Plug Strips circuit numbers shall be painted onto both sides of the wireway in letters not less than 1-1/2 inches high, using white epoxy paint for standard 20-amp stage circuit numbers and epoxy paint, color as noted, for all other numbers per the Drawings.
   b. Circuit numbers on all other devices shall be engraved into the face plate in letters not less than one inch high and filled with white epoxy paint for standard stage circuit numbers and epoxy paint, color as noted, for all other numbers per the Drawings.
8. All multi-pin receptacles shall include a removable threaded cover with retaining chain.
9. Receptacle configuration as shown in the Drawings.
10. Exterior finish shall be flat black baked enamel (for steel) or black anodized (for aluminum) unless noted otherwise.
11. Devices with multiple voltages shall provide continuous voltage barriers separating each voltage. Device shall also bear a warning label indicating multiple power sources are supplied to the device. Device shall also bear a warning label indicating multiple power sources are supplied to the device.
12. All components requiring external electrical connections of more than eight (8) conductors shall include barrier-type terminal strips properly sized and permanently labeled. For drop boxes the terminal strips shall be sized to accept a range of wire from #10 to #12. For all other devices the terminal strips shall be sized to accept a range of wire from #12 to #6.
13. Provide woven wire supports on all devices connected to portable cable (SO) including, but not limited to gridiron junction boxes, batten-mounted plug strips, border lights, and hanging plug boxes. Woven wire supports installed in gridiron junction boxes shall be installed in the bottom of the box, rather than the side.

B. Plug strips
1. Plug strips shall be mounted as shown in the Drawings and constructed of 18 gauge steel or extruded aluminum.
2. Overall construction of wireway and associated terminal block shall not exceed twenty-four (24) inches in height.
3. Mounting brackets shall be constructed of min. 1-1/2" wide 7-gauge steel, as shown in the Drawings. Provide sufficient mounting brackets to support plug strips min. 5'-0" O. C., plus additional mounting brackets as required for specific conditions.
4. Stage pin connectors when used on pig tails shall be equal to Union 2P&G with clear covers except where otherwise noted.
5. Circuit numbers to be applied in bright yellow, 2" high format at each receptacle in non-removable permanent fashion.
6. Plug strips shall be shipped as folded segments for ease of installation. Maximum segment length shall be 8’-0”.

C. Plug boxes
1. Plug boxes shall be constructed of 16-gauge steel or extruded aluminum. Knockouts shall be provided on all sides of the back box.

D. Floor pockets
   1. Floor pockets shall be flush floor mounted, with a hinged access cover. Cover plate shall be 3/8" thick cast iron, with cast-in non-skid gridding in the top and at least one cable notch for each receptacle. The back box shall be constructed of 20-gauge steel, with knockouts provided in the bottom and on all sides. Receptacles shall be mounted on a 20-gauge steel plate angled for visibility and access.
   2. Provide a dust flap for each faceplate. Dust flap shall be min. 1/8" sheet neoprene, commercial grade. Flap shall be sized to completely cover all receptacles, shall be permanently attached to the top of the faceplate, and shall be slit once between each receptacle. Dust flap shall be designed and constructed to protect the receptacles from dust when not in use and to be peeled back to allow a cord to be plugged into a receptacle. Paint circuit numbers onto dust flap segments in letters not less than 1 inch high.

E. Drop boxes
   1. Drop boxes shall be portable, entirely enclosed, and constructed of 16-gauge steel or extruded aluminum. End plates shall be filleted to prevent any sharp edges. The bottom shall contain two C-clamps and one load rated eyebolt with 11/16” i.d. eye for attachment to pipe batten. The offstage side shall contain "Kellems" type mesh grips to support the entrance of the multi-conductor cable.

F. Gridiron junction boxes
   1. Gridiron junction boxes shall be constructed of 20-gauge steel.
   2. Exterior finish shall include safety yellow stripes.
   3. Access shall be by means of a removable cover plate. Knockouts shall be provided in all sides for contractor wiring and multi-conductor cables.
   4. Each flexible cable entry shall have a "Kellems" type mesh grip attached to the box.

G. Multi-conductor cables
   1. Cables shall be rated at 600 volts, minimum 90 degrees Celsius, with two (2) conductors for each 20-ampere circuit required plus one grounding conductor for every three (3) circuits.
   2. Permanently installed cables shall be cord type SC or SO.
   3. Portable cables shall be cord type SC.
      a. Approved Manufacturers:
         i. “Pro Cable” as manufactured by TMB, Burbank, CA.
         ii. “PowerFlex” as manufactured by LEX Products, Stamford, CT.
         iii. Coast Entertainment, a division of Coast Wire & Plastic Tech, Inc., Carson, CA
         iv. or approved equal.
   4. Wire size shall be minimum #12 AWG, or larger as code requirements dictate.
   5. Sizes and lengths as indicated in the Drawings and schedules.

H. Cable clamps
   1. Cable clamps shall hold multi-conductor cables at the batten, before they enter the plug strip and as otherwise shown in the Drawings.
   2. Provide and install one (1) per multi-conductor cable per plug strip.

I. Locations, quantities, sizes and circuits as shown in the Drawings.

J. Install as shown in the Drawings.

2.15 STAGE LIGHTING CONNECTORS

A. Twist-lock
   1. 20-Ampere devices
      a. Connectors shall be 20 ampere, 2 wire plus ground, locking, with nylon bodies and casings, and integral cable clamp. Configuration shall be NEMA L5-20.
      b. The following manufacturer's devices shall be acceptable:
         i. Hubbell
         ii. Leviton
   2. 30-Ampere devices
      a. Connectors shall be 30 ampere, 2 wire plus ground, locking, with nylon bodies and casings, and integral cable clamp. Configuration shall be NEMA L5-30
      b. The following manufacturer's devices shall be acceptable:
         i. Hubbell
         ii. Leviton
   3. 20-Ampere 208V devices
      a. Connectors shall be 20 ampere, 2 wire plus ground, locking, with nylon bodies and casings, and integral cable clamp. Configuration shall be NEMA L6-20.
      b. The following manufacturer's devices shall be acceptable:
         i. Hubbell
         ii. Leviton

B. Edison
   1. 20 Ampere device
      a. Connectors shall be 20 ampere 2 wire plus ground with nylon bodies and casings, and integral cable clamp. Configuration shall be U ground NEMA 5-20.
      b. Connectors shall be of commercial grade or better.
      c. The following manufacturer's devices shall be acceptable.
         i. Hubbell
         ii. Leviton

C. PowerCon devices
   1. A locking 3-conductor equipment AC connector with contacts for line, neutral and pre-mating ground contact.
   2. Power In devices shall be Blue
   3. Power-Out devices shall be Grey.
   4. The following manufacturer's devices shall be acceptable:
      a. Neutrik "powerCON"
      b. Approved Equals

D. PowerCON TRUE1-TOP
   1. A locking 3-conductor equipment AC connector with contacts for line, neutral, and ground.
   2. NRTL rated for 20-amps, 250VAC.
   3. Accepts SOOW 14-12 AWG wire size.
   4. Designed to be engaged and disengaged in normal use under load.
   5. Certified IP65 rating while mated.
   6. Constructed of high impact, UV resistant materials.
   7. The following manufacturer's devices shall be acceptable:
      a. Neutrik "powerCON TRUE1 TOP"
      b. Approved Equals

E. 20-ampere 6-circuit multi-pin
   1. A threaded coupling 19-pin cylindrical connector for theatrical lighting applications
   2. All multi-conductor connectors shall be wired in accordance with the recommended practice RP-1 as published by the U. S. Institute for Theatre Technology.
   3. The following manufacturer's devices shall be acceptable:
      a. Veam
      b. Socapex
      c. LEX Products
   4. All products shall be compatible with Socapex 419 Series connectors.

F. Single pole locking connectors
   1. Connectors shall be 400 ampere, single wire, locking with Thermoplastic Elastomer casing, with nylon retaining screw. Body shall be brass with double set screw termination. Configuration shall be compliant with UL 1691.
   2. Connectors shall accept wire sizes from #6 Awg to 4/0 Awg.
   3. Acceptable Products:
      a. Hubbell Single Pole Devices
      b. Crouse-Hinds Cam-Lok
      c. Leviton Rhino-Hide

G. Quantities per Drawings & Schedules.

2.16 ELECTRICAL CABLE MANAGEMENT

A. Stage lighting contractor shall furnish the required components for electrical cable management as indicated in the drawings. Coordinate the installation of cable management assemblies with Division 26, Section 116113, and Section 116133.

B. Pantograph
   1. The pantograph shall provide permanent electrical connections for circuits as shown in the Drawings.
   2. The pantograph assembly shall consist of extruded aluminum wire way segments joined by robust hinged connections.
   3. Assembly shall operate without causing lateral movement of the associated rigging element.
   4. Hinges shall be sized to maintain the required electrical cable bending radius while not damaging the cable.
   5. Segments shall be sized in cross section to carry the required quantity and size of power and data cables with internal voltage barriers as required.
   6. The length of each segment shall be based on the distance between rigging pick up cables and maximum actual travel to minimize the total number of segments.
   7. The assembly shall have an electrostatic paint finish in black.
   8. Festoon cable for non-data wiring shall be annealed stranded bare copper insulated with flame-retardant Polyvinyl Chloride (PVC) and provided in the required number of conductors and wire sizes per Division 26.
   9. Data wiring shall comply with requirements as outlined in this Section and shall be able to meet the bending requirements imposed on it by this assembly.
   10. Units shall contain electrically insulated, adjustable strain relief devices to hold all cable securely in place.
   11. The pantograph shall be installed between rigging lift lines and in such as way as to prevent electrical cables from fouling with other hoisting components or mechanism.
   12. A horizontal movement compensation trolley track shall be provided.
      a. One (1) trolley and mounting bracket shall be provided to attach extruded aluminum wire way segment to track.
      b. One (1) trolley and bracket shall be provided to manage excess cable between segments and electrical connection point.
      c. Two (2) end stop plates to be provided to prevent the trolley from exiting the track.
   13. Warranty shall be for a minimum of three (3) years

14. Approved Manufacturers:
    a. J. R. Clancy
    b. SSRC
    c. Approved Equal
15. Quantity: As shown on drawings.

2.17 EMERGENCY BYPASS DETECTION (EBDK)

A. The Enclosure shall be a surface mounted, constructed of 16-guage formed steel panels removable front cover finished in fine textured, scratch-resistant, powder coat paint.

B. Accessories for installation, including tap kits and manual reset switch kits shall be available from a single manufacturer.

C. Emergency Bypass Detection enclosures shall support 100 to 277-volt configurations. EBDK enclosures shall be field configurable for single-phase, bi-phase, and three-phase operation without the need for additional components.

D. The Emergency Bypass Detection Kit shall be completely pre-wired by the manufacturer. The contractor shall provide input feed and control wiring.

E. All control wire connections shall be terminated via factory provided connectors.

F. The Bypass Detection Kit shall be UL-924 Listed for interaction with similarly listed dimming and switching panels.

G. The EBDK shall be fully compatible with other equipment furnished under this Section.

H. Approved Products:
    1. ETC: Emergency Bypass Detection Kit
    2. Vari*Lite: Phase Loss Sense Panel

I. Refer to E series drawings for quantity and location.

J. Furnish to Division 26 contractor for installation.

2.18 BRANCH CIRCUIT EMERGENCY TRANSFER SWITCH (BCELTS)

A. The BCELTS shall provide automatic transfer of a single branch 120V circuit from normal to emergency power source, when normal power fails.

B. The BCELTS shall transfer a lighting load branch circuit from a relay to a second power source in the event of a loss of power to the primary power source, a normal system failure, or activation of a fire alarm.

C. The system shall be listed under ANSI / UL1008 Transfer Switch Equipment and comply with ANSI / NFPA 110 Standard for Emergency and Standby Power Systems, and ANSI / NFPA 70 (NEC), including Article 700, 701 and 702 safety standards.

D. The switch shall be positively latched and unaffected by voltage variations or momentary outages so that constant contact pressure is maintained, and temperature rise at the contacts is minimized. The switch shall be electrically interlocked to ensure only one position, either Normal or Emergency, is engaged at any time. The switch shall be break-before-make to ensure that normal and emergency sources are never interconnected within the unit. Built-in fuses shall provide 10,000 Ampere Short Circuit Current Rating (SCCR) on the connected emergency circuit. Switch contacts shall withstand transfer without welding, with 180º phase displacement between normal and emergency power sources if both sources are energized. Transfer switch contacts shall be rated for mixed loads.

E. Furnish per E series drawings.

2.19 DMX EMERGENCY BYPASS CONTROL

A. Where required to trigger special-purpose lighting presets and bypass normal lighting controls during emergency or panic situations, a DMX Emergency Bypass Controller (DEBC) shall be provided.

B. Functional
   1. The DMX Emergency Bypass Controller shall be capable of overriding a single universe of ANSI E1.11–2008, USITT DMX512-A control signals from “Normal” to “Bypass” when a trigger signal is detected via a two-pin trigger input.
      a. The DMX Emergency Bypass Controller shall poll the bypass trigger input after a power loss and react upon start up.
      b. The default or recorded sequence shall be recalled immediately on restart if the trigger is also applied at restart
   2. The DMX Emergency Bypass Controller shall be capable of recording a single DMX preset (snapshot) of 512 channels for recall during “Bypass” mode.
   3. The DMX Emergency Bypass Controller shall output to up to six optically isolated DMX lines.
   4. The DMX Emergency Bypass Controller shall be UL-924 Listed for interaction with similarly listed products.
   5. The DEBC shall be fully compatible with the control system provided under this Section.

C. Approved Products:
   1. ETC: DMX Emergency Bypass Controller
   2. Vari*Lite: Emergency DMX Bypass Switch

D. Refer to E series drawings for quantity and location.

E. Furnish to Division 26 contractor for installation.

2.20 WORK LIGHT FIXTURE

A. Uniform wide beam fixture with high temperature housing and lens. Integral electronic driver shall be auto ranging 120V-277V, 50/60 Hz, minimum 40,000-hour lamp life. Fixture shall be convection cooled. Housing to be black.

B. Dimmable LED, 3,000 degrees Kelvin, beam angle shall be 60° to 120°.
   1. 90W, 14,000 lumens, 3000 degrees Kelvin
   2. 80W, 11,600 lumens, 3000 degrees Kelvin
   3. 150W, 21,000 lumens, 3000 degrees Kelvin
   4. 200W, 28,000 lumens, 3000 degrees Kelvin

C. Install 3' power cord with L5-20 twist lock plug. Mount fixture with Leviton TA0CC-000 C-clamp or equal. Provide black safety cable.

D. Approved fixture:
   1. Altman LED Work Light II, 90W, 3000K
   2. Times Square WL80, 3000K
   3. SSRC WL-LED-200-W
   4. SSRC WL-LED-150-W
   5. Approved equal

E. Quantity: Auditorium – 9 work light assemblies.

2.21 APRON EDGE MARKER LIGHTING SYSTEM

A. Low profile extrusion housing capable of supporting up to 200# point loads. Extrusion shall be no larger than ¾” wide by ½” deep.

B. Sources shall be low voltage LEDs.

C. 120v AC power supply with manual intensity control.

D. One circuit on controlled via lighting network touchscreen(s):
   1. One circuit on apron edge

E. Angled red LED lights shall be visible to stage performers but not visible to audience. Configure as shown on drawings. Centerline and quarter-mark LEDs blue.

F. Approved Product:
   1. Edgelyte by Future Light
   2. Stage Edge Light by Tivoli Lighting
   3. Acceptable substitution

2.22 COMPANY SWITCHES

A. Provide Theatrical System company switches as described herein and as shown on Electrical Drawings.

B. Company switch configuration shall be 120/208V, 60A to 400A, 3-phase, 5-wire, as noted on Electrical Drawings. Switches rated 200A or greater shall have double neutrals.

C. 200A and 400A switches
   1. Provide 100% rated, 3-pole, Main Circuit Breaker with minimum AIC rating of 65,000A.
   2. 3-phase, 120/208 VAC company switch assemblies shall be provided with connectors by Cam-Lok, Leviton or equal, compatible with industry standard Cam-Lok E1016 devices, six connectors, including neutrals.
   3. All connections from Main Circuit Breaker to output panel shall be by copper bus.
   4. All internal, non-current carrying metal parts shall be grounded to main cassis frame.
   5. Enclosure
      a. Should meet or exceed all applicable NEC standards and shall be listed by a Nationally Recognized Testing Laboratory (NRTL).
      b. Shall be of no less than 14 gauge steel with 4 welded mounting tabs.
   6. Provide a front door panel to protect circuit breaker controls. Circuit breaker shall be protected from accidental operation. Breaker shall be equipped with a padlock attachment to lock the handle in the off position when not in use.
   7. Access door shall contain a shunt-trip mechanism that is engaged when door is not fully closed so that no connections can be made or broken under load. This access door shall include a keyed locking handle. Provide a continuous piano hinge with a stainless steel pin for access door.
   8. Internal connections shall accept up to 500mcm wire.
   9. Ground shall not be connected to frame.
   10. Unit shall provide strain relief for securing cable in connection chamber. All temporary power connections shall be from below.
   11. Indicator lights shall be provided for each supply phase and ground. Lights shall be color-coded and labeled with alphabetic name, per NEC standards.
   12. Label according to application.
   13. Maximum dimensions: 40” H x 24” W x 10” D
   14. Manufacturers:
      a. ESL Power Systems Show Switch
      b. Lex Products Corp. CS-XXXF-C6DS1
      c. ETC PowerSafe

D. 60A and 100A switches:
   1. 3-phase, 120/208VAC 4-pole, 5-wire company switch assemblies shall be provided with connectors compatible with industry standard pin and sleeve devices.
   2. Enclosure
      a. Should meet or exceed all applicable NEC standards and shall be listed by a Nationally Recognized Testing Laboratory (NRTL).
   3. Switch shall contain unfused pin and sleeve mechanical interlock receptacle with safety disconnect. Mechanical interlock shall prevent connection or disconnection from occurring in while disconnect is in “on” position.

4. Maximum dimensions TBD.
5. Label according to application.
6. Manufacturers:
    a. ESL Power Systems Pin & Sleeve Company Switch
    b. Hubbell
    c. Leviton
    d. Approved Equal

2.23 CONSOLE TABLE

A. Provide a table for the lighting console with the following features:
1. Desk top 5’-0” long by 2’-8” wide
2. Two (2) removable front access panels
3. One (1) removable rear access panel
4. Provide with 4-memory programmable controller.
    a. Controller shall provide minimum of 4 user programable presets and display the desktop elevation.
5. Provide with Freeport power strip.
    a. Eight 15-amp receptacles
    b. Two USB charging ports
    c. On/Off power switch
6. Desktop and panel finish: Per Architect
7. Anodized aluminum tambours (rolltop) with industrial grade locking system
8. Frame:
    a. Powered height adjustment
        i. Adjustable in height from 25” to 36”.
    b. Minimum load capacity 225 pounds evenly distributed.
9. Warranty shall be for 1 year.
10. Approved Manufacturer:
    a. HAS – Ascension Series 1860-D
    b. Acceptable substitution
11. Quantity:
    a. Auditorium: 2

PART 3 EXECUTION

3.01 GENERAL

A. Install all items of the stage lighting and dimming system where indicated and completely connect, wire, and make operative as specified.

B. Isolate cables carrying signals at different levels to restrict control interference. Separate wiring into conduits for low-level analog and digital and optical control, power circuits up to 50 amps each, and feeder services to dimmer banks. Exercise care in wiring to avoid damage to cables and equipment.

C. Make all digital control circuits, wiring, and connections with shielded cable and connectors. Terminate shields properly to prevent and guard against electromagnetic and electrostatic noise.

D. Equipment racks and portable equipment to be wired in a neat manner with care taken to provide for future serviceability and expansion. No loose or randomly routed wires shall be permitted.

E. Each outlet box shall be provided with connector shown on drawing or as specified. Each receptacle circuit number shall be clear coated after application to prevent removal. Orient the number in an upright position easily seen by operating personnel.

F. All lamicoid labels shall be permanently attached in a neat and plumb manner (i.e., glue and screws). Double-sided adhesive tape will not be accepted.

G. Letters on pushbutton switches shall be engraved and filled with contrasting paint (on translucent lenses).

H. Each stage circuit shall have one load and one neutral connector. All unused wire shall be terminated in an approved manner at a junction box terminal strip for future expansion.

I. All circuits, which are disconnected during the construction period, shall be reconnected to insure that all equipment is in proper working order at end of construction period.

J. Coordinate location of all devices installed over the stage and wings with Section 116133 work.

K. Protect all portable cables (Type SO cables) from kinks, abrasion and binding. Support both ends of portable cables with strain relief devices as specified herein. Make top connection of cable then allow the cable to hang free for a minimum of four days prior to bottom connection or rigging to prevent cable twisting.

L. Install work light fixtures at owner's direction.

M. Install dimmer rack using resilient pads as specified herein. No portion of the dimmer rack shall contact any part of the building structure or walls except through resilient connections specifically approved by the Architect. All load, feed, and control conduit connections to the dimmer racks shall be isolated through the use of deflection fittings, Type DF as manufactured by Appleton Electric, or approved equal.

N. Assemble and move console tables to control booth.

O. Terminate control wire from architectural fixtures controlled by this Section in appropriate devices at the Signal Processing Rack.

P. Address and make fully operational all lighting network devices. Coordinate addressing of light fixtures controlled under this Section with Division 26.

Q. Program preset and master stations per direction of the Architect, Consultant, and Owner.

3.02 MANUFACTURER'S RESPONSIBILITY

A. An authorized representative of the manufacturer of the stage lighting and dimming system equipment shall be required to visit the project during construction and after completion to check installation of each system of stage and house lighting dimming equipment.

B. Systems will not be turned on or rendered active in any way until approved by representative of manufacturer who shall be present when systems are activated.

3.03 INSTRUCTION OF OWNER PERSONNEL

A. Contractor or manufacturer's representative, fully knowledgeable and qualified in operation of the installed system, shall provide a total of eight (8) hours of instruction to Owner-designated personnel on the safe operation, servicing, care, and maintenance of these systems. Training times may not be continuous, however, manufacturer shall not be required to conduct more than two separate training sessions. Instruction times shall be arranged through the Owner.

B. Instruction shall be scheduled in conformance with test and instruction schedules, and availability of Owner, staff, Architect, Architect's Consultant, and their representatives. While it may be possible to schedule the instruction session(s) to coincide with the final observation, such coincidence shall not be assumed.

C. The Architect and other representatives may be present or represented.

D. The same Contractor's representative shall be present at the first formal use of the Stage Lighting and Dimming System to further instruct Owner personnel in operation.

E. Completion of staff instruction shall be verified, in writing, with the signature of an authorized Owner's Representative within 5 business days of completion. Copies will be given to the Owner, the General Contractor, the Architect and the Consultant.

3.04 ACCEPTANCE BY OWNER

A. Contractor will request acceptance testing by the Architect's Consultant when the system is substantially complete.

B. Acceptance testing will include operation of each major system and all other components deemed necessary. Contractor will the assist as necessary in this testing, and will provide test equipment and personnel as required.

C. In the event the need for further adjustment or work becomes evident during acceptance testing, the Contractor will continue his work until system is acceptable at no addition to the contract price. If approval is delayed because of defective equipment or failure of equipment or installation to meet the requirements of these specifications, the Contractor will pay for any additional time and expenses of the Architect's Consultant during any extension of the acceptance testing period.

3.05 CLEANING OF THE SITE AND EQUIPMENT

A. Remove from the site all rubbish, trash, discarded packing materials, cartons, and other debris caused by daily operations. Upon completion of work, the entire area of work by this Contractor shall be left in broom clean condition.

B. Clean any racks, floor pockets, panels, and similar devices that may have accumulated dust and debris during work.

END OF SECTION

SECTION 12 36 00
COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Countertops for architectural cabinet work.

B. Wall-hung counters and vanity tops.

1.02 RELATED REQUIREMENTS

A. Section 06 41 00 - Architectural Wood Casework.

1.03 REFERENCE STANDARDS

A. ANSI A208.2 - Medium Density Fiberboard (MDF) for Interior Applications; 2022.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026a.

C. ISFA 3-01 - Classification and Standards for Quartz Surfacing Material; 2013.

D. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

E. NSI (DSDM) - Dimensional Stone Design Manual, Version VIII; 2016.

F. PS 1 - Structural Plywood; 2023.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Specimen warranty.

C. Shop Drawings: Complete details of materials and installation ; combine with shop drawings of cabinets and casework specified in other sections.

D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, minimum size 6 inches square, representing actual product, color, and patterns.

F. Test Reports: Chemical resistance testing, showing compliance with specified requirements.

G. Installation Instructions: Manufacturer's installation instructions and recommendations.

H. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.05 QUALITY ASSURANCE

A. Fabricator: Same fabricator as for cabinets on which tops are to be installed.

B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 COUNTERTOPS

A. Quartz Countertops: Sheet or slab of natural quartz and plastic resin over continuous substrate.
   1. Flat Sheet Thickness: 1-1/4 inch, minimum.
   2. Natural Quartz and Resin Composite Sheets, Slabs and Castings: Complying with ISFA 3-01 and NEMA LD 3; orthophthalic polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard stone fabrication tools; no surface coating; color and pattern consistent throughout thickness.
      a. Manufacturers:
         1) Wilsonart: www.wilsonart.com/#sle.
         2) Substitutions: Not permitted.
      b. Factory fabricate components to the greatest extent practical in sizes and shapes indicated; comply with NSI (DSDM).
      c. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
      d. Color and Pattern: As indicated on drawings.

2.02 MATERIALS

A. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.

B. Medium Density Fiberboard for Supporting Substrate: ANSI A208.2.

C. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.

D. Joint Sealant: Mildew-resistant silicone sealant, clear.

2.03 FABRICATION

A. Fabricate in accordance with standards governing fabrication quality that are specified in Section 06 41 00.

B. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
   1. Join lengths of tops using best method recommended by manufacturer.
   2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
   3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.

C. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
   1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
   2. Height: 4 inches, unless otherwise indicated.

D. Solid Surfacing: Fabricate tops and wall panels up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.

E. Wall-Mounted Counters: Provide skirts, aprons, brackets, and braces as indicated on drawings, finished to match.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect Engineer of unsatisfactory preparation before proceeding.

C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.

B. Attach plastic laminate countertops using screws with minimum penetration into substrate board of 5/8 inch.

C. Seal joint between back/end splashes and vertical surfaces.

3.04 TOLERANCES

A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.

B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.

C. Field Joints: 1/8 inch wide, maximum.

3.05 CLEANING

A. Clean countertops surfaces thoroughly.

3.06 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 12 61 00
FIXED AUDIENCE SEATING

PART 1 GENERAL

1.01 WORK INCLUDED IN THIS SECTION:

A. Provision of cushioned floor-mounted or riser-mounted fixed auditorium seating including attachment, or other work required for installation unless otherwise noted.

1.02 REFERENCE STANDARDS

A. BIFMA X5.4 - Public and Lounge Seating; 2020.

B. UL 94 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances; Current Edition, Including All Revisions.

C. UL 746C - Polymeric Materials – Use in Electrical Equipment Evaluations; Current Edition, Including All Revisions.

1.03 RELATED SECTIONS

A. Section 26 00 00: Electrical.

B. Floor mounting anchors are provided as specified with every order.

C. Data/Communications cabling and jacks not included.

1.04 SUBMITTALS

A. Product Data including manufacturer’s assembly instructions.

B. Code Requirements - Compliance with the required local and national building and safety codes is the sole responsibility of the Owner/Architect/Contractor. Shop drawings are based on code requirements for assembly seating as found in IBC (International Building Code). Code information above is offered for informational purposes only and strictly as a courtesy to the Owner/Architect/Contractor.

C. Field Verification - Shop drawings incorporate building information compiled from various sources associated with this project and deemed as reliable. Conditions directly affecting the product or its installation must be field verified.

D. Drawing Review - Shop drawings are produced to assure compliance with the contract. Drawings must be reviewed by the Owner/Architect/Contractor, or other appropriate owner's representative. If drawings are correct, mark them as such; if incorrect, note corrections to be made and return to Architect for corrections. Any deviations from the contract included in the shop drawing must be approved in writing from the Owner/Architect/Contractor. Drawing must be signed by authorized personnel including title, company or affiliation, and date. When power is specified, all locations of electrical and data infeeds must be verified and approved by a signature on the drawings by the responsible party. Manufacture of product shown is not scheduled until drawing review is complete and an authorized signature is received.

1.05 DELIVERY, STORAGE, AND HANDLING

A. tore delivered in clean, safe, dry area.

1.06 SCHEDULING

A. Schedule installation of items to occur after application of exposed finishes wherever installation will not damage exposed finish surfaces and completion of finishes will not impede installation.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturer Basis of Design:
   1. Lancaster Auditorium Seating is manufactured by KI, Bonduel, WI.

B. Alternates or substitutes not accepted. “As Equal” products must be approved as meeting specification.

2.02 DESCRIPTION

A. Seating is available floor-mounted or riser-mounted, with common upright support assemblies and upholstered seat and back cushions. The fixed back accommodates three pitch positions at 16°, 19°, and 22°. The back cushion is protected by an injection-molded polypropylene back shroud. The seat cushion is counter-balanced with a gravity-lift to ensure an automatic return to a full fold position. Sloped floors will be accommodated (up to 9° slope).

2.03 PRODUCT BENEFITS:

A. Gravity-lift seat return maintains constant seat return.

B. Five nominal seat-spacing widths are available for comfort and sight lines (20", 21”, 22”, 23”, 24").

C. 33.5" back height provides upper back support in addition to lumbar support.

D. Polypropylene seat and back shrouds provide maximum strength and durability. Optional wood back panels enhance aesthetics.

E. One-motion tablet arms provide safety and ease in exiting.

F. Power & Data or Power & USB module and distribution system provides convenient Power & Data or Power & USB access directly underneath the armcap for laptop users. All wiring is enclosed in tamper-resistant shrouds. Power & Data or Power & USB systems are retrofittable at a later date if needed.

G. Powder-coated frames provide maximum durability.

2.04 CONSTRUCTION

A. Seating will be manufactured in three seat- and back-widths to accommodate five nominal seat-spacings of 20", 21”, 22", 23” and 24" seat-centers. Sight lines will be accommodated as indicated on the seating plans. Seating with left- or right-hand tablet arms will be manufactured to accommodate 20", 21”, 22", 23 and 24" seat center spacings.

B. Back Cushion Assembly

1. Structural back consists of a 7-ply, 7/16" molded plywood inner structure bonded within 2" urethane foam. Foam density is 1.8 lb per cubic foot and 36 lb I.F.D. The upholstery fabric is bonded to the foam and attached through C-Gex® upholstery methods. An injection-molded polypropylene back shroud wraps around the edge of the inner structure board and the foam. The fixed back assembly with integral shroud is mounted to the uprights by four screws bolted through the structural 14-gauge steel inner back brackets. Three pitch options are available, 16°, 19° and 22°, to be set during installation. Overall back height is 33.5”.
2. An optional wood back panel is designed to be 3/8” thick with Gum veneer core and 1/16” Maple veneer faces. Outer face of veneer back panel is grade A veneer. The back panel will attach to the inner structure board and the foam with hidden keyhole slot brackets and 1/4-20 x 1-1/4” Torx screws. The wood back panel assembly attaches to the uprights by four screws bolted through the structural 14-gauge steel back brackets. The wood back extends above the upholstered foam cushion by approximately 1/2” thereby protecting the fabric, and extends below the seat at the bottom to protect the seat cushion. Wood back panels are not available for use with Power & Data or Power & USB. Wood backs are available in stain finishes according to standard color offering.
3. An optional high wood back panel will be 1/2” thick with Gum veneer core and 1/16” Maple veneer faces. Outer face of wood back panel is grade A veneer. The back panel attaches to the inner structure board

4. and the foam with hidden keyhole slot brackets and 1/4-20 x 1-1/4” Torx screws. The wood back panel assembly attaches to the uprights by four screws bolted through the structural 14-gauge steel back brackets. The wood back extends above the upholstered foam cushion by approximately 1/2” thereby protecting the fabric, and extends below the seat at the bottom to protect the seat cushion. Wood back panels are not available for use with Power & Data or Power & USB options. Wood backs are available in stain finishes according to standard color offering. Overall back height is 38”.
5. Note: Natural wood and wood veneers may have variations in pattern, grain, and coloring that can produce inconsistencies in the finished product. The inconsistencies may show up as dark patches or lines, color variations between light and dark, and various grain patterns. These variations are normal and cannot be avoided.

C. Seat Cushion Assembly
1. The seat assembly is constructed of an inner structure consisting of 14-gauge steel ring spanned with UltraFlex elastic webbing, covered with 3” molded urethane foam cushion. Foam density is 3.0 lb per cubic foot and 35 lb I.F.D. The upholstery fabric will be placed around the seat foam and stapled to a molded plastic upholstery board. The bottom is covered by an injection-molded polypropylene seat shroud. All pivoting and positioning are accomplished within the seat cushion assembly, thereby eliminating all pinch points.
2. An optional acoustical seat shroud consists of an injection-molded polypropylene seat shroud with 0.50” diameter holes spaced 1” apart on the center, flat portion of the shroud. A polyether convoluted foam is placed between the inner structural board and the outer acoustical seat shroud for sound absorption. The foam is nominal 1/2” to 1” thick and “charcoal” in color. The NRC rating is .050.

D. Flammability Rating
1. Upholstered products are manufactured to meet TB 117-2013 flammability testing requirements. Products will be labeled to indicate if flame retardant chemicals are used in the fabrics and foam.
2. Products can be manufactured to meet TB-133 flammability testing requirements. Changes in materials may be made and restrictions placed on fabric selection and product options. Products manufactured with this option will be labeled accordingly.

E. Seat Pivot Assembly
1. Seat pivot will be an integral part of the seat assembly. The seat pivots on a 3/4” diameter steel tube using oil free, self-lubricating, plastic bearings, joined to the seat ring by die-formed 11-gauge steel housings.
2. Brackets made of 11-gauge formed steel and welded to the upright tubes support the seat assembly. Seat assembly is fastened to the upright brackets by 3/8” bolts. The seat return will be a gravity-lift which automatically returns the seat to a full fold position.

F. Uprights
1. Floor-mounted uprights are 14-gauge 1” x 3” rectangular steel column welded to an 11-gauge back plate with a 14-gauge steel top cap. The floor plate will be 14-gauge, 2.5” x 7.5” floor plate attached to the upright by a concealed weldment. Finish to be powder-coated according to standard color offerings.
2. Riser-mounted uprights are 14-gauge steel 1” x 3” rectangular steel column welded to an 11-gauge back plate with a 14-gauge steel top cap. The riser plate will be 3/16” steel, 4-3/4” x 5-1/4” plate welded to the upright. Finish to be powder-coat painted according to standard color offerings.

G. Armcap - Plastic
1. Each armcap is injection-molded engineering grade thermoplastic. Armcaps on uprights without tablets are 2-5/16” wide by 11-1/2” long and attach with four concealed screws. Armcaps on uprights with tablets are
2. 2-5/16” wide by 17” long and attach with six concealed screws. All plastic armcaps include an oval inset at the back of the armrest for optional row markers.

H. Armcap - Wood
   1. Optional machined wood armcaps on uprights without tablets are 25/16” wide by 111/2” long and attach with
   2. four concealed screws. Wood armcaps on uprights with tablets are 25/16” wide by 17” long and attach with six concealed screws. Wood armcaps can include pilot holes for the installation of optional row markers, when specified.
   3. Armcaps are mounted on a 14-gauge steel support. The 1” wide by 10” long support is welded to the upright by a concealed weldment.

I. Cupholder Armcap - Plastic
   1. Plastic Cupholder armcap is constructed of high-density polyethylene, 2" x 13-1/4" with a 3-3/4" diameter cupholder, molded into one integral unit. Will be sized to accept standard cup sizes and 12oz. cans with bottom element for support. Cannot be specified with tablet arms, Power & Data or Power & USB options.

J. Cupholder Armcap - Wood
   1. Wood cupholder armcap is constructed of White Oak or Maple wood, 4" x 14" with a 2.69" diameter cupholder, formed into one integral armcap unit. Will be sized to accept standard cup sizes and 12oz. cans. Cannot be specified with tablet arms, Power & Data or Power & USB options.

K. Tablet Arm
   1. Tablet is self-storing, gravity-activated, one-motion tablet arm, consisting of a storable writing surface constructed of a 0.59 inch thick Baltic Birch plywood core, with high-pressure laminate surface and a phenolic backing sheet undersurface, measuring 10” x 15-1/2” (131 sq. in.) capable of supporting a laptop computer. Overall tablet thickness is 5/8”. The tablet arm mechanism consists of a pivot arm, pivot mount bracket and support bracket constructed of 11-gauge steel with controlled 90° side-to-side rotation and 86° up-and-down rotation. Tablet arm will store between the seats, without interfering with the seat.

L. Aisle Light
   1. LED aisle lights are installed inside a molded plastic rectangular housing approximately 1” high by 3-3/8” wide that is mounted to the outside of an end panel, approximately 11-1/2” off the floor on flat floors.
   2. Wiring for the light feeds down through the upright tube and out the inside of the upright, near the foot plate. Aisle light wiring is hard wired to the building source by a certified electrician.
   3. A 12VDC class II power supply is required for the LED aisle lights. Provide two power supply options: A 30 watt transformer that can support a minimum of four aisle lights and a maximum of 112 aisle lights, and a 60 watt transformer that can support a minimum of eight aisle lights and maximum of 225 aisle lights. A 12VDC light dimmer, that works with both the 30 watt and 60 watt transformers, is available as well.
   4. Available with LED light tubes.
      a. LED Aisle Light
      b. Light Size = 3” long Candlepower
      c. Voltage = 12 VDC At floor, under light = 2.4 Current per lamp = 0.02 amps
      d. Lamps per aisle light = 3
      e. Power per aisle light = .24 watts
      f. LED Color Temperature = 6250k Cool White Operating lamp life = 40,000 hours
      g. Wire: 22-gauge, 2-conductor multi-strand copper, black jacket, copper+ and silver-, 72” long.

M. Decorative End Panels – Recommended for All Aisle Ends

1. Plastic end panel is injection-molded polypropylene, attached to the upright with one 14-gauge U-shaped bracket and four screws. Not available on Designated Aisle Seat (ADA Flip-up Arm).
2. Laminate end panel is 3/8" thick MDF particleboard core with .040” high-pressure laminate on both sides, attached to uprights with one 14-gauge bracket and four screws. Edges are finished to match powder-coat paint of upright.
3. Wood end panel is 0.59 inch thick Baltic Birch plywood core with veneer on both sides, stained to standard finish specifications. Edges are stained to match veneer faces.

N. Seat Numbers
1. Adhesive-backed elliptical shaped seat numbers, 0.78” tall by 1.18” wide, are available for application into elliptical shaped recesses on the front lips of the plastic seat shrouds. Adhesive-backed seat numbers are available in a Lexan film material in cool grey color, aluminum in silver color, or aluminum in gold color.

O. Row Markers for Plastic Armcaps
1. Adhesive-backed elliptical shaped row markers, 0.78” tall by 1.18” wide, are available for application into elliptical shaped recesses atop plastic arm caps. Adhesive-backed row markers for plastic armcaps are available in a Lexan film material in cool grey color, aluminum in silver color, or aluminum in gold color.

P. Row Markers for Wood Armcaps
1. Elliptical shaped row markers, 0.78” tall by 1.18” wide, are available for application atop wood
2. armcaps. When applicable, the wood armcaps will have two pilot holes for securing the row markers with two small brads. Row markers for wood armcaps are available in aluminum in silver color, or aluminum in gold color.

Q. Designated Aisle Seat - ADA Flip-Up Arm
1. Armcap support is hinged at rear to allow armrest to flip up, providing easy access for limited mobility occupants. Available with laminate or wood end panels and aisle lights. Includes row markers with ADA symbol to be mounted on the upright.

R. ADA Removable Units
1. Chairs requiring mobility for handicapped access are mounted to a 7-gauge welded frame and include four glides per upright. One-, two- and three-seat units are available. Not available with power or aisle light options.

S. Power & Data Module and Distribution System
1. Product is designed to bring Power & Data from the building power source to a position directly below the armcap to accommodate the requirements of notebook computers in a temporary use situation. The receptacle and data port(s) will not extend beyond the width of the armcap and is mounted at an angle so plugs will not interfere with the occupant. All wires and cables are concealed with plastic covers. Wires are routed to the module through an infeed channel attached to an upright, concealed with plastic side covers and connected to the five-wire, three-circuit harness system (each circuit provides 20 amps). Fully enclosed wireway covers protect all wires at the bottom of the back shroud as they are routed and connected to each seat. The module accommodates one simplex receptacle and a mounting bracket for one or two data jacks per seat. The data jack bracket accommodates various connectors (data jacks are not provided). One distribution harness is designed to feed two seats. A data infeed is provided to conceal the entry of data wires. Power & Data option is available on all seat sizes. All electrical components are installed on site with hardware provided. Power & Data system is UL Listed as an accessory for use with seating system.
2. Power & Data Module

a. The receptacle and single data port module are constructed of a molded polycarbonate body, riveted to a galvanized steel top mounting bracket. The placement will be at a slight angle away from the seat to allow easy plug in and removal of plugs. A second data port can be specified which will be located directly below the first data port. Data ports accommodate various data connectors. The data jacks must be provided by the customer. Power & Data outlets are located on the right-hand side only (when seated).

3. 5-Wire Harness
   a. The 5-wire distribution harness distributes power between the Power & Data modules and accepts an infeed harness. Each harness consists of a three-way housing on one end and a single connector on the other end. All harnesses and connections are fully enclosed in plastic troughs.
4. Wireway Cover
   a. The harness will be enclosed in the plastic cover mounted at the bottom of the back shroud. The wireway covers are constructed of vacuum-formed polystyrene. The cover is attached to the bottom of the back shroud with two #8 x 1/2” screws provided. The cover measures a minimum of .056” thick with a UL 94-HB minimum flame rating. The trough accommodates twenty-four Category 5 or Category 7 four-pair twisted wires.
5. Power Infeed
   a. The 5-wire power infeed harness with 3-way modular connector end consists of three 12-gauge hot wires, one 12-gauge ground wire and one 10-gauge neutral wire encased in flexible conduit with a 30” length of five exposed wires. The harness with exposed wires originates from the seat wireway, routes into the power infeed box (behind the end upright), through a 90° metal connector inside the box and out through a 1/2" rigid straight coupler at the left-hand, exterior of the box (when seated). A 24” length of 1/2" liquid-tight conduit is supplied (to be cut to size) to house the wires and connect between the rigid straight coupler and the building source power junction box on the floor, under the seat. The building source power junction box must be located under the end seat, ideally 10” to 16” from the end upright, and 2” to 4” from the front-to-back centerline of the upright base. One Power infeed can support up to three circuits and 39 seats, with a maximum of 13 seats per circuit, depending on the available power source (estimated usage of 1.25 amps per outlet). End panels are required on aisle ends when Power & Data modules are specified.
6. Retrofit of Power & Data
   a. The Power & Data system is retrofittable to existing installations with polypropylene back shrouds.

T. Power & USB Module and Distribution System
   1. Product is designed to bring Power & USB from the building power source to a position directly below the armcap, to accommodate the requirements of notebook computers in a temporary use situation. The Power & USB module is mounted at an angle so plugs will not interfere with the occupant. All source power wires and cables are concealed with plastic covers. Wires are routed to the module through an infeed channel attached to an upright, concealed with plastic side covers and connected to the 8-wire, four-circuit harness system (each circuit provides 20 amps). Fully enclosed wireway covers protect all wires at the bottom of the back shroud as they are routed and connected to each seat. One distribution harness is designed to feed two seats. Power & USB option is available on all seat sizes. All electrical components are installed on site with hardware provided.

U. Power & USB Module

1. The Power & USB module is 4.05” tall by 2.77” deep by 1.69” wide. The module is constructed of polycarbonate and polypropylene with a 5VA flammability rating per UL 746C. Metal parts are pre-galvanized steel. The module has one simplex receptacle port (rated at 15 amps/125 volts), one USB-A and one USB-C port, 2.1 amps per port. The placement will be at a slight angle away from the seat to allow easy plug in and removal of plugs. The Power & USB modules are located on the right-hand side only (when seated).

V. 8-Wire Electrical Harness – Power & USB
1. The 8-wire distribution harness of flexible conduit distributes power between the Power & USB modules and accepts a power infeed harness. Each infeed harness and module consists of single housing on one end and the jumper harness consists of single housing on both ends. A four-way connector (quad block) is used to connect the infeed, jumper harness and module.

W. Wireway Cover
1. The harness will be enclosed in the plastic cover mounted at the bottom of the back shroud. The wireway covers are constructed of vacuum-formed polystyrene. The cover is attached to the bottom of the back shroud with two #8 x 1/2” screws provided. The cover measures a minimum of .056” thick meeting UL 94-HB minimum flame rating.

X. Power Infeed
1. The 8-wire power infeed harness with single modular connector end consists of four 12-gauge hot wires, two 12-gauge ground wires and two 10-gauge neutral wires encased in flexible conduit with a 30” length of five exposed wires. The harness with exposed wires originates from the seat wireway, routes into the power infeed box (behind the end upright), through a 90° metal connector inside the box and out through a 1/2" rigid straight coupler at the left-hand, exterior of the box (when seated). A 24” length of 1/2" liquid-tight conduit is supplied (to be cut to size) to house the wires and connect between the rigid straight coupler and the building source power junction box on the floor, under the seat. The building source power junction box must be located under the end seat, ideally 10” to 16” from the end upright, and 2” to 4” from the front-to-back centerline of the upright base. One Power infeed can support up to four circuits and 52 seats, with a maximum of 13 seats per circuit, depending on the available power source (estimated usage of 1.25 amps per outlet). End panels are required on aisle ends when Power & USB modules are specified.

Y. Retrofit of Power & USB
1. The Power & USB system is retrofittable to installation with polypropylene back shrouds.
a. Power & Data and Power & USB systems are not interchangeable and cannot be used together.

2.05 FINISHES

A. Powder-coat paint is standard finish on all frames.

B. Fabrics: All finishes and colors to be selected by Architect.

2.06 TEST REQUIREMENTS

A. Seating is designed and manufactured in compliance with the intent of ANSI/BIFMA X5.4 - Large Occupant Public & Lounge Seating.

B. Seating exceeds all applicable BIFMA performance test criteria.

C. Seating is “UL Classified for Electrical Hazards Only” in the Commercial Seating category per UL 1286 and CAN/CSA C22.2 No. 203. SCS Indoor Advantage™ Gold certified.

PART 3 EXECUTION

3.01 PREPARATION

A. Coordination details with other work supporting, adjoining, or otherwise contracting items as required to insure proper installation.

B. Examine construction to verify that:
   1. Dimensions are correct to manufacturer's specifications.

C. Do not install items until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install items in strict accordance to manufacturer's Assembly Instructions and approved Shop Drawings.

3.03 FLOOR MOUNTING REQUIREMENTS

A. Minimum Floor Construction Required for Upright Installation.

B. Wood Floors
   1. Minimum two layers of 3/4" APA-rated plywood or minimum 1-1/2" thick spruce/pine/fir with minimum specific gravity of 0.42.
   2. Minimum anchor embedment 1-1/2".

C. Concrete Floors
   1. Minimum 3000 psi concrete, compressed strength, cracked, lightweight.
   2. Minimum embedment varies by anchor specification.

D. Riser Mount Floors
   1. Minimum 4000 psi concrete, compressed strength, cracked, normal weight.
   2. Minimum anchor embedment 2-1/2".

E. Raised Floors
   1. Manufacturer not responsible for how flooring is secured.
   2. Provide floor construction information to Architect for anchor specification.
   3. Warranty null and void if product is installed on flooring not meeting minimum structural requirements stated above.

F. Floor Fastener Requirements
   1. For specific flooring construction and anchor details, refer to drawings.
   2. Floor-mounting fasteners are provided unless specified.

END OF SECTION

SECTION 22 05 10
BASIC PLUMBING REQUIREMENTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 PROJECT MANAGEMENT

A. Drawings are diagrammatic, all offsets, fitting, valves and accessories are not shown. Refer to all drawings in the contract documents and plan work accordingly. Coordinate with all trades and crafts.

B. In case of interference between trades, Architect Engineer will decide which work is to take precedence regardless of work that might be installed.

1.03 CODES, ORDINANCES, INSPECTIONS, AND PERMITS

A. Execute and inspect Work in accordance with local and state codes, laws, ordinances, rules and regulations applicable to particular class of Work.

B. Should any part of Drawings or specifications be found to be in conflict with applicable codes or ordinances, notify the Architect Engineer, in writing, 72 hours prior to receiving of bids. After the receiving of bids, any discovery of code violations shall be promptly reported to the Architect Engineer. Any work performed knowingly in violation of codes shall be corrected without additional expense to the Owner or his representative.

C. All Plumbing work shall comply with latest State and local Plumbing Codes in Design-Builder.

D. Arrange with County, City, or State, if City has no ordinances covering work, for complete inspection, paying all charges pertaining thereto. Give proper authority all requisite notice relating to work under such; afford Architect Engineer and all authorized inspectors every facility for inspection and be responsible for all violations of law. Upon completion of Work, have Work inspected, if required, obtaining certificate of inspection and approval from inspecting agency and deliver such certificate to Architect Engineer. Comply with Division 01.

1.04 COORDINATION

A. Conduct multi-trade coordination and preinstallation meetings to establish bottom elevations of all piping, ductwork and conduit before fabrication and installation. Comply with Division 01.

B. All equipment shall be installed in accordance with the manufacturer's recommendations. It is the contractor's responsibility to follow all installation requirements and guidelines provided in the manufacture's installation manual. If there is a conflict with regards to installation, the contractor shall stop work and notify the design Architect Engineer representative.

1.05 SUBMITTALS

A. Comply with Division 01.

B. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for plumbing fixtures, plumbing specialties, plumbing equipment, and others as may be requested.

C. Shop Drawings: Miscellaneous steel for pipe support, duct support, pipe guides, anchors, and miscellaneous steel used for supporting any mechanical equipment.

1.06 SUBSTITUTIONS

A. Comply with Division 01.

B. Any proposed substitutions of equipment shall be accompanied by shop drawings showing revised equipment layouts, piping diagrams, ductwork drawings and/or wiring diagrams. Where substituted equipment furnished requires use of larger, more, or differently arranged connections, such connections shall be installed to the complete satisfaction of Architect Engineer without additional cost to Owner.

C. Should a substitution be accepted and subsequently proven unsatisfactory for the service intended within the warranty period, the Contractor shall replace this material or equipment with that as originally specified, or corrected as directed by Architect Engineer.

1.07 CLEAN UP

A. Comply with Division 01.

B. Do not allow waste material or rubbish to accumulate in or about job site.

C. Any discoloration or other damage to parts of building, its finish or furnishings due to failure to properly clean or keep clean mechanical systems shall be repaired without cost to Owner.

1.08 EQUIPMENT START-UP AND SYSTEM COORDINATION

A. Comply with Division 01.

B. The Contractor shall be responsible for placing all equipment and system components into operation. Individual components shall be coordinated with other parts of Mechanical, Electrical, Plumbing and/or Fire Protection Systems to ensure that the entire project functions as designed and described by the contract documents.

1.09 CUTTING AND PATCHING

A. Comply with Section 01 17 00 - Execution and Closeout Requirements.

B. Provide all cutting and patching required to perform the mechanical work, when alteration, repair, renovation, or addition, to existing construction.

1.10 DEMOLITION

A. Comply with Section 02 41 00 - Demolition.

B. Alterations and Minor Demolition: Comply with Section 01 70 00 - Execution and Closeout Requirements.

1.11 RECORD DOCUMENTS

A. Comply with Division 01.

1.12 ACCESS PANELS

A. Provide access panels as necessary for servicing of fire dampers, smoke dampers, valves, VAV terminals and any other equipment in concealed spaces.

1.13 PAINT EXTERIOR PIPING

A. All exterior steel piping shall be painted using a metal primer coat, second coat of enamel, top coat of enamel and a finish coat of gloss.

B. Natural gas piping shall be painted yellow.

1.14 DOMESTIC WATER PIPING

A. Valve, strainer and other domestic water piping specialties shall be bronze, brass, stainless steel or epoxy coated cast iron only for the services that are in contact with domestic water.

B. No cast iron valves, strainers or any other accessories that contact domestic water are allowed without epoxy coating.

1.15 LOCAL SITE CONDITIONS

A. Before bidding, make complete investigation at site in order to be informed as to location of utilities and as to conditions under which work is to be performed. Utility locations shown were obtained from surveys and/or local utility companies and are not to be assumed as being accurate.

B. Make determination of soil conditions before bidding. These specifications and accompanying drawings in no way imply as to condition of soil to be encountered.

1.16 GUARANTY-WARRANTY

A. This guarantee shall include capacity and integrated performance of component parts of various systems in strict accord with the true intent and purpose of these specifications. Conduct such tests as herein specified or as may be required by the Architect Engineer to demonstrate capacity and performance ability of various systems to maintain specified conditions.

B. All materials and equipment shall be new and unused and shall carry a full year's warranty from time Owner accepts building or the date of substantial completion, whichever is earlier, regardless of start-up date of equipment, unless a longer warranty period is specified under other sections.

1.17 EQUIPMENT CONNECTIONS

A. Each equipment item with drain connections, shall be provided with a properly-sized drain run to the nearest floor drain or as directed.

B. Rough-in and make final connection to all equipment requiring same, furnished under other Divisions of these specifications or by the Owner.
   1. Provide necessary labor and materials, including stop valves, traps, pressure-reducing valves, etc. necessary. Trap and vent drainage connections as required.
   2. If equipment or fixtures to be furnished by Owner and/or Owner's vendor are not delivered prior to final acceptance, services shall be capped or plugged at walls or floor as directed, ready for future connection.

C. No equipment or fixture shall be "roughed-in" until proper rough-in drawings are in the hands of the trade doing the work.

1.18 ELECTRICAL

A. Furnish and install all electrical interlock, control and other wiring, not covered specifically under the electrical plans and specifications, for proper operation and control of all equipment specified under this Division of the specifications.

B. Supervise and coordinate all electrical work in connection with mechanical system.

1.19 EXCAVATION, TRENCHING, AND BACKFILLING

A. All excavation, trenching and backfilling in connection with the mechanical system, to a point 5'0" outside the building, is included as part of this Division.

B. All excavation required shall be done as part of the bid price regardless of any implied conditions on the plans or in these specifications.

C. Excavation to have 12 inch minimum and 24 inch maximum clearance on all sides. Do not carry excavation below required level unless indicated otherwise on the drawings. Excess excavation below required level shall be backfilled at no expense to Owner with earth, sand, gravel or concrete, as directed by Architect Engineer and thoroughly compacted. Remove any unstable soil and replace with gravel, crushed stone or clean sand and thoroughly compact. Architect Engineer will determine the depth of removal of any unstable soil encountered. Grade ground adjacent to excavations to prevent water running in. Remove, by pumping or other means any water accumulated in excavation.

D. Banks of trenches shall be vertical or as shown on the drawings. Width of trench to be 5 inches minimum, 8 inches maximum on each side of pipe bell. Bottom of trench for sewers and culverts shall be rounded so that an arc of circumference equal to 0.6 of outside diameter or pipe rests on undisturbed soil wherever practicable. Excavate bell holes accurately to size by hand. In rock, excavations shall be carried 8 inches below bottom of pipe. Use loose earth or gravel for backfill and tamp thoroughly.

E. Bracing, sheathing and shoring shall be performed as necessary to complete and protect excavations indicated on the drawings, as required for safety, as directed by Architect Engineer, or to conform to governing laws.

F. After piping, conduit, ducts, etc. have been installed, inspected, tested and approved by governing agency, backfill trenches with clean, stable soil free from stones. Place backfill in 4 inch layers, tamped under and around pipe and conduit to height of at least 2'0" above pipe. Tamping shall be done in such manner as not to disturb underlying work. Remainder of trenches and excavations shall be backfilled with clean, stable earth, deposited in 8 inch layers and brought up to rough grade, with each layer compacted to density of surrounding soil. Remove sheathing and shoring as backfill is placed and fill space with dry sand. Compaction tests in accordance with Division 31 may be required by the Architect Engineer, with the costs paid by the Contractor.

G. Replace existing appurtenances removed or damaged in connection with work, and restore to original conditions, unless otherwise directed.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 22 05 17
SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe sleeves.

B. Pipe sleeve-seals.

1.02 RELATED REQUIREMENTS

A. Section 22 05 53 - Identification for Plumbing Piping and Equipment: Piping identification.

B. Section 22 07 19 - Plumbing Piping Insulation.

1.03 REFERENCE STANDARDS

A. FM (AG) - FM Approval Guide; current edition.

B. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified this section.

B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store sleeve and sleeve seals in shipping containers, with labeling in place.

B. Provide temporary protective coating on cast iron and steel sleeves if shipped loose.

PART 2 PRODUCTS

2.01 PIPE SLEEVES

A. Manufacturers:
   1. American Polywater Corporation: www.polywater-haufftechnik.com/#sle.
   2. Flexicraft Industries: www.flexicraft.com/#sle.
   3. Substitutions: See Section 01 60 00 - Product Requirements.

B. 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.

C. Clearances:
   1. Provide allowance for insulated piping.
   2. Wall, Floor, Partitions, and Beam Flanges: 1 inch greater than external pipe diameter.

2.02 PIPE-SLEEVE SEALS

A. Manufacturers:
   1. Advance Products & Systems, LLC: www.apsonline.com/#sle.
   2. American Polywater Corporation: www.polywater-haufftechnik.com/#sle.
   3. Flexicraft Industries: www.flexicraft.com/#sle.
   4. The Metraflex Company: www.metraflex.com/#sle.

5. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and foreign material, from inside and outside, before assembly.

3.02 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.

3.03 CLEANING

A. Upon completion of work, clean all parts of the installation.

B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

END OF SECTION

SECTION 22 05 19
METERS AND GAUGES FOR PLUMBING PIPING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Thermometers.

1.03 REFERENCE STANDARDS

A. ASME MFC-3M - Measurement of Fluid Flow in Pipes Using Orifice, Nozzle, and Venturi; 2004 (Reaffirmed 2017).

B. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers; 2014 (Reapproved 2025).

C. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers; 2014 (Reapproved 2021).

D. UL 393 - Indicating Pressure Gauges for Fire-Protection Service; Current Edition, Including All Revisions.

E. UL 404 - Gauges, Indicating Pressure, for Compressed Gas Service; Current Edition, Including All Revisions.

F. NSF 61 - Drinking Water System Components - Health Effects; 2012.

G. NSF 372 - Drinking Water System Components - Lead Content; 2011.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.

C. Project Record Documents: Record actual locations of components and instrumentation.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements. for additional provisions.

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 STEM TYPE THERMOMETERS

A. Manufacturers:
   1. Dwyer Instruments, Inc: www.dwyer-inst.com/#sle.
   2. Omega Engineering, Inc: www.omega.com/#sle.
   3. Weksler Glass Thermometer Corp: www.wekslerglass.com/#sle.
   4. H.O. Trerice Co.: www.trerice.com/#sle
   5. Substitutions: See Section 01 60 00 - Product Requirements.

B. 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. Accuracy: 2 percent.
4. Calibration: Degrees F.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Verify Utility Service Provider piping readiness to receive meter.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install thermometers as follows:
   1. Hot Water Heaters: Place upstream and downstream of heater.

C. Install gauges and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.

D. Adjust gauges and thermometers to final angle, clean windows and lenses, and calibrate to zero.

END OF SECTION

SECTION 22 05 29
HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Prefabricated trapeze-framed systems.

B. Beam clamps.

C. Pipe hangers.

D. Pipe supports, guides, shields, and saddles.

1.02 RELATED REQUIREMENTS

A. Section 05 50 00 - Metal Fabrications.

1.03 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

B. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2022).

C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.

D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

E. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General-Purpose Piping; 2025.

F. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2024.

G. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures; 1999 (Reapproved 2022).

H. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2025a.

I. 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; 2018a.

J. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.

K. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026a.

L. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.

M. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2025.

N. UL (DIR) - Online Certifications Directory; Current Edition.

O. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components 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. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
5. Notify Architect Engineer 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.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems and post-installed concrete and masonry anchors.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Provide required hardware to hang or support piping, equipment, or fixtures with related accessories as necessary to complete installation of plumbing work.

B. Provide hardware products listed, classified, and labeled as suitable for intended purpose.

C. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.

D. Materials for Metal Fabricated Supports: Comply with Section 05 50 00.
1. Zinc-Plated Steel: Electroplated in accordance with ASTM B633 unless stated otherwise.
2. Galvanized Steel: Hot-dip galvanized in accordance with ASTM A123/A123M or ASTM A153/A153M unless stated otherwise.

E. Corrosion Resistance: Use corrosion-resistant metal-based materials fully compatible with exposed piping materials and suitable for the environment where installed.
1. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.

2.02 PREFABRICATED TRAPEZE-FRAMED SYSTEMS

A. Prefabricated Trapeze-Framed Metal Strut Systems:
1. Manufacturers:
a. Gripple, Inc; Fast Track - Standard: www.gripple.com/#sle.
b. Unistrut, a brand of Atkore International, Inc: www.unistrut.com/#sle.
c. ASC International: www.asc-es.com/#sle.
d. Substitutions: See Section 01 60 00 - Product Requirements.
2. Strut Channel or Bracket Material:
3. Accessories: Provide bracket covers, cable basket clips, cable tray clips, clamps, conduit clamps, fire-retarding brackets, j-hooks, protectors, and vibration dampeners.

2.03 BEAM CLAMPS

A. Manufacturers:
1. B-Line, a brand of Eaton Corporation: www.eaton.com/#sle.
2. Unistrut, a brand of Atkore International, Inc: www.unistrut.com/#sle.
3. Substitutions: See Section 01 60 00 - Product Requirements.

B. C-Clamp: MSS SP-58 type 23, malleable iron and steel with plain, stainless steel, and zinc finish.

C. Wide Mouth Beam Clamp: MSS SP-58 type 19, malleable iron with plain finish.

D. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.

E. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.

2.04 PIPE HANGERS

A. Clevis Hangers, Adjustable:
   1. Manufacturers:
      a. B-Line, a brand of Eaton Corporation: www.eaton.com/#sle.
      b. FNW: www.fnw.com/#sle.
      c. Substitutions: See Section 01 60 00 - Product Requirements.
   2. Standard-Duty: MSS SP-58 type 1, zinc-colored, epoxy plated.

2.05 PIPE CLAMPS

A. Riser Clamps:
   1. Manufacturers:
      a. B-Line, a brand of Eaton Corporation: www.eaton.com/#sle.
      b. FNW: www.fnw.com/#sle.
      c. ASC International: www.asc-es.com/#sle.
      d. Substitutions: See Section 01 60 00 - Product Requirements.
   2. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.
   3. MSS SP-58 type 1 or 8, carbon steel or steel with epoxy plated, plain, stainless steel, or zinc plated finish.
   4. Copper Tube Pipe Clamp: MSS SP-58 type 8, epoxy plated copper.
   5. UL (DIR) listed: Pipe sizes 1/2 to 8 inch.

2.06 PIPE SUPPORTS, GUIDES, SHIELDS, AND SADDLES

A. Dielectric Barriers: Provide between metallic supports and metallic piping and associated items of dissimilar type; acceptable dielectric barriers include rubber or plastic sheets or coatings attached securely to pipe or item.

B. Pipe Shields for Insulated Piping:
   1. Manufacturers:
      a. Anvil International: www.anvilintl.com/#sle.
      b. FNW: www.fnw.com/#sle.
      c. Gregory Industries, Inc: www.gregorycorp.com/#sle.
      d. Substitutions: See Section 01 60 00 - Product Requirements.
   2. MSS SP-58 type 40, ASTM A1011/A1011M steel or ASTM A653/A653M carbon steel.
   3. General Construction and Requirements:
      a. Surface Burning Characteristics: Comply with ASTM E84 or UL 723.
      b. Shields Material: UV-resistant polypropylene with glass fill.
      c. Maximum Insulated Pipe Outer Diameter: 12-5/8 inch.
      d. Service Temperature: Minus 40 to 178 degrees F.
      e. Pipe shields to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.

C. Pipe Supports:
   1. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
   2. Liquid Temperatures Up to 122 degrees F:
      a. Overhead Support: MSS SP-58 types 1, 3 through 12 clamps.
      b. Support From Below: MSS SP-58 types 35 through 38.

D. Pipe Supports, Thermal Insulated:
   1. General Requirements:
      a. Insulated pipe supports to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
      b. Provide pipe supports for 1/2 to 30 inch iron pipes.
      c. Insulation inserts to consist of rigid phenolic foam insulation surrounded by 360 degree, PVC jacketing.
   2. PVC Jacket:
      a. Pipe insulation protection shields to be provided with ball bearing hinge and locking seam.
      b. Moisture Vapor Transmission: 0.0071 perm inch, when tested in accordance with ASTM E96/E96M.
      c. Minimum Thickness: 60 mil, 0.06 inch.

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 anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

C. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.

D. Unless specifically indicated or approved by Architect Engineer, do not provide support from suspended ceiling support system or ceiling grid.

E. Unless specifically indicated or approved by Architect Engineer, do not provide support from roof deck.

F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

G. 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. Unless otherwise indicated, mount floor-mounted equipment on properly sized 3 inch high concrete pad constructed.
   5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

H. Secure fasteners according to manufacturer's recommended torque settings.

I. Remove temporary supports.

END OF SECTION

SECTION 22 05 48
VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Vibration isolation requirements.

B. Seismic control requirements.

C. Seismic restraint systems.

1.02 RELATED REQUIREMENTS

A. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment.

1.03 DEFINITIONS

A. Plumbing Component: Where referenced in this section in regards to seismic controls, applies to any portion of the plumbing system subject to seismic evaluation in accordance with applicable codes, including distributed systems (e.g., 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; Most Recent Edition Cited by Referring Code or Reference Standard.

B. ASCE 19 - Structural Applications of Steel Cables for Buildings; 2016.

C. FEMA 414 - Installing Seismic Restraints for Duct and Pipe; 2004.

D. FEMA E-74 - Reducing the Risks of Nonstructural Earthquake Damage; 2012.

E. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. ICC-ES AC156 - Acceptance Criteria for Seismic Certification by Shake-Table Testing of Nonstructural Components; 2010, with Editorial Revision (2020).

G. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems; 2008.

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 piping, conduit, 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 Engineer 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.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for products, including materials, fabrication details, dimensions, and finishes.
   1. Vibration Isolators: Include rated load capacities and deflections; include information on color coding or other identification methods for spring element load capacities.
   2. Seismic Controls: Include seismic load capacities.

1.07 QUALITY ASSURANCE

A. Comply with applicable building code.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

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 plumbing equipment and/or plumbing 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.

2.02 SEISMIC CONTROL REQUIREMENTS

A. Design and provide plumbing 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 plumbing components.

B. Seismic Design Criteria: As indicated on drawings.

C. Component Importance Factor (Ip): Plumbing components to be assigned a component importance factor (Ip) of 1.5 unless otherwise indicated.

D. Seismic Restraints:
   1. Provide seismic restraints for plumbing 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) Discrete plumbing components that are positively attached to the structure where either of the following apply:
            (a) The component weighs 400 pounds or less, has a center of mass located 4 feet or less above the adjacent floor level, flexible connections are provided between the component and associated ductwork, piping, and conduit, and the component importance factor (Ip) is 1.0.
            (b) The component weighs 20 pounds or less or, in the case of a distributed system, 5 pounds per foot or less.

2) Plumbing piping with component importance factor (Ip) of 1.0 and nominal pipe size of 3 inch or less, or with component importance factor (Ip) of 1.5 and nominal pipe size of 1 inch or less, where flexible connections, expansion loops, or other assemblies are provided between piping and associated components, and where piping is positively attached to the structure; exemption does not apply to piping constructed of low-deformability materials (e.g., cast iron, glass, nonductile plastics).

b. Plumbing Piping Exemptions, All Seismic Design Categories:
1) Plumbing piping where flexible connections, expansion loops, or other assemblies are provided between piping and associated components, where piping is positively attached to the structure, and where one of the following apply:
(a) Trapeze supported piping weighing less than 10 pounds per foot, where all pipes supported meet size requirements for exemption as single pipes described under specific seismic design category exemptions above.
(b) Trapeze supported piping with trapeze assemblies using 3/8 inch diameter rod hangers not exceeding 12 inches in length from support point connection to the supporting structure, where all pipes supported have a component importance factor (Ip) of 1.0 and meet size requirements for exemption as single pipes described under specific seismic design category exemptions above, and where the total weight supported by any single trapeze is 100 pounds or less.
(c) Trapeze supported piping with trapeze assemblies using 1/2 inch diameter rod hangers not exceeding 12 inches in length from support point connection to the supporting structure, where all pipes supported have a component importance factor (Ip) of 1.0 and meet size requirements for exemption as single pipes described under specific seismic design category exemptions above, and where the total weight supported by any single trapeze is 200 pounds or less.
(d) Trapeze supported piping with trapeze assemblies using 1/2 inch diameter rod hangers not exceeding 24 inches in length from support point connection to the supporting structure, where all pipes supported have a component importance factor (Ip) of 1.0 and meet size requirements for exemption as single pipes described under specific seismic design category exemptions above, and where the total weight supported by any single trapeze is 100 pounds or less.
(e) Hanger supported piping with individual rod hangers 3/8 inch or 1/2 inch in diameter not exceeding 12 inches in length from support point connection to the supporting structure, where pipe has a component importance factor (Ip) of 1.0 and meets size requirements for exemption as single pipes described under specific seismic design category exemptions above, and where the total weight supported by any single rod is 50 pounds or less.

3. 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 plumbing components, including distributed systems.
c. Use only one restraint system type for a given plumbing component or distributed system (e.g., 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 plumbing 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 plumbing 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 plumbing 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.

E. 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.

F. Seismic Interactions:
1. Include provisions to prevent seismic impact between plumbing 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.

G. 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., 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 VIBRATION-ISOLATED EQUIPMENT SUPPORT BASES

A. Manufacturers:
1. Vibration-Isolated Equipment Support Bases:
a. Kinetics Noise Control, Inc: www.kineticsnoise.com/#sle.
b. Mason Industries: www.mason-ind.com/#sle.
c. Vibration Eliminator Company, Inc: www.veco-nyc.com/#sle.

d. Vibro-Acoustics: www.vibro-acoustics.com/#sle.

2.04 SEISMIC RESTRAINT SYSTEMS

A. Manufacturers:
   1. Seismic Restraint Systems:
      a. AFCON, a brand of Anvil International: www.anvilintl.com/#sle.
      b. Kinetics Noise Control, Inc: www.kineticsnoise.com/#sle.
      c. Mason Industries: www.mason-ind.com/#sle.
      d. Vibro-Acoustics: www.vibro-acoustics.com/#sle.
      e. Substitutions: See Section 01 60 00 - 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 CODE-REQUIRED SPECIAL INSPECTIONS

A. Frequency of Special Inspections: Where special inspections are designated as continuous or periodic, arrange work accordingly.
   1. Continuous Special Inspections: Special Inspection Agency to be present in the area where the work is being performed and observe the work at all times the work is in progress.
   2. Periodic Special Inspections: Special Inspection Agency to be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

B. Seismic special inspections include, but are not limited to:
   1. Installation and anchorage of piping systems designed to carry hazardous materials and their associated mechanical units for Seismic Design Categories C, D, E, and F; periodic inspection.
   2. Verification of required clearances between plumbing equipment, distribution systems, and associated supports and fire protection sprinkler system drops and sprigs for Seismic Design Categories C, D, E, and F; periodic inspection.

C. Prior to starting work, Contractor to submit written statement of responsibility to authorities having jurisdiction and to Owner acknowledging awareness of special requirements contained in the statement of special inspections.

D. Special Inspection Agency services do not relieve Contractor from performing inspections and testing specified elsewhere.

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. Vibration-Isolated Equipment Support Bases:
      a. Provide specified minimum clearance beneath base.
   2. Clean debris from beneath vibration-isolated equipment that could cause short-circuiting of isolation.
   3. Use elastomeric grommets for attachments where required to prevent short-circuiting of isolation.
   4. Adjust isolators to be free of isolation short circuits during normal operation.
   5. 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 FIELD QUALITY CONTROL

A. See Section 01 40 00 - 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.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 22 05 53
IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe markers.

B. Underground warning tape.

1.02 RELATED REQUIREMENTS

A. Section 09 90 00 - Painting and Coating: Identification painting.

1.03 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2023.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

C. Product Data: Provide manufacturers catalog literature for each product required.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

2.02 PIPE MARKERS

A. Manufacturers:
   1. Brady Corporation: www.bradycorp.com/#sle.
   2. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
   3. MIFAB, Inc: www.mifab.com/#sle.
   4. Seton Identification Products: www.seton.com/#sle.
   5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Comply with ASME A13.1.

C. Flexible Marker: Factory fabricated, semi-rigid, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid conveyed.

D. Underground Flexible Marker: Bright-colored continuously printed ribbon tape, minimum 6 inches wide by 4 mil, 0.004 inch thick, manufactured for direct burial service.

E. Identification Scheme, ASME A13.1:
   1. Primary: External Pipe Diameter, Uninsulated or Insulated.
      a. 3/4 to 1-1/4 inches: Use 8 inch field-length with 1/2 inch text height.
      b. 1-1/2 to 2 inches: Use 8 inch field-length with 3/4 inch text height.
      c. 2-1/2 to 6 inches: Use 12 inch field-length with 1-1/4 inch text height.
   2. Secondary: Color scheme per fluid service.
      a. Potable, Cold Water, Hot Water, other Water: Green background with White letters
      b. Sanitary Sewer/Vent Piping: Green background with White letters
      c. Natural Gas: Yellow background with Black letters
      d. Water; Potable, Cooling, Boiler Feed, and Other: White text on green background.

2.03 UNDERGROUND WARNING TAPE

A. Manufacturers:
   1. Brady Corporation: www.bradyid.com/#sle.
   2. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
   3. Seton Identification Products: www.seton.com/#sle.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Materials: Use foil-backed detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.

C. Foil-backed Detectable Type Tape: 3 inches wide, with minimum thickness of 5 mil, 0.005 inch, unless otherwise required for proper detection.

D. Legend: Type of service, continuously repeated over full length of tape.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive identification products.

3.02 INSTALLATION

A. Install plastic tape pipe marker around pipe in accordance with manufacturer's instructions.

B. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.

C. Pipe Marker Placement. Pipe markers should be located as follows:
1. At intervals of not more than 20 feet
2. At least once in or above every room
3. On both sides of walls or partitions penetrated by the piping
4. At least once in every story height traversed by risers
5. Adjacent to each valve port and flange end.

END OF SECTION

SECTION 22 07 19
PLUMBING PIPING INSULATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Glass fiber insulation.

B. Polyethylene insulation.

C. Jackets and accessories.

1.03 RELATED REQUIREMENTS

A. Section 22 10 05 - Plumbing Piping: Placement of hangers and hanger inserts.

1.04 REFERENCE STANDARDS

A. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

B. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019, with Editorial Revision (2023).

C. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.

D. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2022.

E. ASTM C585 - Standard Practice for Inner and Outer Diameters of Thermal Insulation for Nominal Sizes of Pipe and Tubing; 2022.

F. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2018).

G. ASTM D1056 - Standard Specification for Flexible Cellular Materials—Sponge or Expanded Rubber; 2020.

H. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2025.

I. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.08 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 GLASS FIBER

A. Manufacturers:
   1. CertainTeed Corporation: www.certainteed.com/#sle.
   2. Johns Manville Corporation: www.jm.com/#sle.
   3. Knauf Insulation: www.knaufinsulation.com/#sle.
   4. Owens Corning Corporation: www.owenscorning.com/en-us/#sle.
   5. Owens Corning Corp: www.owenscorning.com.
   6. Substitutions: See Section 01 60 00 - Product Requirements.

B. Insulation: ASTM C547 and 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. 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.

2.02 POLYETHYLENE INSULATION

A. Manufacturers:
   1. Armacell LLC: www.armacell.us/#sle.
   2. Substitutions: See Section 01 60 00 - Product Requirements.

B. Insulation: Flexible closed-cell polyethylene tubing, slit lengthwise for installation, complying with applicable requirements of ASTM D1056.
   1. K Value: ASTM C177; 0.25 at 75 degrees F.
   2. Maximum Service Temperature: 200 degrees F.
   3. Density: 2 pcf.
   4. Maximum Moisture Absorption: 1.0 percent by volume.
   5. Moisture Vapor Permeability: 0.05 perm inch, when tested in accordance with ASTM E96/E96M.
   6. Connection: Contact adhesive.

2.03 JACKETS

A. PVC Plastic.
   1. Manufacturers:
      a. Johns Manville Corporation: www.jm.com/#sle.
      b. Substitutions: See Section 01 60 00 - 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.
      e. Connections: Brush on welding adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with North American Insulation Manufacturers Association (NAIMA) National Insulation Standards.

C. Exposed Piping: Locate insulation and cover seams in least visible locations.

D. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.

E. 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.

F. Glass fiber insulated pipes conveying fluids above ambient temperature:
   1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
   2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.

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.

H. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions.

I. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 7 feet (2 meters) above finished floor): Finish with aluminum jacket.

3.03 SCHEDULES

A. Plumbing Systems:
   1. Domestic Hot Water Supply and Recirculation:
      a. Glass Fiber Insulation:
         1) Pipe Size Range: 2 inch and smaller.
            (a) Thickness: 1 inch.
   2. Domestic Cold Water:
      a. Glass Fiber Insulation:
         1) Pipe Size Range: All Sizes
            (a) Thickness: [1] inch ([25] mm).

B. Other Systems:
   1. Provide aluminum jacket for all piping exposed to weather or damp locations.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 22 10 05
PLUMBING PIPING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Pipe, pipe fittings, specialties, and connections for piping systems.
   1. Sanitary Sewer.
   2. Domestic Water.
   3. Natural Gas.
   4. Flanges, Unions, and Couplings.
   5. Pipe Hangers and Supports.
   6. Ball valves.
   7. Flow Controls.
   8. Check.
   9. Relief valves.
   10. Strainers.

1.03 REFERENCE STANDARDS

A. ANSI Z21.22 - American National Standard for Relief Valves for Hot Water Supply Systems; 2015 (Reaffirmed 2020).

B. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2016.

C. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.

D. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.

E. ASME B31.1 - Power Piping; 2024.

F. ASME B31.9 - Building Services Piping; 2025.

G. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2022).

H. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2024.

I. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2025.

J. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.

K. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2025.

L. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2022.

M. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2020.

N. ASTM B813 - Standard Specification for Water Flushable Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2024.

O. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2023.

P. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2020a.

Q. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2021a.

R. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40; 2024.

S. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2020 (Reapproved 2024).

T. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2025.

U. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2021.

V. 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; 2020 (Reapproved 2024).

W. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2024, with Editorial Revision (2025).

X. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026a.

Y. ASTM E84 - Standard Specification for "Standard Test Method for Surface Burning Characteristics of Building Materials" - (Flame Spread/Smoke Development).

Z. ASTM F876 - Standard Specification for Crosslinked Polyethylene (PEX) Tubing; 2025.

AA. ASTM F1960 - Standard Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-Linked Polyethylene (PEX) and Polyethylene of Raised Temperature (PE-RT) Tubing; 2024.

BB. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; 2018.

CC. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings; 2021.

DD. AWWA C606 - Grooved and Shouldered Joints; 2022.

EE. AWWA C651 - Disinfecting Water Mains; 2023.

FF. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2021.

GG. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2020.

HH. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2018, with Editorial Revision (2020).

II. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2015.

JJ. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2017, with Editorial Revision (2020).

KK. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements; 2023.

LL. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2025.

MM. MSS SP-67 - Butterfly Valves; 2022.

NN. NSF 61 - Drinking Water System Components - Health Effects; 2024.

OO. NSF 372 - Drinking Water System Components - Lead Content; 2024.

PP. PPI TR-4 - PPI HSB Listing of Hydrostatic Design Basis (HDB), Hydrostatic Design Stress (HDS), Strength Design Basis (SDB), Pressure Design Basis (PDB) and Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipe; 2024.

QQ. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with applicable codes.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

C. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.06 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.

1.07 FIELD CONDITIONS

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

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

B. Plenum-Installed Acid Waste Piping: Flame-spread index equal or below 25 and smoke-spread index equal or below 50 according to ASTM E84 or UL 723 tests.

2.02 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Cast Iron Pipe: ASTM A74 service weight.
   1. Fittings: Cast iron.
   2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.

B. PVC Pipe: ASTM D2665 or ASTM D3034. Schedule 40 Solid Core
   1. Fittings: PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.03 SANITARY SEWER PIPING, ABOVE GRADE

A. Cast Iron Pipe: CISPI 301, hubless, service weight.
   1. Fittings: Cast iron.
   2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.

B. PVC Pipe: ASTM D2665. Schedule 40 Solid Core
   1. Fittings: PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.04 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Cross-Linked Polyethylene (PEX) Pipe: ASTM F876 or ASTM F877.
   1. Manufacturers:

a. Uponor, Inc: www.uponorengineering.com/#sle.
b. Zurn Industries, LLC: www.zurn.com/#sle.
c. Substitutions: See Section 01 60 00 - Product Requirements.

2. PPI TR-4 Pressure Design Basis:
3. Fittings: Brass and engineered polymer (EP) ASTM F1960.
4. Joints: ASTM F1960 cold-expansion fittings.

2.05 DOMESTIC WATER PIPING, ABOVE GRADE

A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
2. Mechanical Press Sealed Fittings: Double pressed type, NSF 61 and NSF 372 approved or certified, utilizing EPDM, non toxic synthetic rubber sealing elements.

2.06 NATURAL GAS PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
1. Manufacturers:
2. Fittings: ASTM A234/A234M, wrought steel welding type.
3. Joints: ASME B31.1, welded.
4. Jacket: AWWA C105/A21.5 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.

B. Polyethylene Pipe: ASTM D2513, SDR 11.
1. Fittings: ASTM D2683 or ASTM D2513 socket type.
2. Joints: Fusion welded

2.07 NATURAL GAS PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
2. Joints: Threaded or welded to ASME B31.1.

2.08 FLANGES, UNIONS, AND COUPLINGS

A. Unions for Pipe Sizes 3 Inches and Under:
1. Ferrous pipe: Class 150 malleable iron threaded unions.
2. Copper tube and pipe: Class 150 bronze unions with soldered joints.

B. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.
1. Dimensions and Testing: In accordance with AWWA C606.
2. Housing Material: Provide ASTM A47/A47M malleable iron or ductile iron, galvanized.
3. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
4. When pipe is field grooved, provide coupling manufacturer's grooving tools.

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

2.09 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. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
3. Trapeze Hangers: Welded steel channel frames attached to structure.
4. Vertical Pipe Support: Steel riser clamp.
5. Floor Supports: Concrete pier or steel pedestal with floor flange; fixture attachment.

B. Plumbing Piping - Drain, Waste, and Vent:
   1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
   2. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
   3. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
   4. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
   5. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

C. Plumbing Piping - Water:
   1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
   2. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
   3. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
   4. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
   5. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.
   6. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

D. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
   1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
   2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
   3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
   4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
   5. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.

2.10 SPRING LOADED CHECK VALVES

A. Class 125, iron body, with epoxy coated interior, bronze trim, stainless steel springs, bronze disc, Buna N seals, wafer style ends.

2.11 RELIEF VALVES

A. Pressure:
   1. ANSI Z21.22, AGA certified, bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated.

B. Temperature and Pressure:
   1. ANSI Z21.22, AGA certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME BPVC-IV certified and labelled.

2.12 STRAINERS

A. Size 1-1/2 inch to 4 inch:
   1. Class 125, flanged iron body, epoxy coated, Y pattern with 1/16 inch stainless steel perforated screen.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

D. Install piping to maintain headroom, conserve space, and not interfere with use of space.

E. Group piping whenever practical at common elevations.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 22 05 16.

G. Provide access where valves and fittings are not exposed.

H. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

I. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting.
   1. All exterior steel piping shall be painted using a metal primer coat, second coat of enamel, top coat of enamel and a finish coat of gloss.
   2. Natural gas piping shall be painted yellow.

J. Install bell and spigot pipe with bell end upstream.

K. Install valves with stems upright or horizontal, not inverted.

L. Install water piping to ASME B31.9.

M. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.

N. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.

O. Sleeve pipes passing through partitions, walls and floors.

P. 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.

Q. Pipe Hangers and Supports:
   1. Install in accordance with ASME B31.9.
   2. Support horizontal piping as indicated.
   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 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   6. Support vertical piping at every floor or per manufacturer's instructions. 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.

9. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
10. Provide hangers adjacent to motor driven equipment with vibration isolation.
11. Support cast iron drainage piping at every joint.

3.04 APPLICATION

A. Use grooved mechanical couplings and fasteners only in accessible locations.

B. Install unions downstream of valves and at equipment or apparatus connections.

C. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

D. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

E. Provide flow controls in water recirculating systems where indicated.

3.05 TOLERANCES

A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/8 inch per foot slope.

B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

3.06 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Disinfect water distribution system in accordance with Section 33 01 10.58.

B. Prior to starting work, verify system is complete, flushed and clean.

C. Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).

D. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.

E. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.

F. Maintain disinfectant in system for 24 hours.

G. If final disinfectant residual tests less than 25 mg/L, repeat treatment.

H. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.

I. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.07 SERVICE CONNECTIONS

A. Provide new sanitary and storm sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.

3.08 SCHEDULES

A. Pipe Hanger Spacing:
   1. Metal Piping:
      a. Pipe Size: 1/2 inches to 1-1/4 inches:
         1) Maximum Hanger Spacing: 6.5 ft.
         2) Hanger Rod Diameter: 3/8 inches.
      b. Pipe Size: 1-1/2 inches to 2 inches:
         1) Maximum Hanger Spacing: 10 ft.
         2) Hanger Rod Diameter: 3/8 inch.
      c. Pipe Size: 2-1/2 inches to 3 inches:
         1) Maximum Hanger Spacing: 10 ft.
         2) Hanger Rod Diameter: 1/2 inch.

d. Pipe Size: 4 inches to 6 inches:
   1) Maximum Hanger Spacing: 10 ft.
   2) Hanger Rod Diameter: 5/8 inch.

2. Plastic Piping:
   a. All Sizes:
      1) Maximum Hanger Spacing: 6 ft.
         (a) Provide metal saddles at each hanger, min 24" in length.
      2) Hanger Rod Diameter: 3/8 inch.

END OF SECTION

SECTION 22 10 06
PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Drains.

B. Cleanouts.

C. Water hammer arrestors.

D. Mixing valves.

E. Floor drain trap seals.

1.03 RELATED REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Procedures for Owner-supplied products.

B. Section 22 10 05 - Plumbing Piping.

C. Section 22 30 00 - Plumbing Equipment.

D. Section 22 40 00 - Plumbing Fixtures.

E. Section 26 05 83 - Wiring Connections: Electrical characteristics and wiring connections.

1.04 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ASME A112.6.3 - Floor Drains; 2022.

C. ASME A112.6.4 - Roof, Deck, and Balcony Drains; 2022.

D. ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers; 2023.

E. ASSE 1012 - Performance Requirements for Backflow Preventers with an Intermediate Atmospheric Vent; 2021.

F. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Prevention Assemblies; 2021.

G. ASSE 1019 - Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance; 2023.

H. ASTM C478 - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections; 2019.

I. NSF 61 - Drinking Water System Components - Health Effects; 2024.

J. NSF 372 - Drinking Water System Components - Lead Content; 2024.

K. PDI-WH 201 - Water Hammer Arresters; 2017.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.

C. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Accept specialties on site in original factory packaging. Inspect for damage.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.02 DRAINS

A. Manufacturers:
   1. Wade Drain (Tyler Pipe): www.wadedrains.com
   2. MIFAB, Inc: www.mifab.com/#sle.
   3. Zurn Industries, Inc: www.zurn.com.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Floor Drain (See Schedule on Drawings):
   1. ASME A112.6.3; lacquered cast iron or stainless steel, two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable nickel-bronze strainer.

2.03 CLEANOUTS

A. Manufacturers:
   1. Jay R. Smith Manufacturing Company: www.jayrsmith.com.
   2. Wade Drain (Tyler Pipe): www.wadedrains.com
   3. Josam Company: www.josam.com.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Cleanouts at Exterior Surfaced and Unsurfaced Areas (COTG/DCOTG):
   1. Line type with lacquered heavy duty cast iron body and round epoxy coated gasketed cover.

C. Cleanouts at Interior Finished Floor Areas (FCO):
   1. Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round gasketed scored cover in service areas and round gasketed depressed cover to accept floor finish in finished floor areas.

D. Cleanouts at Interior Finished Wall Areas (WCO):
   1. Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.

2.04 WATER HAMMER ARRESTORS

A. Water Hammer Arrestors:
   1. Copper construction, piston type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range 34 to 250 degrees F and maximum 150 psi working pressure.

2.05 MIXING VALVES

A. Thermostatic Mixing Valves:
   1. Accessories:
      a. Check valve on inlets.
      b. Stem thermometer on outlet.
      c. Strainer stop checks on inlets.

2.06 FLOOR DRAIN TRAP SEALS

A. Manufacturers:
   1. Green Drains; GD4: www.greendrains.com/#sle.

2. MIFAB, Inc; MI-GARD: www.mifab.com/#sle.
3. Substitutions: See Section 01 60 00 - Product Requirements.

B. Description: Push-fit EPDM or silicone fitting with a one-way membrane.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.

C. Encase exterior cleanouts in concrete flush with grade.

D. Install floor cleanouts at elevation to accommodate finished floor.

E. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibbs.

F. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to all quick closing valves.

3.02 CONNECTIONS

A. Piping installation requirements are specified in Section 22 10 05 - Plumbing Piping. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Make piping connections between interceptors and piping systems.

3.03 IDENTIFICATION

A. Identification materials specified in Section 22 05 53 - Identification for Plumbing Piping and Equipment. Installation specified in Section 312000 "Earthwork." Arrange for installation of green warning tapes directly over piping and at outside edges of underground interceptors.
1. Use warning tapes or detectable warning tape over ferrous piping.

This page was intentionally left blank for duplex printing.

SECTION 22 30 00
PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Commercial electric water heaters.

B. Expansion Tanks.

1.03 RELATED REQUIREMENTS

A. Section 26 05 83 - Wiring Connections: Electrical characteristics and wiring connections.

1.04 REFERENCE STANDARDS

A. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

B. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels; 2025, with Errata .

1.05 REFERENCE STANDARDS

A. ANSI Z21.10.1 - Gas Water Heaters, Volume I, Storage Water Heaters with Input Ratings of 75,000 Btu per Hour or Less; 2019 (Reaffirmed 2024).

B. ANSI Z21.10.3 - Gas-Fired Water Heaters, Volume III, Storage Water Heaters with Input Ratings Above 75,000 Btu per Hour, Circulating and Instantaneous; 2019 (Reaffirmed 2024).

C. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels; 2025, with Errata .

D. ICC (IPC) - International Plumbing Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. UL 174 - Standard for Household Electric Storage Tank Water Heaters; Current Edition, Including All Revisions.

F. UL 778 - Standard for Motor-Operated Water Pumps; Current Edition, Including All Revisions.

G. UL 1453 - Standard for Electric Booster and Commercial Storage Tank Water Heaters; Current Edition, Including All Revisions.

H. NSF 61 - Drinking Water System Components - Health Effects; 2012.

I. NSF 372 - Drinking Water System Components - Lead Content; 2011.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittals procedures.

B. Product Data:
   1. Product Data: Provide manufacturer's literature and data sheets for each product. Include information on materials of fabrication, assembly of components, dimensions, weights, capabilities, performance, electrical characteristics, location and sizes of connections, service and access locations, and manufacturer-provided and field-installed accessories.
   2. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
   3. Provide electrical characteristics and connection requirements.

C. Manufacturer's Instructions: Indicate clearances and connection requirements.

D. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer warranty for domestic water heaters.

PART 2 PRODUCTS

2.01 WATER HEATERS

A. Electric Tank Type Water Heater (See Plumbing Schedule)
   1. Manufacturers:
      a. Rheem
      b. A.O. Smith
      c. Substitutions: See Section01 60 00-Product Requirements

B. Commercial Electric Water Heaters:
   1. Type: Factory-assembled and wired, electric, vertical storage.
   2. Minimum Efficiency Required: ASHRAE Std 90.1 I-P.
   3. Performance:
   4. Electrical Characteristics:
   5. Tank: Glass lined welded steel; 4 inch diameter inspection port, thermally insulated with minimum 2 inches glass fiber encased in corrosion-resistant steel jacket; baked-on enamel finish.
   6. Controls: Automatic immersion water thermostat; externally adjustable temperature range from 60 to 180 degrees F, flanged or screw-in nichrome elements, high temperature limit thermostat.
   7. Accessories:
   8. Heating Elements: Flange-mounted immersion elements; individual elements sheathed with Incoloy corrosion-resistant metal alloy, rated less than 75 W/sq in.

2.02 EXPANSION TANKS (SEE PLUMBING SCHEDULE)

A. Construction: Welded steel, tested and stamped in accordance with ASME BPVC-VIII-1; supplied with National Board Form U-1, rated for working pressure of 125 psig, with flexible EPDM diaphragm sealed into tank, and steel legs or saddles.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.

B. Coordinate with plumbing piping and related electrical work to achieve operating system.

C. Domestic Water Storage Tanks:
   1. Provide steel pipe support, independent of building structural framing members.
   2. Clean and flush prior to delivery to site. Seal until pipe connections are made.

END OF SECTION

SECTION 22 40 00
PLUMBING FIXTURES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Water Closets

B. Urinals

C. Lavatories

D. Mop Sinks

E. Bi-level, electric water coolers.

1.03 RELATED REQUIREMENTS

A. Section 07 92 00 - Joint Sealants: Sealing joints between fixtures and walls and floors.

B. Section 22 10 05 - Plumbing Piping.

C. Section 22 10 06 - Plumbing Piping Specialties.

D. Section 22 30 00 - Plumbing Equipment.

E. Section 26 05 83 - Wiring Connections: Electrical characteristics and wiring connections.

1.04 REFERENCE STANDARDS

A. ANSI Z358.1 - American National Standard for Emergency Eyewash and Shower Equipment; 2014, with Editorial Revision (2020).

B. ASHRAE Std 18 - Methods of Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration; 2008 (Reaffirmed 2013).

C. ASME A112.6.1M - Floor-Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use; 1997 (Reaffirmed 2017).

D. ASME A112.18.1 - Plumbing Supply Fittings; 2024.

E. ASME A112.19.1 - Enamelled Cast Iron and Enamelled Steel Plumbing Fixtures; 2024.

F. ASME A112.19.3 - Stainless Steel Plumbing Fixtures; 2022.

G. ASME A112.19.5 - Flush Valves and Spuds for Water Closets, Urinals, and Tanks; 2017.

H. ASSE 1070 - Performance Requirements for Water Temperature Limiting Devices; 2020.

I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026a.

J. IAPMO Z124 - Plastic Plumbing Fixtures; 2017, with Errata.

K. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.

L. NSF 61 - Drinking Water System Components - Health Effects; 2024.

M. NSF 372 - Drinking Water System Components - Lead Content; 2024.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

C. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.07 REGULATORY REQUIREMENTS

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

1.08 DELIVERY, STORAGE, AND HANDLING

A. Accept fixtures on site in factory packaging. Inspect for damage.

B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer warranty for electric water cooler.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 FLUSH VALVE WATER CLOSETS (SEE PLUMBING SCHEDULE)

A. Water Closets: Vitreous china, ASME A112.19.2, floor mounted, siphon jet flush action.

B. Flush Valves: ASME A112.18.1, diaphragm type, complete with vacuum breaker stops and accessories.
   1. Manual-Operated Type: Oscillating lever handle, manual operation.
   2. Manufacturers:
      a. Sloan Valve Company: www.sloanvalve.com/#sle.
      b. Zurn Industries, LLC: www.zurn.com/#sle.
      c. Substitutions: See Section 01 60 00 - Product Requirements.

C. Seats:
   1. Plastic: Solid, white finish, enlongated shape, open front, slow-closing hinged seat cover, and brass bolts with covers.

2.03 WALL HUNG URINALS (SEE PLUMBING SCHEDULE)

A. Wall Hung Urinal Manufacturers:
   1. American Standard, Inc: www.americanstandard-us.com/#sle.
   2. Kohler Company: www.kohler.com/#sle.
   3. Zurn Industries, LLC: www.zurn.com/#sle.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Vitreous china, ASME A112.19.2, wall hung with side shields and concealed carrier.
   1. Consumption Volume: 0.5 gal per flush, maximum.
   2. Flush Style: Siphon jet.
   3. Flush Valve: Exposed (top spud).
   4. Flush Operation: Manual oscillating handle.
   5. Trapway Outlet: Integral.
   6. Removable stainless steel strainer.

C. Flush Valves: ASME A112.18.1, diaphragm type, complete with vacuum breaker stops and accessories.
   1. Manual-Operated Type: Oscillating lever handle, manual operation.

2.04 LAVATORIES (SEE PLUMBING SCHEDULE)

A. Under-Mount Basin:
   1. Vitreous China: ASME A112.19.2; white interior, rectangular shape, front overflow, seal of putty, caulking, or concealed vinyl gasket, and white exterior finish. Size as indicated on drawings.

B. Sensor Operated Faucet: Cast brass, chrome-plated, deck mounted with sensor located on neck of spout.
   1. Cast brass, chrome plated, deck mounted with sensor located on neck of spout.

C. Thermostatic Mixing Valve:
   1. ASSE 1070 listed with combination stop, strainer, and check valves, and flexible stainless steel connectors.

2.05 BI-LEVEL, ELECTRIC WATER COOLERS

A. Manufacturers:
   1. Elkay Manufacturing Company: www.elkay.com/#sle.
   2. Haws Corporation: www.hawsco.com/#sle.
   3. Oasis International: www.oasiscoolers.com/#sle.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Water Cooler: Bi-level, electric, mechanically refrigerated; surface mounted, ADA compliant; stainless steel top, stainless steel body, elevated anti-squirt bubbler with stream guard, automatic stream regulator, push button, mounting bracket; integral air cooled condenser and stainless steel grille.
   1. Capacity: 8 gph of 50 degrees F water with inlet at 80 degrees F and room temperature of 90 degrees F, when tested in accordance with ASHRAE Std 18.
   2. Electrical: 115 VAC, 60 Hertz compressor, 6 foot cord and plug for connection to electric wiring system including grounding connector.

C. Bottle Filler: Materials to match fountain.

2.06 MOP SINKS

A. Manufacturers:
   1. Acorn Engineering Company: www.acorneng.com/#sle.
   2. Just Manufacturing Company: www.justmfg.com/#sle.
   3. Zurn Industries, LLC: www.zurn.com/#sle.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Material: Terrazzo.

C. Shape: Square

D. Grid Strainer: Stainless steel; integral; removable.

E. Grid strainer: Stainless steel; integral; removable.

F. Dimensions: As indicated on drawings.

G. Accessories:
   1. Hose clamp hanger.
   2. Mop hanger.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.

B. Verify rough-ins for field connections match sizes and locations shown on drawings.

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

D. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.02 PREPARATION

A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.03 INSTALLATION

A. Install each fixture with trap, easily removable for servicing and cleaning.

B. Provide chrome plated rigid or flexible supplies to fixtures with wheel handle stops, reducers, and escutcheons.

C. Install components level and plumb.

D. Install and secure fixtures in place with wall supports and bolts.

E. Seal fixtures to wall and floor surfaces with sealant as specified in Section 07 92 00, color to match fixture.

F. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.

3.04 INTERFACE WITH WORK OF OTHER SECTIONS

A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.05 ADJUSTING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.06 CLEANING

A. Clean plumbing fixtures and equipment.

3.07 PROTECTION

A. Protect installed products from damage due to subsequent construction operations.

B. Do not permit use of fixtures by construction personnel.

C. Repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 23 05 10
BASIC HVAC REQUIREMENTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 PROJECT MANAGEMENT

A. Drawings are diagrammatic, all offsets, fitting, valves and accessories are not shown. Refer to all drawings in the contract documents and plan work accordingly. Coordinate with all trades and crafts.

B. In case of interference between trades, Architect Engineer will decide which work is to take precedence regardless of work that might be installed.

1.03 CODES, ORDINANCES, INSPECTIONS, AND PERMITS

A. Execute and inspect Work in accordance with local and state codes, laws, ordinances, rules and regulations applicable to particular class of Work.

B. Should any part of Drawings or specifications be found to be in conflict with applicable codes or ordinances, notify the Architect Engineer, in writing, 72 hours prior to receiving of bids. After the receiving of bids, any discovery of code violations shall be promptly reported to the Architect Engineer. Any work performed knowingly in violation of codes shall be corrected without additional expense to the Owner or their representative.

C. All HVAC work shall comply with latest State and local Mechanical Codes in Design-Builder.

D. Arrange with County, City, or State, if City has no ordinances covering work, for complete inspection, paying all charges pertaining thereto. Give proper authority all requisite notice relating to work under such; afford Architect Engineer and all authorized inspectors every facility for inspection and be responsible for all violations of law. Upon completion of Work, have Work inspected, if required, obtaining certificate of inspection and approval from inspecting agency and deliver such certificate to Architect Engineer. Comply with Division 01.

1.04 COORDINATION

A. Conduct multi-trade coordination and preinstallation meetings to establish bottom elevations of all piping, ductwork and conduit before fabrication and installation. Comply with Division 01.

B. All equipment shall be installed in accordance with the manufacturer's recommendations. It is the contractor's responsibility to follow all installation requirements and guidelines provided in the manufacture's installation manual. If there is a conflict with regards to installation, the contractor shall stop work and notify the design Architect Engineer representative.

1.05 SUBMITTALS

A. Comply with Division 01.

B. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for HVAC equipment, HVAC piping specialties, air distribution devices and others as may be requested.

C. Shop Drawings: Miscellaneous steel for pipe support, duct support, pipe guides, anchors, and miscellaneous steel used for supporting any mechanical equipment.

1.06 SUBSTITUTIONS

A. Comply with Division 01.

B. Any proposed substitutions of equipment shall be accompanied by shop drawings showing revised equipment layouts, piping diagrams, ductwork drawings and/or wiring diagrams. Where substituted equipment furnished requires use of larger, more, or differently arranged connections, such connections shall be installed to the complete satisfaction of Architect Engineer without additional cost to Owner.

C. Should a substitution be accepted and subsequently proven unsatisfactory for the service intended within the warranty period, the Contractor shall replace this material or equipment with that as originally specified, or corrected as directed by Architect Engineer.

1.07 CLEAN UP

A. Comply with Division 01.

B. Do not allow waste material or rubbish to accumulate in or about job site.

C. Any discoloration or other damage to parts of building, its finish or furnishings due to failure to properly clean or keep clean mechanical systems shall be repaired without cost to Owner.

1.08 EQUIPMENT START-UP AND SYSTEM COORDINATION

A. Comply with Division 01.

B. The Contractor shall be responsible for placing all equipment and system components into operation. Individual components shall be coordinated with other parts of Mechanical, Electrical, Plumbing and/or Fire Protection Systems to ensure that the entire project functions as designed and described by the contract documents.

1.09 CUTTING AND PATCHING

A. Comply with Division 01.

B. Provide all cutting and patching required to perform the mechanical work, when alteration, repair, renovation, or addition, to existing construction.

1.10 DEMOLITION

A. Comply with Section 02 41 00 - Demolition.

1.11 RECORD DOCUMENTS

A. Comply with Division 01.

1.12 OPERATION INSTRUCTIONS

A. Comply with Division 01.

B. Printed instructions covering the operation and maintenance of each major item of equipment, shall be provided in 2 bound manuals containing complete repair parts lists, and operating service and maintenance instructions for all equipment provided.

1.13 INSTRUCTION

A. Comply with Section 01 79 00 - Demonstration and Training.

1.14 FLASHINGS

A. Refer to Division 07 for roof flashings.

1.15 ACCESS PANELS

A. Comply with Section 08 31 00 - Access Doors.

B. Provide access panels as necessary for servicing of fire dampers, smoke dampers, valves, VAV terminals and any other equipment in concealed spaces.

1.16 PAINT EXTERIOR PIPING

A. All exterior steel piping shall be painted using a metal primer coat, second coat of enamel, top coat of enamel and a finish coat of gloss.

1.17 LOCAL SITE CONDITIONS

A. Before bidding, make complete investigation at site in order to be informed as to location of utilities and as to conditions under which work is to be performed. Utility locations shown were obtained from surveys and/or local utility companies and are not to be assumed as being accurate.

B. Make determination of soil conditions before bidding. These specifications and accompanying drawings in no way imply as to condition of soil to be encountered.

1.18 GUARANTY-WARRANTY

A. This guarantee shall include capacity and integrated performance of component parts of various systems in strict accord with the true intent and purpose of these specifications. Conduct such tests as herein specified or as may be required by the Architect Engineer to demonstrate capacity and performance ability of various systems to maintain specified conditions.

B. All materials and equipment shall be new and unused and shall carry a full year's warranty from time Owner accepts building or the date of substantial completion, whichever is earlier, regardless of start-up date of equipment, unless a longer warranty period is specified under other sections.

1.19 EQUIPMENT CONNECTIONS AND INSTALLATION

A. Each equipment item with drain connections, shall be provided with a properly-sized drain run to the nearest floor drain or as directed.

B. Rough-in and make final connection to all equipment requiring same, furnished under other Divisions of these specifications or by the Owner.
   1. Provide necessary labor and materials, including stop valves, traps, pressure-reducing valves, etc. necessary. Trap and vent drainage connections as required.
   2. If equipment or fixtures to be furnished by Owner and/or Owner's vendor are not delivered prior to final acceptance, services shall be capped or plugged at walls or floor as directed, ready for future connection.

C. No equipment or fixture shall be "roughed-in" until proper rough-in drawings are in the hands of the trade doing the work.

D. Unless another form of vibration isolation is used, all equipment shall be mounted at least on neoprene pads.

1.20 ELECTRICAL

A. Furnish and install all electrical interlock, control and other wiring, not covered specifically under the electrical plans and specifications, for proper operation and control of all equipment specified under this Division of the specifications.

B. Provide electrical disconnects for all mechanical equipment as per NEC.

C. Supervise and coordinate all electrical work in connection with mechanical system.

1.21 MOTOR CONTROLLERS

A. Furnish all motor controllers or contactors, not furnished as part of a motor control center, for proper operation of all motors.

B. Where motor controllers or contactors are furnished as part of a motor control center, provide a schedule of every motor or equipment item furnished, its voltage requirements, type controller required, accessories required and interlocks. This schedule shall be submitted within 45 days of Notice to Proceed to Architect Engineer and supplier of motor control center for approval.

C. Provide variable frequency drive controllers on all HVAC fan and pump motors that are three phase powered regardless if they serve a constant flow or variable flow system.

D. Provide a motor mounterd potentiometer dial on all HVAC motors that are electronic commutation (EC) motors.

E. Provide variable speed solid state controllers on all HVAC fan motors that are single phase powered and are not electronic commutation (EC) motors.

F. All starters and switches shall be in a proper NEMA enclosure and shall be identified with engraved laminated plastic label.

1.22 EQUIPMENT FEATURES

A. All belt driven fans shall include an automatice belt tensioner to maintain belt tension after start-up.

1.23 EXCAVATION, TRENCHING, AND BACKFILLING

A. All excavation, trenching and backfilling in connection with the mechanical system, to a point 5'0" outside the building, is included as part of this Division.

B. All excavation required shall be done as part of the bid price regardless of any implied conditions on the plans or in these specifications.

C. Excavation to have 12 inch minimum and 24 inch maximum clearance on all sides. Do not carry excavation below required level unless indicated otherwise on the drawings. Excess excavation below required level shall be backfilled at no expense to Owner with earth, sand, gravel or concrete, as directed by Architect Engineer and thoroughly compacted. Remove any unstable soil and replace with gravel, crushed stone or clean sand and thoroughly compact. Architect Engineer will determine the depth of removal of any unstable soil encountered. Grade ground adjacent to excavations to prevent water running in. Remove, by pumping or other means any water accumulated in excavation.

D. Banks of trenches shall be vertical or as shown on the drawings. Width of trench to be 5 inches minimum, 8 inches maximum on each side of pipe bell. Bottom of trench for sewers and culverts shall be rounded so that an arc of circumference equal to 0.6 of outside diameter or pipe rests on undisturbed soil wherever practicable. Excavate bell holes accurately to size by hand. In rock, excavations shall be carried 8 inches below bottom of pipe. Use loose earth or gravel for backfill and tamp thoroughly.

E. Bracing, sheathing and shoring shall be performed as necessary to complete and protect excavations indicated on the drawings, as required for safety, as directed by Architect Engineer, or to conform to governing laws.

F. After piping, conduit, ducts, etc. have been installed, inspected, tested and approved by governing agency, backfill trenches with clean, stable soil free from stones. Place backfill in 4 inch layers, tamped under and around pipe and conduit to height of at least 2'0" above pipe. Tamping shall be done in such manner as not to disturb underlying work. Remainder of trenches and excavations shall be backfilled with clean, stable earth, deposited in 8 inch layers and brought up to rough grade, with each layer compacted to density of surrounding soil. Remove sheathing and shoring as backfill is placed and fill space with dry sand. Compaction tests in accordance with Division 31 may be required by the Architect Engineer, with the costs paid by the Contractor.

G. Replace existing appurtenances removed or damaged in connection with work, and restore to original conditions, unless otherwise directed.

1.24 SEISMIC QUALIFICATION OF EQUIPMENT

A. Provide manufacturer's certificate of compliance for the following equipment requiring seismic qualifications.
   1. Air handling equipment
   2. Air terminal units
   3. Boilers
   4. Pumps

5. Heat Exchangers
6. Chillers

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 23 05 13
COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General construction and requirements.

B. Single phase electric motors.

C. Three phase electric motors.

D. Electronically Commutated Motors (ECM).

1.02 REFERENCE STANDARDS

A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings; 2015 (Reaffirmed 2020).

B. IEEE 112 - IEEE Standard Test Procedure for Polyphase Induction Motors and Generators; 2017.

C. NEMA MG 00001 - Motors and Generators; 2024.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Operation Data: Include instructions for safe operating procedures.

C. Maintenance Data: Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

1.04 QUALITY ASSURANCE

A. Comply with NFPA 70.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

1.06 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 GENERAL CONSTRUCTION AND REQUIREMENTS

A. Electrical Service:
   1. Motors 1/2 HP and Smaller: 115 volts, single phase, 60 Hz.

B. Construction:
   1. Open drip-proof type except where specifically noted otherwise.
   2. Design for continuous operation in 104 degrees F environment.
   3. Design for temperature rise in accordance with NEMA MG 00001 limits for insulation class, service factor, and motor enclosure type.

C. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.

D. Wiring Terminations:
   1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.

2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

2.02 SINGLE PHASE POWER - SPLIT PHASE MOTORS

A. Starting Torque: Less than 150 percent of full load torque.

B. Starting Current: Up to seven times full load current.

C. Breakdown Torque: Approximately 200 percent of full load torque.

D. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve or ball bearings.

E. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

2.03 SINGLE PHASE POWER - PERMANENT-SPLIT CAPACITOR MOTORS

A. Starting Torque: Exceeding one fourth of full load torque.

B. Starting Current: Up to six times full load current.

C. Multiple Speed: Through tapped windings.

D. Open Drip-proof or Enclosed Air Over Enclosure: Class A (50 degrees C temperature rise) insulation, minimum 1.0 Service Factor, prelubricated sleeve or ball bearings, automatic reset overload protector.

2.04 SINGLE PHASE POWER - CAPACITOR START MOTORS

A. Starting Torque: Three times full load torque.

B. Starting Current: Less than five times full load current.

C. Pull-up Torque: Up to 350 percent of full load torque.

D. Breakdown Torque: Approximately 250 percent of full load torque.

E. Motors: Capacitor in series with starting winding; provide capacitor-start/capacitor-run motors with two capacitors in parallel with run capacitor remaining in circuit at operating speeds.

F. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve bearings.

G. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

2.05 THREE PHASE POWER - SQUIRREL CAGE MOTORS

A. Starting Torque: Between 1 and 1-1/2 times full load torque.

B. Starting Current: Six times full load current.

C. Power Output, Locked Rotor Torque, Breakdown or Pull Out Torque: NEMA Design B characteristics.

D. Design, Construction, Testing, and Performance: Comply with NEMA MG 00001 for Design B motors.

E. Insulation System: NEMA Class B or better.

F. Testing Procedure: In accordance with IEEE 112. Load test motors to determine free from electrical or mechanical defects in compliance with performance data.

G. Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.

H. Thermistor System (Motor Frame Sizes 254T and Larger): Three PTC thermistors embedded in motor windings and epoxy encapsulated solid state control relay for wiring into motor starter.

I. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum ABMA STD 9, L-10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.

J. Sound Power Levels: To NEMA MG 00001.

K. Nominal Power Factor: As indicated at full load and rated voltage when tested in accordance with IEEE 112.

2.06 ELECTRONICALLY COMMUTATED MOTORS (ECM)

A. Motor to be an electronic commutation (EC) motor specifically designed for HVAC applications. AC induction type motors are not acceptable. Examples of unacceptable motors are: Shaded Pole, Permanent Split Capacitor (PSC), Split Phase, Capacitor Start and 3 phase induction type motors. Motors shall be permanently lubricated with heavy-duty ball bearings to match the fan load and prewired to the specific voltage and phase. Internal motor circuitry shall convert AC power supplied to the fan to DC power to operate the motor. Motor shall be speed controllable down to 20% of full speed (80% turndown). Speed shall be controlled by either a potentiometer dial mounted on the motor or by a 0-10 VDC signal as scheduled. Motor shall be a minimum of 85% efficient at all speeds.

B. Applications:
   1. Commercial:
      a. Roof Top Unit:
         1) Operating Mode: Constant speed.
         2) Input: Motor manufacturer to coordinate control requirements with the control board of the roof top unit and/or specified sequence of operation.
         3) Shaft Extension: Single.
         4) RPM: 300 through 1200.
      b. DX Fan Coil Unit:
         1) Operating Mode: Constant cfm.
         2) Input: Motor manufacturer to coordinate control requirements with the control board of the DX fan coil unit and/or specified sequence of operation.
         3) Shaft Extension: Single.
         4) Options: Remote mount control/User-Interface.
         5) RPM: 300 through 1250.
      c. Hydronic Fan Coil Unit:
         1) Operating Mode: Constant cfm.
         2) Input: Motor manufacturer to coordinate control requirements with the control board of the fan coil unit and/or specified sequence of operation.
         3) Shaft Extension: Single.
         4) Options: User-interface.
         5) RPM: 300 through 1250.
      d. Power Roof Ventilator (PRV):
         1) Operating Mode: Constant cfm.
         2) Input: Motor manufacturer to coordinate control requirements with the control board of the PRV and/or specified sequence of operation.
         3) Shaft Extension: Single.
         4) Options: Remote mount control.
      e. Energy Recovery Ventilator:
         1) Operating Mode: Constant cfm.
         2) Input: Motor manufacturer to coordinate control requirements with the control board of the energy recovery ventilator and/or specified sequence of operation.
         3) Shaft Extension: Single.
         4) Options: Remote mount control.

f. Hydronic Pump:
   1) Operating Mode: Constant speed.
   2) Input: Motor manufacturer to coordinate control requirements with the control board of the hydronic pump and/or specified sequence of operation.
   3) Flange Configuration: "C".

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.

C. Check line voltage and phase and ensure agreement with nameplate.

END OF SECTION

SECTION 23 05 19
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.

D. Filter gauges.

1.02 REFERENCE STANDARDS

A. ASME B40.100 - Pressure Gauges and Gauge Attachments; 2022.

B. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers; 2014 (Reapproved 2025).

C. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers; 2014 (Reapproved 2021).

D. UL 393 - Indicating Pressure Gauges for Fire-Protection Service; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.

1.04 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. Size: 4-1/2 inch diameter.
   3. Mid-Scale Accuracy: One percent.
   4. Scale: Psi.

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 - Fixed Mounting: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish.
   1. Size: 9 inch scale.
   2. Window: Clear Acrylic on ranges to 300 F.
   3. Accuracy: 2 percent, per ASTM E77.
   4. Calibration: Degrees F.

B. 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 Acrylic on ranges to 300 F.
   3. Stem: 3/4 inch NPT brass.
   4. Accuracy: 2 percent, per ASTM E77.
   5. Calibration: Degrees F.

2.04 DIAL THERMOMETERS

A. Thermometers - Fixed Mounting: Dial type bimetallic actuated; ASTM E1; stainless steel case, silicone fluid damping, white with black markings and black pointer, hermetically sealed lens, stainless steel stem.
   1. Size: 5 inch diameter dial.
   2. Lens: Clear glass.
   3. Accuracy: 1 percent.
   4. Calibration: Degrees F.

2.05 THERMOMETER SUPPORTS

A. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.

B. Flange: 3 inch outside diameter reversible flange, designed to fasten to sheet metal air ducts, with brass perforated stem.

2.06 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.

2.07 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.

B. Inclined manometer, red liquid on white background with black figures, front recalibration adjustment, 3 percent of full scale accuracy.

C. Accessories: Static pressure tips with compression fittings for bulkhead mounting, 1/4 inch diameter tubing.

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 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.

D. Install thermometer sockets adjacent to controls system thermostat, transmitter, or sensor sockets. Where thermometers are provided on local panels, duct or pipe mounted thermometers are not required.

E. Locate duct mounted thermometers minimum 10 feet downstream of mixing dampers, coils, or other devices causing air turbulence.

F. Coil and conceal excess capillary on remote element instruments.

G. Provide instruments with scale ranges selected according to service with largest appropriate scale.

H. Install gauges and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.

I. Adjust gauges and thermometers to final angle, clean windows and lenses, and calibrate to zero.

J. Locate test plugs adjacent thermometers and thermometer sockets.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 23 05 29
HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment components.

B. Retrofit piping cover system.

1.02 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

B. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2022).

C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.

D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

E. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General-Purpose Piping; 2025.

F. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2024.

G. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures; 1999 (Reapproved 2022).

H. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.

I. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2022.

J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026a.

K. FM (AG) - FM Approval Guide; current edition.

L. MFMA-4 - Metal Framing Standards Publication; 2004.

M. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2025.

N. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

O. UL (DIR) - Online Certifications Directory; Current Edition.

P. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components 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. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.

5. Notify Architect Engineer 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.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.
1. Fiberglass Channel (Strut) Framing Systems: Include requirements for strength derating according to ambient temperature.

1.05 QUALITY ASSURANCE

A. Comply with applicable building code.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of 3.5. Include consideration for vibration, equipment operation, and shock loads where applicable.
4. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
1. Comply with MFMA-4.

C. Fiberglass Channel (Strut) Framing Systems:
1. Factory-fabricated continuous-slot fiberglass channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
2. Channel Material: Use polyester resin or vinyl ester resin.
3. Minimum Channel Dimensions: 1-5/8 inch width by 1 inch height.
4. Flammability: Fire retardant with NFPA 101, Class A flame spread index (maximum of 25) when tested in accordance with ASTM E84; self-extinguishing in accordance with ASTM D635.

D. Hanger Rods:
1. Threaded zinc-plated steel unless otherwise indicated.
2. Minimum Size, Unless Otherwise Indicated or Required:
a. Equipment Supports: 1/2 inch diameter.

b. Piping up to 1 inch: 1/4 inch diameter.
c. Piping larger than 1 inch: 3/8 inch diameter.
d. Trapeze Support for Multiple Pipes: 3/8 inch diameter.

E. Thermal Insulated Pipe Supports:
1. General Requirements:
a. Insulated pipe supports to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
b. Surface Burning Characteristics: Flame spread index/smoke developed index of 5/30, maximum, when tested in accordance with ASTM E84 or UL 723.
c. Pipe supports to be provided for nominally sized, 1/2 to 30 inch iron pipes.
d. Insulation inserts to consist of rigid polyisocyanurate (urethane) insulation surrounded by a galvanized steel jacketing.
2. Pipe insulation protection shields to be provided at the hanger points and guide locations on pipes requiring insulation as indicated on drawings.

F. Pipe Supports:
1. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
2. Liquid Temperatures Up To 122 degrees F:
a. Overhead Support: MSS SP-58 Types 1, 3 through 12.
b. Support From Below: MSS SP-58 Types 35 through 38.

G. Beam Clamps:
1. MSS SP-58 types 19 through 23, 25 or 27 through 30 based on required load.
2. Beam C-Clamp: MSS SP-58 type 23, malleable iron and steel with plain, stainless steel, and zinc finish.
3. Small or Junior Beam Clamp: MSS SP-58 type 19, malleable iron with plain finish. For inverted usage provide manufacturer listed size(s).
4. Wide Mouth Beam Clamp: MSS SP-58 type 19, malleable iron with plain finish.
5. Centerload Beam Clamp with Extension Piece: MSS SP-58 type 30, malleable iron with plain finish.
6. FM (AG) and UL (DIR) Approved Beam Clamp: MSS SP-58 type 19, plain finish,
7. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.
8. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.

H. Riser Clamps:
1. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.
2. MSS SP-58 type 1 or 8, carbon steel or steel with epoxy plated, plain, stainless steel, or zinc plated finish.
3. Medium Split Horizontal Pipe Clamp: MSS SP-58 type 4, carbon steel or stainless steel with epoxy plated, plain, stainless steel, or zinc plated finish.
4. Copper Tube Pipe Clamp: MSS SP-58 type 8, epoxy plated copper.
5. UL (DIR) listed: Pipe sizes 1/2 to 8 inch.

I. Offset Pipe Clamps: Double-leg design two-piece pipe clamp.

J. Strut Clamps:
1. Pipe Clamp: Two-piece rigid, universal, or outer diameter type, carbon steel with epoxy copper or zinc finish.

K. Insulation Clamps:
1. Two bolt-type clamps designed for installation under insulation.
2. Material: Carbon steel with epoxy copper or zinc finish.

L. Pipe Hangers:
   1. Hangers:
      a. Provide hinged split ring and yoke roller hanger with plain finish.
      b. Material: ASTM A47/A47M malleable iron or ASTM A36/A36M carbon steel.
      c. Provide hanger rod and nuts of the same type and material for a given pipe run.
      d. Provide coated or plated hangers to isolate steel hangers from dissimilar metal tube or pipe.

M. Nonmetallic Pipe Hangers:

N. Intermediate Pipe Guides:
   1. Pipe Diameter 6 inch and Smaller: Provide minimum clearance of 0.16 inch.
   2. Pipe Sizes 8 inch: 0.625 inch U-bolt with double nuts providing minimum clearance of 0.28 inch.
   3. Pipe Size 10 inch: 0.75 inch U-bolt.
   4. Pipe Sizes 12 to 16 inch: 0.875 inch U-bolt.
   5. Pipe Sizes 18 to 30 inch: 1 inch U-bolt.
   6. Use pipe clamps with oversize pipe sleeve that provides clearance around pipe.

O. Pipe Alignment Guides: Galvanized steel.
   1. Pipe Sizes 8 inch and Smaller: Spider or sleeve type.
   2. Pipe Sizes 10 inch and Larger: Roller type.
   3. Pipe Sizes 18 to 30 inch: 1 inch U-bolt.

P. Dielectric Barriers: Provide between metallic supports and metallic piping and associated items of dissimilar type; acceptable dielectric barriers include rubber or plastic sheets or coatings attached securely to pipe or item.

Q. Nonpenetrating Rooftop Supports for Low-Slope Roofs:
   1. Provide steel pedestals with thermoplastic or rubber base 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.
   2. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
   3. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
   4. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.

R. Anchors and Fasteners:
   1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
   2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
   3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
   4. Hollow Masonry: Use toggle bolts.
   5. Hollow Stud Walls: Use toggle bolts.
   6. Steel: Use beam-ceiling clamps, beam clamps, machine bolts, or welded threaded studs.
   7. Sheet Metal: Use sheet metal screws.
   8. Wood: Use wood screws.
   9. Plastic and lead anchors are not permitted.
   10. Powder-actuated fasteners are not permitted.
   11. Hammer-driven anchors and fasteners are not permitted.
   12. 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. Manufacturer: Same as manufacturer of metal channel (strut) framing system.

2.02 RETROFIT PIPING COVER SYSTEM

A. General Requirements:
   1. Surface Burning Characteristics: Flame spread index/smoke developed index of 20/250, maximum, when tested in accordance with ASTM E84 or UL 723.

B. Materials:
   1. Piping Cover System: Removal-resistant, modular, snap-fit cover units, clips, and anchors for use with CPVC, steel, and copper piping systems.
   2. Cover Units: L-shaped and U-shaped cross-section units of flame retardant resin material, paintable finish.
   3. Unit Length: 7.5 feet.
   4. Provide coupling fittings for joining units end to end and prefabricated inside and outside corner fittings and end caps as required.
   5. Provide mounting clips to secure covers to wall-ceiling per manufacturer requirements.

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. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.

C. Unless specifically indicated or approved by Architect Engineer, do not provide support from suspended ceiling support system or ceiling grid.

D. Unless specifically indicated or approved by Architect Engineer, do not provide support from roof deck.

E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

F. Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.

G. 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.

H. Preset Concrete Inserts: Use manufacturer-provided closure strips to inhibit concrete seepage during concrete pour.

I. Secure fasteners according to manufacturer's recommended torque settings.

J. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - 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

SECTION 23 05 48
VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION

A. Intent:
   1. All equipment, piping, ductwork and electrical distribution as noted on the equipment schedule or in the specification shall be mounted using vibration isolators to prevent the transmission of vibration and mechanically transmitted sound to the building structure. Vibration isolators shall be selected in accordance with the weight distribution so as to produce reasonably uniform deflections.
   2. All isolators and isolation materials for the Project shall be of the same manufacturer and shall be certified by the manufacturer.
   3. It is the intent of the seismic portion of this specification to keep all life-safety, plumbing, mechanical and electrical building system components in place during a seismic event.
   4. All such systems shall be installed in strict accordance with seismic codes, component manufacturer's requirements and building construction standards. Whenever a conflict occurs between the manufacturer's requirements or construction standards, the most stringent shall apply.
   5. This specification is considered to be minimum requirements for seismic consideration and is not intended as a substitute for legislated, more stringent, national, state or local construction requirements (i.e. California Title 24, California OSHPD, Canadian Building Codes, or other requirements).
   6. Any variance or non-compliance with these specification requirements shall be corrected in an Architect Engineer approved manner and without additional expense to the Owner.
   7. Seismic restraints shall be designed in accordance with seismic design criteria as indicated on drawings and ASCE 7 chapter 13.

B. The work in this section includes, but is not limited to the following:
   1. Vibration isolation for piping, ductwork and equipment.
   2. Equipment isolation bases.
   3. Flexible piping connections.
   4. Seismic restraints for isolated equipment.
   5. Seismic restraints for non-isolated equipment.
   6. Certification of seismic restraint designs and installation supervision.
   7. Certification of seismic attachment of housekeeping pads.
   8. All life-safety, plumbing, mechanical and electrical systems. Equipment buried underground is excluded but entry of services through the foundation wall is included.

1.03 REFERENCE STANDARDS

A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

B. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications; Most Recent Edition Cited by Referring Code or Reference Standard.

C. FEMA 412 - Installing Seismic Restraints for Mechanical Equipment; 2002.

D. FEMA 413 - Installing Seismic Restraints for Electrical Equipment; 2004.

E. FEMA 414 - Installing Seismic Restraints for Duct and Pipe; 2004.

F. FEMA E-74 - Reducing the Risks of Nonstructural Earthquake Damage; 2012.

G. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems; 2008.

1.04 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 piping, conduit, 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 Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Seismic Design Data:
   1. Compile information on project-specific characteristics of actual installed HVAC 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.
      f. Applicability of overstrength factor (for certain anchorage in concrete and masonry).
   2. Include structural calculations, stamped or sealed by seismic controls designer, demonstrating suitability of seismic controls for seismic design forces.

C. Evidence of qualifications for seismic controls designer.

1.06 CODE AND STANDARDS REQUIREMENTS

A. Applicable codes and standards are referenced on the drawings.

B. ASCE 7, Chapter 13.

1.07 MANUFACTURER'S RESPONSIBILITY

A. Manufacturer of vibration isolation and seismic control equipment shall have the following responsibilities:
   1. Determine vibration isolation and seismic restraint sizes and locations.
   2. Provide vibration isolation and seismic restraints as scheduled or specified.
   3. Provide calculations and materials if required for restraint of unisolated equipment.
   4. Provide installation instructions, drawings and trained field supervision to insure proper installation and performance.

1.08 RELATED WORK

A. Housekeeping Pads:
   1. Housekeeping pad reinforcement and monolithic pad attachment to the structure details and design shall be prepared by the supplier of restraints, if not already indicated on the drawings.

2. Housekeeping pads shall be coordinated with the supplier of restraints and sized to provide a minimum edge distance of ten (10) bolt diameters all around the outermost anchor bolt to allow development of full drill-in wedge anchor ratings. If cast-in anchors are to be used, the housekeeping pads shall be sized to accommodate the ACI requirements for bolt coverage and embedment.

B. Supplementary Support Steel: Provide supplementary support steel for all equipment, piping, ductwork, etc. including roof mounted equipment, as required or specified.

C. Attachments: Provide restraint attachment plates cast into housekeeping pads, concrete inserts, double sided beam clamps, etc. in accordance with the requirements of the vibration vendor's calculations.

1.09 QUALITY ASSURANCE

A. Seismic Controls Designer Qualifications: Registered professional engineer licensed in the State in which the Project is located 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.

PART 2 PRODUCTS

2.01 INTENT

A. All vibration isolators and seismic restraints described in this section shall be the product of a single manufacturer.
   1. Mason Industries, www.mason-ind.com, products are the basis of these specifications; products of other manufacturers are acceptable provided their systems strictly comply with the specification and have the approval of the Architect Engineer.
   2. Substitutions: See Section 01 60 00 - Product Requirements.
   3. Submittals and certification sheets shall be in accordance with paragraph Submittals.
   4. For the purposes of this project, failure is defined as the discontinuance of any attachment point between equipment or structure, vertical permanent deformation greater than 1/8 inch (3 mm) and/or horizontal permanent deformation greater that 1/4 inch (6 mm).

2.02 PRODUCT DESCRIPTIONS

A. Vibration Isolators and Seismic Restraints:
   1. Type 1: Two layers of 3/4 inch (19 mm) thick neoprene pad consisting of 2 inches (50 mm) square waffle modules separated horizontally by a 1/16 inch (1.5 mm) gauge galvanized shim. Load distribution plates shall be used as required. Pads shall be equal to type Super W as manufactured by Mason Industries, Inc.
   2. Type 2: Bridge-bearing neoprene mountings shall have a minimum static deflection of 0.2 inch (5 mm) and all directional seismic capability. The mount shall consist of a ductile iron casting containing two separated and opposing molded neoprene elements. The elements shall prevent the central threaded sleeve and attachment bolt from contacting the casting during normal operation. The shock absorbing neoprene materials shall be compounded to bridge-bearing specifications. Mountings shall be UL listed for seismic restraint. Mountings shall be equal to type BR as manufactured by Mason Industries, Inc.
   3. Type 3: Sheet metal panels shall be bolted to the walls or supporting structure by assemblies consisting of a neoprene bushing cushioned between 2 steel sleeves. The outer sleeve prevents the sheet metal from cutting into the neoprene. Enlarge panel holes as required. Neoprene elements pass over the bushing to cushion the back panel horizontally. A steel disc covers the inside neoprene element and the inner steel sleeve is elongated to act as a stop so tightening the anchor bolts does not interfere with panel isolation in 3 planes. Bushing assemblies can be applied to the ends of steel cross members where applicable. All neoprene shall be bridge bearing quality. Bushing assemblies shall be equal to type PB as manufactured by Mason Industries, Inc.

4. Type 4: A one piece molded bridge bearing neoprene washer/bushing. The bushing shall surround the anchor bolt and have a flat washer face to avoid metal to metal contact. Neoprene bushings shall be equal to type HG as manufactured by Mason Industries, Inc.
5. Type 5: Spring isolators shall be free standing and laterally stable without any housing and complete with a molded neoprene cup or 1/4 inch (6 mm) neoprene acoustical friction pad between the base plate and the support. All mountings shall have leveling bolts that shall be rigidly bolted to the equipment. Spring diameters shall be no less than 80% of the compressed height of the spring at rated load. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Submittals shall include spring diameters, deflection, compressed spring height and solid spring height. Mountings shall be equal to type SLF as manufactured by Mason Industries, Inc.
6. Type 6: Restrained spring mountings shall have an SLF mounting as described in Type 5, within a rigid housing that includes vertical limit stops to prevent spring extension when weight is removed. The housing shall serve as blocking during erection. Installed and operating heights are equal. A minimum clearance of 1/2 inch (12 mm) shall be maintained around restraining bolts and between the housing and the spring so as not to interfere with the spring action. Restraining Bolts shall have a neoprene bushing between the bolt and the housing. Limit stops shall be out of contact during normal operation. Since housings will be bolted or welded in position there shall be an internal isolation pad. Housing shall be designed to resist all seismic forces. Mountings shall be UL listed for seismic restraint. Mountings shall be equal to type SLR or SLRS as manufactured by Mason Industries, Inc.
7. Type 7: Spring mountings as in Type 5 built into a ductile iron or steel housing to provide all directional seismic snubbing. The snubber shall be adjustable vertically and allow a maximum of 1/4 inch (6 mm) travel in all directions before contacting the resilient snubbing collars. Mountings shall be UL listed for seismic restraint. Mountings shall be equal to type SSLFH as manufactured by Mason Industries, Inc.
8. Type 8: Air Springs shall be manufactured with upper and lower steel sections connected by a replaceable flexible nylon reinforced neoprene element. Air spring configuration shall be multiple bellows to achieve a maximum natural frequency of 3 Hz. Air Springs shall be designed for a burst pressure that is a minimum of three times the published maximum operating pressure. All air spring systems shall be connected to either the building control air or a supplementary air supply and equipped with three leveling valves to maintain leveling within plus or minus 1/8 inch (3 mm). Submittals shall include natural frequency, load and damping tests performed by an independent lab or acoustician. Air Springs shall be equal to type MT and leveling valves equal to type LV as manufactured by Mason Industries, Inc.
9. Type 9: Restrained air spring mountings shall have an MT air spring as described in Type 8, within a rigid housing that includes vertical limit stops to prevent air spring extension when weight is removed. The housing shall serve as blocking during erection. A steel spacer shall be removed after adjustment. Installed and operating heights are equal. A minimum clearance of 1/2 inch (12 mm) shall be maintained around restraining bolts and between the housing and the air spring so as not to interfere with the air spring action. Limit stops shall be out of contact during normal operation. Housing shall be designed to resist all seismic forces. Mountings shall be equal to type SLR-MT as manufactured by Mason Industries, Inc.

10. Type 10: Hangers shall consist of rigid steel frames containing minimum 1-1/4 inch (32 mm) thick neoprene elements at the top and a steel spring with general characteristics as in Type 5 seated in a steel washer reinforced neoprene cup on the bottom. The neoprene element and the cup shall have neoprene bushings projecting through the steel box. To maintain stability the boxes shall not be articulated as clevis hangers nor the neoprene element stacked on top of the spring. Spring diameters and hanger box lower hole sizes shall be large enough to permit the hanger rod to swing through a 30-degree arc from side to side before contacting the rod bushing and short circuiting the spring. Submittals shall include a hanger drawing showing the 30-degree capability. Hangers shall be equal to type 30N as manufactured by Mason Industries, Inc.
    a. Type 10A: Hangers shall be as described in Type 10, but they shall be supplied with a combination rubber and steel rebound washer as the seismic upstop for suspended piping, ductwork, equipment and electrical cable trays. Rubber thickness shall be a minimum of 1/4 inch (6 mm). Submittals shall include a drawing of the hanger showing the installation of the rebound washer. Hangers shall be equal to type RW30N as manufactured by Mason Industries, Inc.
11. Type 11: Hangers shall be as described in Type 10, but they shall be precompressed and locked at the rated deflection by means of a resilient seismic upstop to keep the piping or equipment at a fixed elevation during installation. The hangers shall be designed with a release mechanism to free the spring after the installation is complete and the hanger is subjected to its full load. Deflection shall be clearly indicated by means of a scale. Submittals shall include a drawing of the hanger showing the 30-degree capability. Hangers shall be equal to type PC30N as manufactured by Mason Industries, Inc.
12. Type 12: Seismic Cable Restraints shall consist of galvanized steel aircraft cables sized to resist seismic loads with a minimum safety factor of two and arranged to provide all-directional restraint. Cables shall be pre-stretched to achieve a certified minimum modulus of elasticity. Cable end connections shall be steel assemblies that swivel to final installation angle and utilize two clamping bolts to provide proper cable engagement. Cables shall not be allowed to bend across sharp edges. Cable assemblies shall be UL listed for seismic restraint. At trapeze anchor locations piping shall be shackled to the trapeze. Cable assemblies shall be equal to type SCB at the ceiling and at the clevis bolt, equal to SCBH between the hanger rod nut and the clevis or equal to SCBV if clamped to a beam, all as manufactured by Mason Industries, Inc.
13. Type 13: Seismic solid braces shall consist of steel angles or channels to resist seismic loads with a minimum safety factor of 2 and arranged to provide all directional restraint. Seismic solid brace end connectors shall be steel assemblies that swivel to the final installation angle and utilize two through bolts to provide proper attachment. Seismic solid brace assembly shall have anchorage preapproval OPA number from OSHPD in the state of California verifying the maximum certified load ratings. At trapeze anchor locations piping shall be shackled to the trapeze. Solid seismic brace assemblies shall be equal to type SSB, SSBS or SSRF as manufactured by Mason Industries, Inc.
14. Type 14: Steel angles, sized to prevent buckling, shall be clamped to pipe or equipment rods utilizing a minimum of three ductile iron clamps at each restraint location when required. Welding of support rods is not acceptable. Rod clamp assemblies shall have an Anchorage Preapproval OPA Number from OSHPD in the State of California. At trapeze anchor locations piping shall be shackled to the trapeze. Rod clamp assemblies shall be equal to type SRC or UC as manufactured by Mason Industries, Inc.
15. Type 15: Pipe clevis cross bolt braces are required in all restraint locations. They shall be special purpose preformed channels deep enough to be held in place by bolts passing over the cross bolt. Clevis cross braces shall be UL listed for seismic restraint. Clevis cross brace shall be equal to type CCB as manufactured by Mason Industries, Inc.

16. Type 16: All-directional seismic snubbers shall consist of interlocking steel members restrained by a one-piece molded neoprene bushing of bridge bearing neoprene. Bushing shall be replaceable and a minimum of 1/4 inch (6 mm) thick. Rated loadings shall not exceed 1000 psi (70.3 kg/sq-cm). A minimum air gap of 1/8 inch (3 mm) shall be incorporated in the snubber design in all directions before contact is made between the rigid and resilient surfaces. Snubber end caps shall be removable to allow inspection of internal clearances. Neoprene bushings shall be rotated to insure no short circuits exist before systems are activated. Snubbers shall be UL listed for seismic restraint. Snubber shall be equal to type Z-1225 as manufactured by Mason Industries, Inc.
17. Type 17: All-directional seismic snubbers shall consist of interlocking steel members restrained by shock absorbent rubber materials compounded to bridge bearing specifications. Elastomeric materials shall be replaceable and a minimum of 3/4 inch (19 mm) thick. Rated loadings shall not exceed 1000 psi (70.3kg/sq-cm). Snubbers shall be manufactured with an air gap between hard and resilient material of not less than 1/8 inch (3 mm) nor more that 1/4 inch (6 mm). Snubbers shall be installed with factory set clearances. The capacity of the seismic snubber at 3/8 inch (9 mm) deflection shall be equal or greater than the load assigned to the mounting grouping controlled by the snubber multiplied by the applicable G force. Submittals shall include the load deflection curves up to 1/2 inch (12 mm) deflection in the x, y and z planes. Snubbers shall have an anchorage preapproval OPA number from OSHPD in the state of California verifying the maximum certified horizontal and vertical load ratings. Snubbers shall be equal to type Z-1011 as manufactured by Mason Industries, Inc.
18. Type 18: Stud wedge anchors shall be manufactured from full diameter wire, not from undersized wire that is rolled to create the thread. The stud anchor shall also have a safety shoulder which fully supports the wedge ring under load. The stud anchors shall have an evaluation report number from the ICC Evaluation Service, Inc. verifying its allowable loads. Drill-in stud wedge anchors shall be equal to type SAS as manufactured by Mason Industries, Inc.
19. Type 19: Female wedge anchors are preferred in floor locations so isolators or equipment can be slid into place after the anchors are installed. Anchors shall be manufactured from full diameter wire, and shall have a safety shoulder to fully support the wedge ring under load. Female wedge anchors shall have an evaluation report number from the ICC Evaluation Service, Inc. verifying to its allowable loads. Drill-in female wedge anchors shall be equal to type SAB as manufactured by Mason Industries, Inc.
20. Type 20: Vibration isolation manufacturer shall furnish integral structural steel bases. Rectangular bases are preferred for all equipment. Centrifugal refrigeration machines and pump bases may be T or L shaped where space is a problem. Pump bases for split case pump shall include supports for suction and discharge elbows. All perimeter members shall be steel beams with a minimum depth equal to 1/10 of the longest dimension of the base. Base depth need not exceed 14 inches (350 mm) provided that deflection and misalignment are limited to values that are acceptable to the . Height saving brackets shall be employed in all mounting locations to provide a base clearance of 1 inch (25 mm). Bases shall be equal to type WF as manufactured by Mason Industries, Inc.

21. Type 21: Vibration isolation manufacturer shall furnish rectangular steel concrete pouring forms for floating and inertia foundations. Bases for split case pumps shall be large enough to provide for suction and discharge elbows. Base depth shall be a minimum of 1/12 of the longest dimension of the base but not less than 6 inches (150 mm). The base depth need not exceed 12 inches (300 mm) unless specifically recommended by the base manufacturer for mass or rigidity. Forms shall include minimum concrete reinforcing consisting of 1/2 inch (12 mm) bars welded in place on 6 inches (150 mm) centers running both ways in a layer 1-1/2 inches (38 mm) above the bottom. Forms shall be furnished with steel templates to hold the anchor bolts sleeves and anchors while concrete is being poured. Height saving brackets shall be employed in all mounting locations to maintain a 1 inch (25 mm) clearance below the base. Wooden formed bases leaving a concrete rather than a steel finish are not acceptable. Base shall be equal to type BMK or K as manufactured by Mason Industries, Inc.
22. Type 22: Curb mounted rooftop equipment shall be mounted on spring isolation curbs. The lower member shall consist of a sheet metal or structural steel sections containing adjustable and removable steel springs that support the upper floating section. The upper frame shall provide continuous support for the equipment and shall be captive so as to resiliently resist wind and seismic forces. All directional neoprene snubber bushings shall be a minimum of 1/4 inch (6 mm) thick. Steel springs shall be laterally stable and rest on 1/4 inch (6 mm) thick neoprene acoustical pads. Hardware shall be plated and the springs provided with a rust resistant finish. The curbs waterproofing shall consist of a continuous flexible flashing nailed over the lower curbs waterproofing. All spring locations shall have accessibility to adjust springs. Lower curbs shall have provision for 2 inch (50 mm) of insulation. The roof curbs shall be built to seismically contain the rooftop unit. The unit shall be solidly fastened to the top floating rail, and the lower section anchored to the roof structure. Curb shall be UL listed for seismic restraint. Curb shall be equal to type SRSC or RMSS as manufactured by Mason Industries, Inc.
23. Type 23: Flexible spherical expansion joints shall employ peroxide cured EPDM in the covers, liners and Kevlar® tire cord frictioning. Any substitutions shall have equal or superior physical and chemical characteristics. Solid steel rings shall be used within the raised face rubber flanged ends to prevent pullout. Flexible cable bead wire is not acceptable. Sizes 2 inches (50 mm) and larger shall have two spheres reinforced with a ductile iron external ring between spheres. Flanges shall be split ductile iron or steel with hooked or similar interlocks. Sizes 16 inches (400 mm) to 24 inches (600 mm) may be single sphere. Sizes 3/4 inch (19 mm) to 1-1/2 inches (38 mm) may have threaded two piece bolted flange assemblies, one sphere and cable retention. Connectors shall be rated at 250 psi (1.72 MPa) up to 170 degrees F (77 degrees C) with a uniform drop in allowable pressure to 215 psi (1.48 MPa) at 250 degrees F (121 degrees C) in sizes through 14 inches (350 mm). 16 inches (400 mm) through 24 inches (600 mm) single sphere minimum ratings are 180 psi (1.24 MPa) at 170 degrees F (77 degrees C) and 150 psi (1.03 MPa) at 250 degrees F (121 degrees C). Higher rated connectors may be used to accommodate service conditions. All expansion joints shall be factory tested to 150% of rated pressure for 12 minutes before shipment. Safety factors to burst and flange pullout shall be a minimum of 3:1. Concentric reducers to the above ratings may be substituted for equal ended expansion joints.
    a. Expansion joints shall be installed in piping gaps equal to the length of the expansion joints under pressure. Control rods shall be used in unanchored piping locations. If control rods are used, they shall have 1/2 inch (12 mm) thick Neoprene washer bushings large enough in diameter to take the thrust at 1000 psi (70.3 kg/sq-cm) maximum on the washer area.

b. Submittals shall include two test reports by independent consultants showing minimum reductions of 20 DB in vibration accelerations and 10 DB in sound pressure levels at actual blade passage frequencies on this project. All expansion joints shall be installed on the equipment side of the shut off valves. Expansion joints shall be equal to type SAFEFLEX SFDEJ, SFEJ, SFDCR or SFU and Control Rods CR as manufactured by Mason Industries, Inc.

24. Type 24: Flexible stainless steel hose shall have stainless steel braid and carbon steel fittings. Sizes 3 inches (75 mm) and larger shall be flanged. Smaller sizes shall have male nipples.
    a. Minimum lengths shall be as follows:
        1) Flanged:
            (a) 3 inches x 14 inches (75 by 350 mm)
            (b) 4 inches x 15 inches (100 by 375 mm)
            (c) 5 inches x 19 inches (125 by 475 mm)
            (d) 6 inches x 20 inches (150 by 500 mm)
            (e) 8 inches x 22 inches (200 by 550 mm)
            (f) 10 inches x 26 inches (250 by 650 mm)
            (g) 12 inches x 28 inches (300 by 700 mm)
            (h) 14 inches x 30 inches (350 by 750 mm)
            (i) 16 inches x 32 inches (400 by 800 mm)
        2) Male Nipples:
            (a) 1/2 inch x 9 inches (12 by 225 mm)
            (b) 3/4 inch x 10 inches (19 by 250 mm)
            (c) 1 inch x 11 inches (25 by 275 mm)
            (d) 1-1/4 inches x 12 inches (32 by 300 mm)
            (e) 1-1/2 inches x 13 inches (38 by 325 mm)
            (f) 2 inches x 14 inches (50 by 350 mm)
            (g) 2-1/2 inches x 18 inches (64 by 450 mm)
    b. Hoses shall be installed on the equipment side of the shut-off valves horizontally and parallel to the equipment shafts wherever possible. Hoses shall be equal to type BSS as manufactured by Mason Industries, Inc.
25. Type 25: All-directional acoustical pipe anchor shall consist of two sizes of steel tubing separated by a minimum 1/2 inch (12 mm) thick 60 durometer neoprene. Vertical restraint shall be provided by similar material arranged to prevent vertical travel in either direction. Allowable loads on the isolation material should not exceed 500 psi (35.2 kg/sq-cm) and the design shall be balanced for equal resistance in any direction. All-directional anchors shall be equal to type ADA as manufactured by Mason Industries, Inc.
26. Type 26: Pipe guides shall consist of a telescopic arrangement of two sizes of steel tubing separated by a minimum 1/2 inch (12 mm) thickness of 60 durometer neoprene. The height of the guides shall be preset with a shear pin to allow vertical motion due to pipe expansion or contraction. Shear pin shall be removable and reinsertable to allow for selection of pipe movement. Guides shall be capable of plus or minus 1-5/8 inches (41 mm) motion, or to meet location requirements. Pipe guides shall be equal to type VSG as manufactured by Mason Industries, Inc.
27. Type 27: Split Wall Seals consist of two bolted pipe halves with minimum 3/4 inch (19 mm) thick neoprene sponge bonded to the inner faces. The seal shall be tightened around the pipe to eliminate clearance between the inner sponge face and the piping. Concrete may be packed around the seal to make it integral with the floor, wall or ceiling if the seal is not already in place around the pipe prior to the construction of the building member. Seals shall project a minimum of 1 inch (25 mm) past either face of the wall. Where temperatures exceed 240 degrees F (115 degrees C), 10 pounds per cubic foot (160 kg/cu. m) density fiberglass may be used in lieu of the sponge. Seals shall be equal to type SWS as manufactured by Mason Industries, Inc.

28. Type 28: The horizontal thrust restraint shall consist of a spring element in series with a neoprene molded cup as described in Type 5 with the same deflection as specified for the mountings or hangers. The spring element shall be designed so it can be preset for thrust at the factory and adjusted in the field to allow for a maximum of 1/4 inch (6 mm) movement at start and stop. The assembly shall be furnished with 1 rod and angle brackets for attachment to both the equipment and the ductwork or the equipment and the structure. Horizontal restraints shall be attached at the centerline of thrust and symmetrical on either side of the unit. Horizontal thrust restraints shall be equal to type WBI/WBD as manufactured by Mason Industries, Inc.
29. Type 29: Housekeeping pad anchors shall consist of a ductile iron casting that is tapered and hexagonal, smaller at its base than at its top. The upper portion shall have holes for rebar to pass through. The anchor shall be continuously threaded from top to bottom for the attachment of soleplates. Housekeeping pad anchors shall be attached to the structural slab using a stud wedge anchor. Housekeeping pad anchors shall be equal to type HPA and stud wedge anchor shall be equal to type SAS both as manufactured by Mason Industries, Inc.

PART 3 EXECUTION

3.01 GENERAL

A. All vibration isolators and seismic restraint systems shall be installed in strict accordance with the manufacturer's written instructions and all certified submittal data.

B. Installation of vibration isolators and seismic restraints shall not cause any change of position of equipment, piping or ductwork resulting in stresses or misalignment.

C. No rigid connections between equipment and the building structure shall be made that degrades the noise and vibration control system herein specified.

D. Do not install any equipment, piping, duct or conduit which makes rigid connections with the building unless isolation is not specified. “Building” includes, but is not limited to, slabs, beams, columns, studs and walls.

E. Coordinate work with other trades to avoid rigid contact with the building.

F. Any conflicts with other trades which will result in rigid contact with equipment or piping due to inadequate space or other unforeseen conditions should be brought to the Architect Engineer's attention prior to installation. Corrective work required by conflicts after installation shall be at no additional cost to the Owner.

G. Bring to the Architect Engineer's attention any discrepancies between the specifications and the field conditions or changes required due to specific equipment selection, prior to installation. Corrective work required by discrepancies after installation shall be at no additional cost to the Owner.

H. Correct all installations which are deemed defective in workmanship and materials at no additional cost to the Owner.

I. Overstressing of the building structure shall not occur because of overhead support of equipment. Submit loads to the structural engineer of record for approval. Generally bracing may occur from:
   1. Flanges of structural beams.
   2. Panel points in bar joist construction.
   3. Cast in place inserts or wedge type drill-in concrete anchors.

J. Type 12 cable restraints shall be installed slightly slack to avoid short circuiting the isolated suspended equipment, piping or conduit.

K. Type 12 cable assemblies are installed taut on non-isolated systems. Type 13 seismic solid braces may be used in place of cables on rigidly attached systems only.

L. At locations where Type 12 or Type 13 restraints are located, the support rods shall be braced when necessary to accept compressive loads with Type 14 braces.

M. At locations where Type 12 cable restraints are installed on support rods with spring isolators, the spring isolation hangers shall be Type 10A.

N. At all locations where Type 12 or Type13 restraints are attached to pipe clevis's, the clevis cross bolt shall be reinforced with Type 15 braces.

O. Drill-in concrete anchors for ceiling and wall installation shall be Type 18, and Type 19 female wedge type for floor mounted equipment.

P. Vibration isolation manufacturer shall furnish integral structural steel bases as required. Independent steel rails are not permitted on this project.

Q. Hand built elastomeric expansion joints may be used when pipe sizes exceed 24 inches or specified movements exceed Type 23 capabilities.

R. Where piping passes through walls, floors or ceilings the vibration isolation manufacturer shall provide Type 27 wall seals.

S. Air handling equipment and centrifugal fans shall be protected against excessive displacement which results from high air thrust in relation to the equipment weight. Horizontal thrust restraint shall be Type 28.

T. Locate isolation hangers as near to the overhead support structure as possible.

U. All fire protection piping shall be braced in accordance with NFPA 13 and 14.

V. All mechanical equipment shall be vibration isolated and seismically restrained as per the schedules shown on the drawings.

W. All fire protection equipment is considered life safety equipment and shall be seismically restrained using the seismic force levels calculated for life safety equipment according to the codes and standards shown on Structural Drawings.

X. VAV boxes and fan powered equipment weighing less than 50 pounds (23 kg) and rigidly connected to the supply side of the duct system and supported with a minimum of 4 hanger rods.

3.02 VIBRATION ISOLATION OF PIPING

A. Horizontal Pipe Isolation: The first four pipe hangers in the main lines near the mechanical equipment shall be as described in Type 11. Brace hanger rods with SRC clamps Type 14. Horizontal runs in all other locations throughout the building shall be isolated by hangers as described in Type 10 & Type 10A. Floor supported piping shall rest on isolators as described in Type 6. Heat exchangers and expansion tanks are considered part of the piping run. The first three isolators from the isolated equipment will have the same static deflection as specified for the mountings under the connected equipment. If piping is connected to equipment located in basements and hangs from ceilings under occupied spaces the first three hangers shall have 0.75 inch (19 mm) deflection for pipe sizes up to and including 3 inch (75 mm), 1-1/2 inch (38 mm) deflection for pipe sizes up to and including 6 inch (150 mm), and 2-1/2 inch (64 mm) deflection for pipes larger than 6 inch (150 mm) Hangers shall be located as close to the overhead structure as practical. Hanger locations that also have seismic restraints attached shall have type RW Rebound Washers to limit uplift. Where piping connects to mechanical equipment install Type 23 expansion joints or Type 24 stainless hoses as required for the service.

B. Riser Isolation: Risers shall be suspended from Type 10A hangers or supported by Type 5 mountings, anchored with Type 25 anchors, and guided with Type 26 sliding guides. Steel springs shall be a minimum of 0.75 inch (19 mm) except in those expansion locations where additional deflection is required to limit load changes to plus or minus 25 percent of the initial load. Submittals shall include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on the building structure, spring deflection changes and seismic loads. Submittal data shall include certification that the riser system has been examined for excessive stresses and that none will exist in the proposed design.

C. Seismic Restraint of Piping:
   1. Seismically restrain all piping listed as a, b or c below. Use Type 12 cables if isolated. Type 12 or Type 13 restraints may be used on unisolated piping.
      a. Fuel oil piping, gas piping, medical gas piping, and compressed air piping that is 1 inch (25 mm) I.D. or larger.
      b. Piping located in boiler rooms, mechanical equipment rooms, and refrigeration equipment rooms that is 1-1/4 inch (32 mm) I.D. and larger.
      c. All other piping 2-1/2-inch (64 mm) diameter and larger.
   2. Transverse piping restraints shall be at 40 feet (12 m) maximum spacing for all pipe sizes, except where lesser spacing is required to limit anchorage loads.
   3. Longitudinal restraints shall be at 80 feet (24 m) maximum spacing for all pipe sizes, except where lesser spacing is required to limit anchorage loads.
   4. Where thermal expansion is a consideration, guides and anchors may be used as transverse and longitudinal restraints provided they have a capacity equal to or greater than the restraint loads in addition to the loads induced by expansion or contraction.
   5. For fuel oil and all gas piping transverse restraints shall be at 20 feet (6 m) maximum and longitudinal restraints at 40 feet (12 m) maximum spacing.
   6. Transverse restraint for one pipe section may also act as a longitudinal restraint for a pipe section of the same size connected perpendicular to it if the restraint is installed within 24 inches (600 m) of the elbow or TEE or combined stresses are within allowable limits at longer distances.
   7. Hold down clamps shall be used to attach pipe to all trapeze members before applying restraints in a manner similar to clevis supports.
   8. Branch lines may not be used to restrain main lines.
   9. Cast iron pipe of all types, glass pipe and any other pipes joined with a four band shield and clamp assembly in areas with Ss of 0.35 or greater shall be braced as in Sections 3.02.C.2 and 3.02.C.3. For areas with Ss less than 0.35, 2 band clamps may be used with a reduced spacing of 1/2 of those listed in sections 3.02.C.2 and 3.02.C.3.
   10. Connection to the structure shall be made with a non-friction connection (i.e. no C-clamps).
   11. Hanger locations that also have seismic restraints attached shall have Type 10A RW Rebound Washers.

D. Pipe Exclusions:
   1. Gas piping less than 1 inch (25 mm) inside diameter.
   2. Piping in boiler and mechanical rooms less than 1-1/4 inch (32 mm) inside diameter.
   3. All other piping less than 2-1/2 inch (64 mm) inside diameter.
   4. Certain suspended piping:
      a. All piping suspended by clevis hangers where the distance from the top of the pipe to the suspension point is 12 inches or less.
      b. All trapeze supported piping where the distance from the suspension point to the trapeze member is 12-inch or less.
      c. If any suspension location in the run fails to qualify under (a) or (b) above, the entire run shall be braced.

3.03 VIBRATION ISOLATION AND SEISMIC RESTRAINT OF DUCTWORK

A. Vibration isolation of ductwork:
   1. All discharge runs for a distance of 50 feet (15m) from the connected equipment shall be isolated from the building structure by means of Type 10 hangers or Type 5 floor isolators. Spring deflection shall be a minimum of 0.75 inch (19 mm).
   2. All duct runs having air velocity of 1000 fpm (5 m/s) or more shall be isolated from the building structure by Type 11 hangers or 5 floor supports. Spring deflection shall be a minimum of 0.75 inch (19 mm).

B. Seismic restraint of ductwork:
   1. Seismically restrain all ductwork with Type 12 or Type 13 restraints as listed below:
      a. Restrain rectangular ducts with cross sectional area of 6 sq. ft. (0.5 sq m) or larger.
      b. Restrain round ducts with diameters of 28 inches (700 mm) or larger.
      c. Restrain flat oval ducts the same as rectangular ducts of the same nominal size.
   2. Transverse restraints shall occur at 30 feet (9 mm) intervals or at both ends of the duct run if less than the specified interval. Transverse restraints shall be installed at each duct turn and at each end of a duct run.
   3. Longitudinal restraints shall occur at 60 feet (18 m) intervals with at least one restraint per duct run. Transverse restraints for one duct section may also act as a longitudinal restraint for a duct section connected perpendicular to it if the restraints are installed within 4 feet (1.2 m) of the intersection of the ducts and if the restraints are sized for the larger duct. Duct joints shall conform to SMACNA duct construction standards.
   4. The ductwork shall be reinforced at the restraint locations. Reinforcement shall consist of an additional angle on top of the ductwork that is attached to the support hanger rods. Ductwork is to be attached to both upper angle and lower trapeze.
   5. A group of ducts may be combined in a larger frame so that the combined weights and dimensions of the ducts are less than or equal to the maximum weight and dimensions of the duct for which bracing details are selected.
   6. Walls, including gypsum board non bearing partitions, which have ducts running through them may replace a typical transverse brace. Provide channel framing around ducts and solid blocking between the duct and frame.
   7. Connection to the structure shall be made with a non-friction connection (i.e. no C-clamps)
   8. Hanger locations that also have seismic restraints attached shall have Type 10A RW Rebound Washers.

C. Ductwork Exclusions:
   1. Rectangular and square and ducts that are less than 6 square feet in cross sectional area.
   2. Oval ducts that are less than 6 square feet (0.5 sq m) in cross sectional area based on nominal size.
   3. Round duct less than 28-inch (0.71 m) diameter.
   4. Certain suspended ductwork
      a. All trapeze supported ductwork where the distance from the suspension point to the trapeze member is 12-inches or less.
      b. Ductwork hung with straps where the top of the duct is 12-inches or less from the suspension point and the strap has 2 #10 sheet metal screws within 2-inch of the top of the duct.
      c. If any suspension location in the run fails to qualify under (a) or (b) above, the entire run shall be braced.

END OF SECTION

SECTION 23 05 53
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Stencils.

D. Pipe markers.

E. Ceiling tacks.

1.03 RELATED REQUIREMENTS

A. Section 09 90 00 - Painting and Coating: Identification painting.

1.04 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2023.

B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2025.

1.05 SUBMITTALS

A. See Section 01 30 00 - 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, function, and valve manufacturer's name and model number.

D. Product Data: Provide manufacturers catalog literature for each product required.

E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.

F. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. Air Handling Units: Nameplates.

B. Air Terminal Units: Tags.

C. Automatic Controls: Tags. Key to control schematic.

D. Control Panels: Nameplates.

E. Dampers: Ceiling tacks, where located above lay-in ceiling.

F. Ductwork: Nameplates.

G. Heat Transfer Equipment: Nameplates.

H. Instrumentation: Tags.

I. Major Control Components: Nameplates.

J. Piping: Tags.

K. Pumps: Nameplates.

L. Small-sized Equipment: Tags.

M. Tanks: Nameplates.

N. Thermostats: Nameplates.

O. Valves: Tags and ceiling tacks where located above lay-in ceiling.

P. Water Treatment Devices: Nameplates.

2.02 NAMEPLATES

A. Manufacturers:

B. Letter Color: White.

C. Letter Height: 1/4 inch.

D. Background Color: Black.

E. Plastic: Comply with ASTM D709.

2.03 TAGS

A. Manufacturers:

B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.

C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

D. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.04 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.

B. Stencil Paint: Semi-gloss enamel, colors conforming to ASME A13.1.

2.05 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.

2.06 CEILING TACKS

A. Description: Steel with 3/4 inch diameter color coded head.

PART 3 EXECUTION

3.01 PREPARATION

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

B. Prepare surfaces in accordance with Section 09 90 00 for stencil painting.

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. Apply stencil painting in accordance with Section 09 90 00.

D. Install plastic pipe markers in accordance with manufacturer's instructions.

E. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

F. Pipe Marker Placement. Pipe markers should be located as follows:
   1. At intervals of not more than 20 feet
   2. At least once in or above every room
   3. On both sides of walls or partitions penetrated by the piping
   4. At least once in every story height traversed by risers
   5. Adjacent to each valve port and flange end.

G. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.

H. Use tags on piping 3/4 inch diameter and smaller.

I. Install ductwork with plastic nameplates. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.

J. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 23 05 93
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Testing, adjustment, and balancing of air systems.

B. Duct Air Leakage Testing

C. Testing, adjustment, and balancing of hydronic and refrigerating systems.

D. Measurement of final operating condition of HVAC systems.

E. Commissioning activities.

1.03 RELATED REQUIREMENTS

A. Section 01 40 00 - Quality Requirements: Employment of testing agency and payment for services.

1.04 REFERENCE STANDARDS

A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition; 2016.

B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2024, with Errata (2025).

C. NEBB (TAB) - Procedural Standards for Testing Adjusting and Balancing of Environmental Systems; 2015, with Errata (2017).

D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing; 2023.

1.05 SUBMITTALS

A. See Section 01 30 00 - 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. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
   1. Submit to Architect Engineer.
   2. Submit six weeks prior to starting the testing, adjusting, and balancing work.
   3. Include certification that the plan developer has reviewed the contract documents, the equipment and systems, and the control system with the Architect Engineer and other installers to sufficiently understand the design intent for each system.
   4. Include at least the following in the plan:
      a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
      b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
      c. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
      d. Final test report forms to be used.
      e. Expected problems and solutions, etc.
      f. Procedures for formal deficiency reports, including scope, frequency and distribution.

D. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
   1. Revise TAB plan to reflect actual procedures and submit as part of final report.
   2. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect Engineer and for inclusion in operating and maintenance manuals.
   3. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
   4. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
   5. Units of Measure: Report data in both I-P (inch-pound) and SI (metric) units.
   6. 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.
      e. Project location.
      f. Project Contractor.
      g. Report date.

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. AABC (NSTSB), AABC National Standards for Total System Balance.
   2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
   3. SMACNA (TAB).
   4. NEBB (TAB)
   5. 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. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.

D. 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. NEBB, 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.

E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

3.02 EXAMINATION

A. Verify 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. 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 ADJUSTMENT TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 10 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 10 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

3.04 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.

G. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.

3.05 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.

B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

C. Measure air quantities at air inlets and outlets.

D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

E. Use volume control devices to regulate air quantities only to the extent that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

J. Measure temperature conditions across outside air, return air, and exhaust dampers.

K. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, at minimum air flow rate, and full heating air flow rate.

L. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries.

M. For variable air volume system powered units set volume controller to air flow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable air volume temperature control.

3.06 SCOPE

A. Test, adjust, and balance the following:
1. Boilers
2. HVAC Pumps.
3. Forced Air Furnaces.
4. Direct Fired Furnaces.
5. Air Cooled Water Chillers.
6. Induced Draft Cooling Tower.
7. Packaged Roof Top Heating/Cooling Units.
8. Computer Room Air Conditioning Units.
9. Air Coils.
10. Terminal Heat Transfer Units.
11. Air Handling Units.
12. Air Terminal Units.

3.07 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. V-Belt Drives:
1. Identification/location.
2. Required driven RPM.

3. Driven sheave, diameter and RPM.
4. Belt, size and quantity.
5. Motor sheave diameter and RPM.
6. Center to center distance, maximum, minimum, and actual.

C. 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.

D. Combustion Equipment:
1. Boiler manufacturer.
2. Model number.
3. Serial number.
4. Firing rate.
5. Heat input.
6. Ambient temperature.
7. Heat output.

E. Air Cooled Condensers:
1. Identification/number.
2. Location.
3. Manufacturer.
4. Model number.
5. Serial number.
6. Entering DB air temperature, design and actual.
7. Leaving DB air temperature, design and actual.
8. Number of compressors.

F. 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.

G. 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.

H. Heat Exchangers:
1. Identification/number.
2. Location.
3. Service.
4. Manufacturer.
5. Model number.
6. Serial number.
7. Steam pressure, design and actual.
8. Primary water entering temperature, design and actual.
9. Primary water leaving temperature, design and actual.
10. Primary water flow, design and actual.
11. Primary water pressure drop, design and actual.
12. Secondary water leaving temperature, design and actual.
13. Secondary water flow, design and actual.
14. Secondary water pressure drop, design and actual.

I. Cooling Coils:
1. Identification/number.
2. Location.
3. Service.
4. Manufacturer.
5. Air flow, design and actual.
6. Entering air DB temperature, design and actual.
7. Entering air WB temperature, design and actual.
8. Leaving air DB temperature, design and actual.
9. Leaving air WB temperature, design and actual.
10. Water flow, design and actual.
11. Water pressure drop, design and actual.
12. Entering water temperature, design and actual.
13. Leaving water temperature, design and actual.
14. Saturated suction temperature, design and actual.
15. Air pressure drop, design and actual.

J. Heating Coils:
1. Identification/number.
2. Location.
3. Service.
4. Manufacturer.
5. Air flow, design and actual.
6. Water flow, design and actual.
7. Water pressure drop, design and actual.
8. Entering water temperature, design and actual.
9. Leaving water temperature, design and actual.

10. Entering air temperature, design and actual.
11. Leaving air temperature, design and actual.
12. Air pressure drop, design and actual.

K. Air Moving Equipment:
1. Location.
2. Manufacturer.
3. Model number.
4. Serial number.
5. Arrangement/Class/Discharge.
6. Air flow, specified and actual.
7. Return air flow, specified and actual.
8. Outside air flow, specified and actual.
9. Total static pressure (total external), specified and actual.
10. Inlet pressure.
11. Discharge pressure.
12. Sheave Make/Size/Bore.
13. Number of Belts/Make/Size.
14. Fan RPM.

L. Return Air/Outside Air:
1. Identification/location.
2. Design air flow.
3. Actual air flow.
4. Design return air flow.
5. Actual return air flow.
6. Design outside air flow.
7. Actual outside air flow.
8. Return air temperature.
9. Outside air temperature.
10. Required mixed air temperature.
11. Actual mixed air temperature.
12. Design outside/return air ratio.
13. Actual outside/return air ratio.

M. Exhaust Fans:
1. Location.
2. Manufacturer.
3. Model number.
4. Serial number.
5. Air flow, specified and actual.
6. Total static pressure (total external), specified and actual.
7. Inlet pressure.
8. Discharge pressure.
9. Sheave Make/Size/Bore.
10. Number of Belts/Make/Size.
11. Fan RPM.

N. Duct Traverses:
1. System zone/branch.
2. Duct size.
3. Area.
4. Design velocity.
5. Design air flow.

6. Test velocity.
7. Test air flow.
8. Duct static pressure.
9. Air temperature.
10. Air correction factor.

O. Duct Leak Tests:
1. Description of ductwork under test.
2. Duct design operating pressure.
3. Duct design test static pressure.
4. Duct capacity, air flow.
5. Maximum allowable leakage duct capacity times leak factor.
6. Test apparatus:
   a. Blower.
   b. Orifice, tube size.
   c. Orifice size.
   d. Calibrated.
7. Test static pressure.
8. Test orifice differential pressure.
9. Leakage.

P. Air Monitoring Stations:
1. Identification/location.
2. System.
3. Size.
4. Area.
5. Design velocity.
6. Design air flow.
7. Test velocity.
8. Test air flow.

Q. Flow Measuring Stations:
1. Identification/number.
2. Location.
3. Size.
4. Manufacturer.
5. Model number.
6. Serial number.
7. Design Flow rate.
8. Design pressure drop.
9. Actual/final pressure drop.
10. Actual/final flow rate.
11. Station calibrated setting.

R. Terminal Unit Data:
1. Manufacturer.
2. Type, constant, variable, single, dual duct.
3. Identification/number.
4. Location.
5. Model number.
6. Size.
7. Minimum static pressure.
8. Minimum design air flow.
9. Maximum design air flow.

10. Maximum actual air flow.
11. Inlet static pressure.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 23 07 13
DUCT INSULATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Duct insulation.

B. Insulation jackets.

1.03 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

Section 09 90 00 - Painting and Coating : Painting insulation jackets.

B. Section 23 05 53 - Identification for HVAC Piping and Equipment.

C. Section 23 31 00 - HVAC Ducts and Casings.

1.04 REFERENCE STANDARDS

A. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

B. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.

C. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2024.

D. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014 (Reapproved 2019).

E. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation; 2020.

F. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2025.

G. ASTM C1290 - Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts; 2016 (Reapproved 2021).

H. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings; 2008.

I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026a.

J. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.

K. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).

L. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

M. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

C. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labelled 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.

1.08 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 or UL 723.

2.02 GLASS FIBER, FLEXIBLE

A. Insulation: ASTM C553; flexible, noncombustible blanket.
   1. 'K' value: 0.36 at 75 degrees F, when tested in accordance with ASTM C518.
   2. Maximum Service Temperature: 250 degrees F.
   3. Maximum Water Vapor Absorption: 5.0 percent by weight.

B. Vapor Barrier Jacket:
   1. Kraft paper with glass fiber yarn and bonded to aluminized film.
   2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
   3. Secure with pressure sensitive tape.

C. Vapor Barrier Tape:
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

D. Outdoor Vapor Barrier Mastic:
   1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

E. Tie Wire: Annealed steel, 16 gage, 0.0508 inch diameter.

2.03 GLASS FIBER, RIGID

A. Insulation: ASTM C612; rigid, noncombustible blanket.
   1. 'K' Value: 0.24 at 75 degrees F, when tested in accordance with ASTM C518.
   2. Maximum Service Temperature: 450 degrees F.
   3. Maximum Water Vapor Absorption: 5.0 percent.
   4. Maximum Density: 8.0 lb/cu ft.

B. Vapor Barrier Jacket:
   1. Kraft paper with glass fiber yarn and bonded to aluminized film.
   2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
   3. Secure with pressure sensitive tape.

C. Vapor Barrier Tape:

1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

D. Indoor Vapor Barrier Finish:
   1. Cloth: Untreated; 9 oz/sq yd weight, glass fabric.
   2. Vinyl emulsion type acrylic, compatible with insulation, black color.

2.04 JACKETS

A. Exterior insulation jackets for outside applications shall be a multi-ply embossed UV-resistant aluminum foil/polymer laminate with a layer of rubberized asphalt specially fomulated for use on insulated duct. The jacket willl include a metalized polyester film coated with a high quality low temperature acrylic adhesive that allows for a peel and stick functionality.

B. Aluminum (Indoor) Jacket: ASTM B209 (ASTM B209M).
   1. Thickness: 0.016 inch sheet.
   2. Finish: Smooth.
   3. Joining: Longitudinal slip joints and 2 inch laps.
   4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
   5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.
   6. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that ducts have been sealed and air leak tested per Section 23 31 00 - HVAC Ducts and Casings before applying insulation materials.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NAIMA National Insulation Standards.

C. Insulated ducts conveying air below ambient temperature:
   1. Provide insulation with vapor barrier jackets.
   2. Finish with tape and vapor barrier jacket.
   3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
   4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.

D. Insulated ducts conveying air above ambient temperature:
   1. Provide with or without standard vapor barrier jacket.
   2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.

E. Ducts Exposed in Mechanical Equipment Rooms or Finished Spaces (below 10 feet above finished floor): Finish with canvas jacket sized for finish painting.

F. External Duct Insulation Application:
   1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
   2. Secure insulation without vapor barrier with staples, tape, or wires.
   3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
   4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
   5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

G. Duct and Plenum Liner Application:

1. Adhere insulation with adhesive for 90 percent coverage.
2. Secure insulation with mechanical liner fasteners. Refer to SMACNA (DCS) for spacing.
3. Seal and smooth joints. Seal and coat transverse joints.
4. Seal liner surface penetrations with adhesive.
5. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.

3.03 SCHEDULES

A. Supply Ducts:
   1. 2" Glass Fiber, Flexible

B. Return Ducts:
   1. 2" Glass Fiber, Flexible

C. Exhaust Ducts:
   1. Not required.

D. Return and Relief Ducts in Mechanical Rooms:
   1. 2" Glass Fiber, Flexible

E. Ducts Exposed to Outdoors: 2" Glass Fiber, Rigid with Exterior Insulation Jacket.

END OF SECTION

SECTION 23 07 19
HVAC PIPING INSULATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Piping insulation.

B. Jackets and accessories.

1.03 REFERENCE STANDARDS

A. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2024).

B. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2025.

C. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2022a.

D. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2025.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026a.

F. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.

G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

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.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.07 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

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER, RIGID

A. Insulation: ASTM C547 and 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.

B. Insulation: ASTM C547 and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
   1. Maximum Service Temperature: 650 degrees F.
   2. Maximum Moisture Absorption: 0.2 percent by volume.

C. 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.

D. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

E. Vapor Barrier Lap Adhesive: Compatible with insulation.

F. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.

G. Fibrous Glass Fabric:
   1. Cloth: Untreated; 9 oz/sq yd weight.
   2. Blanket: 1.0 lb/cu ft density.
   3. Weave: 5 by 5.

H. Indoor Vapor Barrier Finish:
   1. Cloth: Untreated; 9 oz/sq yd weight.
   2. Vinyl emulsion type acrylic, compatible with insulation, black color.

I. Outdoor Vapor Barrier Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

J. Outdoor Breather Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

K. Insulating Cement: ASTM C449.

2.03 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

A. 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.

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

2.04 JACKETS

A. PVC Plastic.
   1. 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.
      e. Connections: Brush on welding adhesive.
   2. Covering Adhesive Mastic: Compatible with insulation.

B. ABS Plastic:
   1. Jacket: One piece molded type fitting covers and sheet material, off-white color.
      a. Minimum Service Temperature: Minus 40 degrees F.
      b. Maximum Service Temperature: 180 degrees F.
      c. Moisture Vapor Permeability: 0.012 perm inch, when tested in accordance with ASTM E96/E96M.
      d. Thickness: 30 mil.
      e. Connections: Brush on welding adhesive.

C. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
   1. Thickness: 0.016 inch sheet.
   2. Finish: Smooth.
   3. Joining: Longitudinal slip joints and 2 inch laps.
   4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
   5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Exposed Piping: Locate insulation and cover seams in least visible locations.

C. Insulated pipes conveying fluids below ambient temperature; insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

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 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

F. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.

G. Glass fiber insulated pipes conveying fluids above ambient temperature.
   1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
   2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.

H. 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.

I. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions.

J. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with canvas jacket sized for finish painting.

K. 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.

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. Cooling Systems:
   1. Condensate Drains from Cooling Coils:
      a. 1" Glass Fiber, Rigid
      b. 1" Flexible Elastomeric Insulation
   2. Refrigerant Suction: 1" Flexible Elastomeric Insulation.
   3. Refrigerant Hot Gas: 1" Flexible Elastomeric Insulation.
   4. Refrigerant Liquid (Where required by the manufacturer): 1" Flexible Elastomeric Insulation.

SECTION 23 23 00
REFRIGERANT PIPING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Piping.

B. Moisture and liquid indicators.

C. Filter-driers.

D. Solenoid valves.

E. Expansion valves.

F. Service Valves.

1.03 RELATED REQUIREMENTS

A. Section 09 90 00 - Painting and Coating.

B. Section 22 07 19 - Plumbing Piping Insulation.

C. Section 23 07 19 - HVAC Piping Insulation.

D. Section 23 81 28 - Ductless and Mini-Split Systems.

1.04 REFERENCE STANDARDS

A. AHRI 750 - Thermostatic Refrigerant Expansion Valves; 2007.

B. AHRI 760 - Performance Rating of Solenoid Valves for Use With Volatile Refrigerants; 2007.

C. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2024, with Addendum (2025).

D. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.

E. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; 2024.

F. ASME B31.5 - Refrigeration Piping and Heat Transfer Components; 2020.

G. ASME B31.9 - Building Services Piping; 2025.

H. 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; 2025, with Errata.

I. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.

J. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2022.

K. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2020.

L. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service; 2023.

M. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2019.

N. ICC (IMC)-2018 - International Mechanical Code; 2018.

O. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2025.

P. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical; Current Edition, Including All Revisions.

Q. UL 429 - Electrically Operated Valves; Current Edition, Including All Revisions.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide general assembly of specialties, including manufacturers catalogue information. Provide manufacturers catalog data including load capacity.

C. Shop Drawings: Indicate schematic layout of system, including equipment, critical dimensions, and sizes.

D. Design Data: Submit design data indicating pipe sizing. Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.

E. Test Reports: Indicate results of leak test, acid test.

F. Manufacturer's Installation Instructions: Indicate support, connection requirements, and isolation for servicing.

G. Submit welders certification of compliance with ASME BPVC-IX.

H. Project Record Documents: Record exact locations of equipment and refrigeration accessories on record drawings.

I. Maintenance Data: Include instructions for changing cartridges, assembly views, spare parts lists.

J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Filter-Dryer Cartridges: One of each type and size.
   3. Refrigeration Oil Test Kits: One, each containing everything required to conduct one test.

1.06 QUALITY ASSURANCE

A. Designer Qualifications: Design piping system under direct supervision of a Professional Engineer experienced in design of this type of work.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store piping and specialties in shipping containers with labeling in place.

B. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.

C. Dehydrate and charge components such as piping and receivers, seal prior to shipment, until connected into system.

PART 2 PRODUCTS

2.01 SYSTEM DESCRIPTION

A. Where more than one piping system material is specified ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

B. Provide pipe hangers and supports in accordance with ASME B31.5 unless indicated otherwise.

C. Liquid Indicators:
   1. Where indicated, use line size liquid indicators in main liquid line leaving condenser.

D. Filter-Driers:
   1. Whre indicated, use a filter-drier immediately ahead of liquid-line controls, such as thermostatic expansion valves, solenoid valves, and moisture indicators.

E. Solenoid Valves:
   1. Whre indicated, use in liquid line of single or multiple evaporator systems.

F. Flexible Connectors: Utilize at or near compressors where piping configuration does not absorb vibration.

2.02 REGULATORY REQUIREMENTS

A. Comply with ASME B31.9 for installation of piping system.

B. Products Requiring Electrical Connection: Listed and classified by UL, as suitable for the purpose indicated.

2.03 PIPING

A. Copper Tube: ASTM B280, H58 hard drawn or O60 soft annealed.
   1. Fittings: ASME B16.22 wrought copper.
   2. Joints: Braze, AWS A5.8M/A5.8 BCuP silver/phosphorus/copper alloy.
   3. Copper tube, pressure seal joint fittings for refirgerant piping: Double pressed type complying with UL 207 and ICC (IMC)-2018.
      a. Press Tools: Manufacturer's approved jaw(s) display two circular 360 deg press bands with circular groove to either side, along with a manufacturer's witness mark embossed on the bands.
      b. Housing: Copper.
      c. O-Rings: HR, or compatible with specific refrigerant.
      d. Maximum Allowable Working Pressure: In accordance with UL 207: 700 psig
      e. Minimum Allowable Burst Pressure: In accordance with UL 207: 2100 psig

B. Copper Tube to 7/8 inch OD: ASTM B88 (ASTM B88M), Type K (A), annealed.
   1. Fittings: ASME B16.26 cast copper.
   2. Joints: Flared.
   3. Copper tube, pressure seal joint fittings for refirgerant piping: Double pressed type complying with UL 207 and ICC (IMC)-2018.
      a. Press Tools: Manufacturer's approved jaw(s) display two circular 360 deg press bands with circular groove to either side, along with a manufacturer's witness mark embossed on the bands.
      b. Housing: Copper.
      c. O-Rings: HR, or compatible with specific refrigerant.
      d. Maximum Allowable Working Pressure: In accordance with UL 207: 700 psig
      e. Minimum Allowable Burst Pressure: In accordance with UL 207: 2100 psig

C. Pipe Supports and Anchors:
   1. Provide hangers and supports that comply with MSS SP-58.
      a. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
   2. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
   3. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
   4. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
   5. Vertical Support: Steel riser clamp.
   6. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
   7. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
   8. 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.
   9. 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:
      a. Bases: High density, UV tolerant, polypropylene or reinforced PVC.
      b. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.

c. Steel Components: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
d. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports; corrosion resistant material.
e. Height: Provide minimum clearance of 6 inches under pipe to top of roofing.

2.04 MOISTURE AND LIQUID INDICATORS

A. Indicators: Single port type, UL listed, with copper or brass body, flared, solder or press ends, sight glass, color coded paper moisture indicator with removable element cartridge and plastic cap; for maximum temperature of 200 degrees F and maximum working pressure of 500 psi.

2.05 VALVES

A. Service Valves:
1. Forged brass body with copper stubs, brass caps, removable valve core, integral ball check valve, flared, solder or press ends, for maximum pressure of 500 psi.

2.06 FILTER-DRIERS

A. Performance:
1. Pressure Drop: 2 psi, maximum, when operating at full connected evaporator capacity.
2. Design Working Pressure: 350 psi, minimum.

B. Cores: Molded or loose-fill molecular sieve desiccant compatible with refrigerant, activated alumina, activated charcoal, and filtration to 40 microns, with secondary filtration to 20 microns; of construction that will not pass into refrigerant lines.

C. Construction: UL listed.
1. Connections: As specified for applicable pipe type.

2.07 SOLENOID VALVES

A. Valve: AHRI 760 I-P, pilot operated, copper, brass or steel body and internal parts, synthetic seat, stainless steel stem and plunger assembly (permitting manual operation in case of coil failure), integral strainer, with flared, solder, or threaded ends; for maximum working pressure of 500 psi.

B. Coil Assembly: UL 429 UL listed, replaceable with molded electromagnetic coil, moisture and fungus proof, with surge protector and color coded lead wires, integral junction box with pilot light.

2.08 EXPANSION VALVES

A. Angle or Straight Through Type: AHRI 750; design suitable for refrigerant, brass body, internal or external equalizer, bleed hole, adjustable superheat setting, replaceable inlet strainer, with non-replaceable capillary tube and remote sensing bulb and remote bulb well.

B. Selection: Evaluate refrigerant pressure drop through system to determine available pressure drop across valve. Select valve for maximum load at design operating pressure and minimum 10 degrees F superheat. Select to avoid being undersized at full load and excessively oversized at part load.

2.09 ELECTRONIC EXPANSION VALVES

A. Valve:
1. Brass body with flared or solder connection, needle valve with floating needle and machined seat, stepper motor drive.

B. Evaporation Control System:
1. Electronic microprocessor based unit in enclosed case, proportional integral control with adaptive superheat, maximum operating pressure function, preselection allowance for electrical defrost and hot gas bypass.

C. Refrigeration System Control: Electronic microprocessor based unit in enclosed case, with proportional integral control of valve, on/off thermostat, air temperature alarm (high and low), solenoid valve control, liquid injection adaptive superheat control, maximum operating pressure function, night setback thermostat, timer for defrost control.

2.10 FLEXIBLE CONNECTORS

A. Corrugated stainless steel hose with single layer of stainless steel exterior braiding, minimum 9 inches long with copper tube ends; for maximum working pressure of 500 psi.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

A. Install refrigeration specialties in accordance with manufacturer's instructions.

B. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.

C. Install piping to conserve building space and avoid interference with use of space.

D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

E. Arrange piping to return oil to compressor. Provide traps and loops in piping, and provide double risers as required. Slope horizontal piping 0.40 percent in direction of flow.

F. Provide clearance for installation of insulation and access to valves and fittings.

G. Provide access to concealed valves and fittings.

H. Flood piping system with nitrogen when brazing.

I. Where pipe support members are welded to structural building frame, brush clean, and apply one coat of zinc rich primer to welding.

J. Prepare unfinished pipe, fittings, supports, and accessories ready for finish painting. Refer to Section 09 90 00.

K. Insulate piping; refer to Section 23 07 19.

L. Follow ASHRAE Std 15 procedures for charging and purging of systems and for disposal of refrigerant.

M. Provide replaceable cartridge filter-driers, with isolation valves and valved bypass.

N. Locate expansion valve sensing bulb immediately downstream of evaporator on suction line.

O. Provide external equalizer piping on expansion valves with refrigerant distributor connected to evaporator.

P. Install flexible connectors at right angles to axial movement of compressor, parallel to crankshaft.

Q. Fully charge completed system with refrigerant after testing.

R. Provide electrical connection to solenoid valves. Refer to Section 26 05 83.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Test refrigeration system in accordance with ASME B31.5.

C. Pressure test system with dry nitrogen to 200 psi. Perform final tests at 27 inches vacuum and 200 psi using halide torch. Test to no leakage.

3.04 SCHEDULES

A. Hanger Spacing for Copper Tubing.
   1. 1/2 inch, 5/8 inch, and 7/8 inch OD: Maximum span, 5 feet; minimum rod size, 1/4 inch.
   2. 1-1/8 inch OD: Maximum span, 6 feet; minimum rod size, 1/4 inch.
   3. 1-3/8 inch OD: Maximum span, 7 feet; minimum rod size, 3/8 inch.
   4. 1-5/8 inch OD: Maximum span, 8 feet; minimum rod size, 3/8 inch.

END OF SECTION

SECTION 23 31 00
HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Metal ducts.

B. Flexible ducts.

C. Air plenums and casings.

1.03 RELATED REQUIREMENTS

A. Section 23 07 13 - Duct Insulation: External insulation and duct liner.

B. Section 23 33 00 - Air Duct Accessories.

1.04 REFERENCE STANDARDS

A. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals; Most Recent Edition Cited by Referring Code or Reference Standard.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2025a.

C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

D. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

E. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual; 2012.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for duct materials.

C. Manufacturer's Installation Instructions: Indicate special procedures for glass fiber ducts.

D. Manufacturer's Certificate: Certify that installation of glass fiber ductwork meet or exceed specified requirements.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience, and approved by manufacturer.

B. Duct Sealing, Air Leakage Criteria, and Air Leakage Tests: Ducts shall be sealed as per duct sealing requirements of SMACNA HVAC Air Duct Leakage Test Manual for duct pressure classes shown on the drawings.

1.07 REGULATORY REQUIREMENTS

A. Construct ductwork to NFPA 90A standards.

1.08 FIELD CONDITIONS

A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.

B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Provide UL Class 1 ductwork, fittings, hangers, supports, and appurtenances in accordance with NFPA 90A and SMACNA (DCS) guidelines unless stated otherwise.

B. Provide galvanized steel duct unless otherwise indicated.

C. Acoustical Treatment: Provide sound-absorbing liners and sectional silencers for metal-based ducts in compliance with Section 23 33 19.

D. Acoustical Treatment: Where indicated on the drawings, provide sound-absorbing liners and/or sectional silencers for metal-based ducts.

E. Duct Shape and Material in accordance with Allowed Static Pressure Range:
   1. Round: Plus or minus 4 in-wc of galvanized steel.
   2. Rectangular: Plus or minus 1 in-wc of galvanized steel.
   3. Flat Oval: Plus 4 in-wc of galvanized steel.

F. Duct Sealing and Leakage in accordance with Static Pressure Class:
   1. Duct Pressure Class and Material for Common Mechanical Ventilation Applications:
      a. Low Pressure Supply Air: 1 in-wc pressure class, galvanized steel.
      b. Outside Air Intake: 1/2 in-wc pressure class, galvanized steel.
      c. Return and Relief Air: 1 in-wc pressure class, galvanized steel.
      d. General Exhaust Air: 1 in-wc pressure class, galvanized steel.
      e. Transfer-air and Sound Boots: 1/2 in-wc pressure class.
      f. Buried Duct for Supply and Return Air:
         1) 1/2 in-wc pressure class, closed cell plastic material.
   2. Low Pressure Service: Up to 2 in-wc:
      a. Seal: Class C, apply to seal off transverse joints.
      b. Leakage:
         1) Rectangular: Class 24 or 24 cfm/100 sq ft.
         2) Round: Class 12 or 12 cfm/100 sq ft.

G. Materials:
   1. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
      a. Bonderized (Paintgrip) Finish: For exposed ducts to be field painted, provide galvanized steel that has been zinc coated by the hot-dip process and then coated with a phosphate or bonderized chemical treatment that enhances paint adhesion and finish.
   2. Closed Cell Plastic Material: Conforms to ASTM-D2412.
      a. Resistant to mildew, mold (UL181B), and radon gas (BSS 7239-88).
      b. Ductwork shall have integral R-10 equivalent thermal insulation value, without the use of external insulation, per NSF's P374 protocol and verifed by a NSF Thermal Testing Report.

H. Duct Fabrication Requirements:
   1. Duct and Fitting Fabrication and Support: SMACNA (DCS) including specifics for continuously welded round and oval duct fittings.
   2. Use reinforced and sealed sheet-metal materials at recommended gauges for indicated operating pressures or pressure class.
   3. 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.
   4. Provide turning vanes of perforated metal with glass fiber insulation when acoustical lining is indicated.

5. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
6. 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 METAL DUCTS

A. Material Requirements:
   1. Galvanized Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
      a. Bonderized (Paintgrip) Finish: For exposed ducts to be field painted, provide galvanized steel that has been zinc coated by the hot-dip process and then coated with a phosphate or bonderized chemical treatment that enhances paint adhesion and finish.

B. Flat-Oval Metal Ducts:
   1. Flat-Oval Single Wall Duct: Machine made from a round spiral lock seam duct.
      a. Fittings: Manufacture at least two gauges heavier metal than the duct.
   2. Flat-Oval Double Wall Insulated Duct: Machine made from round spiral lock seam duct.

C. Round Metal Ducts:
   1. Round Single Wall Duct: Round lock seam duct with galvanized steel outer wall.
   2. Round Double Wall Insulated Duct: Round spiral lock seam duct with galvanized steel outer wall, perforated galvanized steel inner wall; fitting with the solid inner wall.
   3. Round Connection System: Interlocking duct connection system in accordance with SMACNA (DCS).

D. Round Spiral Duct:

E. 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).
   2. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
      a. VOC Content: Not more than 250 g/L, excluding water.
      b. For Use with Flexible Ducts: UL labeled.
   3. Gasket Tape:

F. Slab Duct Ventilation System: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS, with G90/Z275 coating designed for installation in cast-in-place concrete floor assemblies.

2.03 FLEXIBLE DUCTS

A. Flexible Ducts: UL 181, Class 1, polyethylene film, mechanically fastened and rolled using galvanized steel to form spiral helix.
   1. Insulation: R6 insulation with polyethylene vapor barrier film.
   2. Maximum Velocity: 4000 fpm.

B. Flexible Air Ducts:
   1. Insulation: Fiberglass insulation with polyethylene vapor barrier film.
   2. Pressure Rating: From 10 in-wc positive to 5 in-wc negative.
   3. Maximum Velocity: 5000 fpm.

C. Flexible Air Ducts:
   1. Insulation: Fiberglass insulation with aluminized vapor barrier film.
   2. Pressure Rating: From 10 in-wc to 5 in-wc negative.
   3. Maximum Velocity: 5000 fpm.

2.04 NON-METAL DUCTS

A. Closed Cell Plastic Ducts
   1. Rigid closed cell plastic material.
   2. Application: Underground use.
   3. Thermal Resistance: Integral insulation
      a. R-Value: R10 equivalent per NSF's P374 protocol and verifed by a NSF Thermal Testing Report.

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. Duct sizes indicated are precise inside dimensions. For lined ducts, maintain sizes inside lining.

E. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

F. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with a crimp in the direction of airflow.

G. Use double nuts and lock washers on threaded rod supports.

H. Connect terminal units to supply ducts directly or with one foot maximum length of flexible duct. Do not use flexible duct to change direction.

I. 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.

J. At exterior wall louvers, seal duct to louver frame and install blank-out panels.

END OF SECTION

SECTION 23 33 00
AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Backdraft dampers - metal.

B. Duct access doors.

C. Duct test holes.

D. Fire dampers.

E. Flexible duct connections.

F. Smoke dampers.

G. Volume control dampers.

1.03 RELATED REQUIREMENTS

A. Section 23 05 48 - Vibration And Seismic Controls For HVAC Piping And Equipment.

B. Section 23 31 00 - HVAC Ducts and Casings.

1.04 REFERENCE STANDARDS

A. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2013.

B. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

C. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2015.

D. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2024.

E. NFPA 105 - Standard for the Installation of Smoke Door Assemblies and Other Opening Protectives; 2013

F. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

G. UL 555S - Standard for Smoke Dampers; Current Edition, Including All Revisions.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.

C. Manufacturer's Installation Instructions: Provide instructions for fire dampers.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

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

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.01 BACKDRAFT DAMPERS - METAL

A. Gravity Backdraft Dampers, Size 18 by 18 inches or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturer's standard construction.

B. Multi-Blade, Parallel Action Gravity Balanced Backdraft Dampers: Galvanized steel, with center pivoted blades of maximum 6 inch width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.

2.02 DUCT ACCESS DOORS

A. Fabricate in accordance with SMACNA (DCS) and as indicated.

2.03 DUCT TEST HOLES

A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

2.04 DYNAMIC FIRE DAMPERS

A. Description: Dynamic curtain fire dampers.

B. Ratings:
   1. Fire Resistance
      a. Dampers shall have a UL 555 fire resistance rating of 1½ hours.
   2. Fire Closure Temperature: Each fire damper shall be equipped with a factory installed heat responsive device (fusible link) rated to close the damper when temperature at the damper reaches:
      a. 165 F
   3. Differential Pressure: Dampers shall have a minimum UL 555 differential pressure rating of 4 in. wg.
   4. Velocity:
      a. Dampers shall have a minimum UL 555 velocity rating of 4000 fpm.

C. Dynamic Fire Damper (DFD) Construction:
   1. Frame:
      a. Galvanized steel in gauges required by manufacturer’s UL listing.
   2. Blades:
      a. Galvanized steel curtain style
   3. Sleeves:
      a. Damper shall be supplied with a factory sleeve.
   4. Retaining Angles: Damper shall be supplied with factory retaining angles sized to provide installation overlap in accordance with the manufacturer’s UL listing.
   5. Fire Closure Device: Damper shall be supplied with fusible link.
   6. Mounting: Vertical or horizontal as indicated on the drawings
   7. Finish:
      a. Galvanized steel
   8. Duct Transition Connection:
      a. Type B
      b. Type C
      c. Type CO
      d. Type CR

D. Quality Control:

E. Factory Tests: Factory cycle damper assemblies to assure proper operation.

2.05 FLEXIBLE DUCT CONNECTIONS

A. Fabricate in accordance with SMACNA (DCS) and as indicated.

B. Flexible Duct Connections: Fabric crimped into metal edging strip.
   1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd.
      a. Net Fabric Width: Minimum nominal 3 inches wide.
   2. Metal: 3 inches wide, 24 gage, 0.0239 inch thick galvanized steel.

C. Maximum Installed Length: 10 inch.

2.06 SMOKE DAMPERS

A. Fabricate in accordance with NFPA 90A and UL 555S, and as indicated.

B. Dampers: UL Class 1 airfoil blade type smoke damper, normally open automatically operated by pneumatic actuator.

C. Electro Thermal Link: Fusible link melting at 165 degrees F; 120 volts, single phase, 60 Hz; UL listed and labeled.

2.07 VOLUME CONTROL DAMPERS

A. Fabricate in accordance with SMACNA (DCS) and as indicated.

B. Splitter Dampers:
   1. Material: Same gage as duct to 24 inches size in either direction, and two gages heavier for sizes over 24 inches.
   2. Blade: Fabricate of single thickness sheet metal to streamline shape, secured with continuous hinge or rod.
   3. Operator: Minimum 1/4 inch diameter rod in self aligning, universal joint action, flanged bushing with set screw .

C. Single Blade Dampers:
   1. Fabricate for duct sizes up to 6 by 30 inch.
   2. Blade: 24 gage, 0.0239 inch, minimum.

D. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 by 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.

E. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon, thermoplastic elastomer, or sintered bronze bearings.

PART 3 EXECUTION

3.01 PREPARATION

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

B. Examine areas to receive dampers. Notify the Engineer of conditions that would adversely affect installation or subsequent utilization of dampers. Do not proceed with installation until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 31 00 for duct construction and pressure class.

B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

C. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide for cleaning kitchen exhaust ducts in accordance with NFPA 96 Provide minimum 8 by 8 inch size for hand access, size for shoulder access, and as indicated. Provide 4 by 4 inch for balancing dampers only. Review locations prior to fabrication.

D. Provide duct test holes where indicated and required for testing and balancing purposes.

E. Provide fire dampers, combination fire and smoke dampers, and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by Authorities Having Jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

F. Dynamic Fire Dampers:
   1. Install dampers in accordance with manufacturer's UL Installation Instructions, labeling, and NFPA 90A at locations indicated on the drawings. Any damper installation that is not in accordance with the manufacturer's UL Installation Instructions must be approved prior to installation.
   2. Dampers must be accessible to allow inspection, adjustment, and replacement of components. The sheet metal contractor shall furnish any access doors in ductwork or plenums required to provide this access. The general contractor shall furnish any access doors required in walls, ceilings, or other general building construction.
   3. Install dampers square and free from racking.
   4. Do not compress or stretch the damper frame into the duct or opening.
   5. Attach multiple damper section assemblies together in accordance with manufacturer's instructions.
   6. Handle dampers using the frame or sleeve. Do not lift or move dampers using blades, actuator or jackshaft.

G. Combination Fire and Smoke Dampers and Smoke Dampers:
   1. Install smoke dampers and combination smoke and fire dampers in accordance with NFPA 92.
   2. Install dampers in accordance with manufacturer's UL Installation Instructions. Any damper installation aspect that is not in accordance with the manufacturer's UL Installation Instructions must be approved prior to installation.
   3. Dampers must be accessible to allow inspection, adjustment, and replacement of components. The sheet metal contractor shall furnish any access doors in ductwork or plenums required to provide this access. The general contractor shall furnish any access doors required in walls, ceilings, or other general building construction.
   4. Install dampers square and free from racking.
   5. The installing contractor shall provide and install bracing for multiple section assemblies to support assembly weight and to hold against system pressure.
   6. Do not compress or stretch the damper frame into the duct or opening.
   7. Attach multiple damper section assemblies together in accordance with manufacturer's instructions.

H. Demonstrate re-setting of fire dampers and combination fire and smoke dampers to Owner's representative.

I. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.

J. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.

K. For fans developing static pressures of 5.0 inches and over, cover flexible connections with leaded vinyl sheet, held in place with metal straps.

L. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.

M. Use splitter dampers only where indicated.

N. Provide balancing dampers on high velocity systems where indicated. Refer to Section 23 36 00 - Air Terminal Units.

O. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

P. Conduct operational testing, documentation, and training for owner's representative of all fire, smoke, and combination fire and smoke dampers as directed by NFPA 80, chapter 19 - Installation, Testing, and Maintenance of Fire Dampers and NFPA 105, chapter 6 - Installation, Testing, and Maintenance of Smoke Dampers.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 23 34 23
HVAC POWER VENTILATORS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Roof exhausters.

1.03 RELATED REQUIREMENTS

A. Section 23 05 13 - Common Motor Requirements for HVAC Equipment.

B. Section 23 05 48 - Vibration And Seismic Controls For HVAC Piping And Equipment.

C. Section 23 33 00 - Air Duct Accessories: Backdraft dampers.

D. Section 26 27 26 - Wiring Devices: Electrical characteristics and wiring connections.

1.04 REFERENCE STANDARDS

A. AMCA 99 - Standards Handbook; 2025.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.

C. Manufacturer's Instructions: Indicate installation instructions.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.07 FIELD CONDITIONS

A. Permanent ventilators may not be used for ventilation during construction.

PART 2 PRODUCTS

2.01 POWER VENTILATORS - GENERAL

A. Static and Dynamically Balanced: AMCA 204 - Balance Quality and Vibration Levels for Fans.

B. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.

C. Sound Ratings: AMCA 301, tested to AMCA 300 and bearing AMCA Certified Sound Rating Seal.

D. Fabrication: Comply with AMCA 99.

E. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.

F. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

G. Enclosed Safety Switches: Comply with NEMA EN 10250.

2.02 ROOF EXHAUSTERS

A. Fan Unit: V-belt or direct driven as indicated, with spun aluminum housing; resilient mounted motor; 1/2 inch mesh, 0.62 inch thick aluminum wire birdscreen; square base to suit roof curb with continuous curb gaskets.

B. Roof Curb: 8 inch high self-flashing of galvanized steel with continuously welded seams, built-in cant strips.

C. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor and wall mounted multiple speed switch.

D. Backdraft Damper: Gravity actuated, aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked, and line voltage motor drive, power open, spring return.

E. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Secure roof exhausters with cadmium plated steel lag screws to roof curb.

C. Extend ducts to roof exhausters into roof curb. Counterflash duct to roof opening.

D. Hung Cabinet Fans:
   1. Install fans with resilient mountings and flexible electrical leads, see Section 23 05 48.
   2. Install flexible connections specified in Section 23 33 00 between fan and ductwork. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.

E. Provide sheaves required for final air balance.

F. Install backdraft dampers on inlet to roof-mounted and externally-mounted wall exhausters.

G. Provide backdraft dampers on outlet from cabinet and ceiling exhauster fans and as indicated.

H. Provide backdraft dampers or motorized dampers in the wall housing or wall collar of sidewall propeller fans.

END OF SECTION

SECTION 23 37 00
AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Diffusers.

B. Registers/grilles.

C. Louvers.

1.03 REFERENCE STANDARDS

A. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2015.

B. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Inlets; 2006 (Reaffirmed 2021).

C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

1.05 QUALITY ASSURANCE

A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.

B. Test and rate louver performance in accordance with AMCA 500-L.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Louvers
   1. Ruskin: www.ruskin.com/category/11~Louver-and-Architectural-Solutions
   2. Greenheck: www.greenheck.com/products/air-control/louvers
   3. Pottorff: www.pottorff.com

B. Air Devices
   1. Titus: www.titus-hvac.com
   2. Price Industries: www.priceindustries.com
   3. Krueger-HVAC: www.krueger-hvac.com
   4. Tuttle and Bailey: www.tuttleandbailey.com

C. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 DIFFUSERS

A. See the Air Device Schedule on the Contract Drawings

2.03 REGISTERS / GRILLES

A. See the Air Device Schedule on the Contract Drawings

2.04 LOUVERS

A. Stationary Drainable Blade
   1. Performance
      a. Free Area: 52.3% based on a 48 in. x 48 in. (1219 mm x 1219 mm) louver size

b. Free Area Velocity at Beginning Point of Water Penetration: 1027 fpm (5.2 m/s)

2. Standard Construction
   a. Frame: Heavy gauge extruded 6063-T5 aluminum, 6 in. (152 mm) x 0.063 in. (2 mm) nominal wall thickness
   b. Blades: Drainable design, heavy gauge extruded 6063-T5 aluminum, 0.063 in. (2 mm) nominal wall thickness, positioned 45º on approximately 6 in. (152 mm) centers
   c. Louver: Depth 6 in. (152 mm)
   d. Construction: Mechanically fastened
   e. Wind Load: 25 PSF (1.2 kPa)
3. Finish:
   a. AAMA 611 compliant Anodized Finish
4. Color: To be selected by Architect Engineer from manufacturer's standard colors range.
5. Options: Provide the following options where indicated on the Contract Drawings:
   a. Bird Screen
   b. Blank Off Panels

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.

C. Provide air device manufacturer's plaster or mounting frame for installation of lay-in type air devices in hard ceilings.

D. Install diffusers to ductwork with air tight connection.

E. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.

F. Paint ductwork visible behind air outlets and inlets matte black. Refer to Section 09 91 23.

END OF SECTION

SECTION 23 62 13
PACKAGE ROOF TOP AIR CONDITIONING UNITS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Condensing unit package.

B. Charge of refrigerant and oil.

C. Controls and control connections.

D. Refrigerant piping connections.

E. Motor starters.

F. Electrical power connections.

1.03 RELATED REQUIREMENTS

A. Section 23 05 13 - Common Motor Requirements for HVAC Equipment.

B. Section 23 05 48 - Vibration And Seismic Controls For HVAC Piping And Equipment: Placement of vibration isolators.

C. Section 23 23 00 - Refrigerant Piping.

1.04 REFERENCE STANDARDS

A. AHRI 210/240 - Standard for Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2008, Including All Addenda.

B. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2024, with Addendum (2025).

C. ASHRAE Std 23.1 - Methods for Performance Testing Positive Displacement Refrigerant Compressors and Condensing Units that Operate at Subcritical Pressures of the Refrigerant; 2019.

D. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.

F. NEMA MG 00001 - Motors and Generators; 2024.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide rated capacities, weights specialties and accessories, electrical nameplate data, and wiring diagrams. Include equipment served by condensing units in submittal, or submit at same time, to ensure capacities are complementary.

C. Shop Drawings: Indicate components, assembly, dimensions, weights and loadings, required clearances, and location and size of field connections. Include schematic layouts showing condensing units, cooling coils, refrigerant piping, and accessories required for complete system.

D. Manufacturer's Instructions: Submit manufacturer's complete installation instructions.

E. Operation and Maintenance Data: Include start-up instructions, maintenance instructions, parts lists, controls, and accessories.

F. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

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

1.07 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide a five year warranty to include coverage for refrigerant compressors.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. See the Packaged Unit Schedule(s) on the Contract Drawings.

2.02 MANUFACTURED UNITS

A. Units: Self-contained, packaged, factory assembled and pre-wired units suitable for outdoor use consisting of cabinet, compressors, condensing coil and fans, integral sub-cooling coil, controls, liquid receiver, wind deflector, and screens.

B. Construction and Ratings: In accordance with AHRI 210/240. Test in accordance with ASHRAE Std 23.1.

C. Performance Ratings: Energy Efficiency Rating (EER) and Coefficient of Performance (COP) not less than prescribed by ASHRAE Std 90.1.

2.03 CASING

A. House components in welded steel frame with galvanized steel panels with weather resistant, baked enamel finish.

B. All cabinet walls, access doors, and roof shall be fabricated of double wall, impact resistant, rigid polyurethane foam panels.

C. Mount starters, disconnects, and controls in weatherproof panel provided with full opening access doors. Provide mechanical interlock to disconnect power when door is opened.

D. Provide removable access doors or panels with quick fasteners and piano hinges.

E. All cabinet walls, access doors, and roof shall be fabricated of double wall, impact resistant, rigid polyurethane foam panels.

F. Unit insulation shall have a minimum thermal resistance R-value of 13. Foam insulation shall have a minimum density of 2 pounds/cubic foot and shall be tested in accordance with ASTM D1929-11 for a minimum flash ignition temperature of 610°F.

G. Unit construction shall be double wall with G90 galvanized steel on both sides and a thermal break. Double wall construction with a thermal break prevents moisture accumulation on the insulation, provides a cleanable interior, prevents heat transfer through the panel, and prevents exterior condensation on the panel.

H. Unit shall be designed to reduce air leakage and infiltration through the cabinet. Cabinet leakage shall not exceed 1% of total airflow when tested at 3 times the minimum external static pressure provided in AHRI Standard 340/360. Panel deflection shall not exceed L/240 ratio at 125% of design static pressure, at a maximum 8 inches of positive or negative static pressure, to reduce air leakage. Deflection shall be measured at the midpoint of the panel height and width. Continuous sealing shall be included between panels and between access doors and openings to reduce air leakage. Piping and electrical conduit through cabinet panels shall include sealing to reduce air leakage.

I. Roof of the air tunnel shall be sloped to provide complete drainage. Cabinet shall have rain break overhangs above access doors.

J. Access to filters, dampers, cooling coils, reheat coil, heaters, exhaust fans, compressors, and electrical and controls components shall be through hinged access doors with quarter turn, zinc cast, lockable handles. Full length stainless steel piano hinges shall be included on the doors.

K. Exterior paint finish shall be capable of withstanding at least 2,500 hours, with no visible corrosive effects, when tested in a salt spray and fog atmosphere in accordance with ASTM B 117-95 test procedure.

L. Units with cooling coils shall include double sloped 304 stainless steel drain pans.

M. Unit shall be provided with base discharge and return air openings. All openings through the base pan of the unit shall have upturned flanges of at least 1/2 inch in height around the opening.

N. Unit shall include lifting lugs on the top of the unit.

O. Unit base pan shall be provided with 1/2 inch thick foam insulation.

2.04 EVAPORATOR COILS

A. Coils shall be designed for use with R-410A refrigerant and constructed of copper tubes with aluminum fins mechanically bonded to the tubes and galvanized steel end casings. Fin design shall be sine wave rippled.

2.05 CONDENSER COILS

A. Coils: Aluminum fins mechanically bonded to seamless copper tubing. Provide sub-cooling circuits. Air test under water to 425 psig, and vacuum dehydrate. Seal with holding charge of nitrogen.

B. Coil Guard: Expanded metal with lint screens.

2.06 FANS AND MOTORS

A. Vertical discharge direct driven propeller type condenser fans with fan guard on discharge. Equip with roller or ball bearings with grease fittings extended to outside of casing.

B. Weatherproof motors suitable for outdoor use, single phase permanent split capacitor or 3 phase, with permanent lubricated ball bearings and built in current and thermal overload protection. Refer to Section 23 05 13.

C. Variable speed supply fan motor using electronically commutated motors. Variable frequency drives shall be factory wired and mounted in the unit. Fan motors shall be premium efficiency.

2.07 COMPRESSORS

A. Compressor: Hermetic scroll type.

B. Mounting: Statically and dynamically balance rotating parts and mount on rubber-in-shear vibration isolators. Compressors shall be mounted in an isolated service compartment which can be accessed without affecting unit operation. Lockable hinged compressor access doors shall be fabricated of double wall, rigid polyurethane foam injected panels to prevent the transmission of noise outside the cabinet.

C. Lubrication System: Reversible, positive displacement oil pump with oil charging valve, oil level sight glass, and magnetic plug or strainer.

D. Motor: variable speed 1800 rpm suction gas cooled with electronic sensor and winding over temperature protection, designed for across-the-line starting. Furnish with starter.

E. Capacity Reduction Equipment: Suction valve unloaders, with lifting mechanism operated by electrically actuated solenoid valve, with unloaded compressor start; controlled from suction pressure. At least one compressor in the system must be digital scroll or variable speed.

F. Sump Oil Heater: Evaporates refrigerant returning to sump during shut down. Energize heater continuously when compressor is not operating.

2.08 GAS HEATING SECTION

A. Stainless steel heat exchanger furnace shall carry a 10 year non-prorated warranty, from the date of original equipment shipment from the factory.

B. Gas furnace shall consist of stainless steel heat exchangers with multiple concavities, an induced draft blower and an electronic pressure switch to lockout the gas valve until the combustion chamber is purged and combustion airflow is established.

C. Furnace shall include a gas ignition system consisting of an electronic igniter to a pilot system, which will be continuous when the heater is operating, but will shut off the pilot when heating is not required.

D. Unit shall include a single gas connection and have gas supply piping entrances in the unit base for through-the-curb gas piping and in the outside cabinet wall for across the roof gas piping.

E. Natural gas furnace shall be equipped with modulating gas valves, adjustable speed combustion blowers, stainless steel tubular heat exchangers, and electronic controller. Combustion blowers and gas valves shall be capable of modulation. Electronic controller includes a factory wired, field installed supply air temperature sensor. Sensor shall be field installed in the supply air ductwork. Supply air temperature setpoint shall be adjustable on the electronic controller within the controls compartment. 90 MBH, 150 MBH, 195 MBH, 210 MBH, 270 MBH, 292.5 MBH, 390 MBH, 540 MBH and 800MBH gas heating assemblies shall be capable of operating at any firing rate between 100% and 30% of their rated capacity. 405 MBH and 810 MBH gas heating assemblies shall be capable of operating at any firing rate between 100% and 20% of their rated capacity. 1080 MBH and 1600 MBH gas heating assembly shall be capable of operating at any firing rate between 100% and 15% of its rated capacity. 2400 MBH gas heating assembly shall be capable of operating at any firing rate between 100% and 10% of its rated capacity.

2.09 REFRIGERANT CIRCUIT

A. Provide each unit with one refrigerant circuit, factory supplied and piped. Refer to Section 23 23 00.

B. For each refrigerant circuit, provide:
   1. Filter dryer replaceable core type.
   2. Liquid line sight glass and moisture indicator.
   3. Thermal expansion valve for maximum operating pressure.
   4. Insulated suction line.
   5. Suction and liquid line service valves and gauge ports.
   6. Liquid line solenoid valve.
   7. Charging valve.
   8. Discharge line check valve.
   9. Compressor discharge service valve.
   10. Condenser pressure relief valve.
   11. Hot-gas reheat coil

C. For heat pump units, provide reversing valve, suction line accumulator, discharge muffler, flow control check valve, and solid-state defrost control utilizing thermistors.

2.10 FILTERS

A. Unit shall include 2 inch thick, pleated panel filters with an ASHRAE efficiency of 30% and MERV rating of 8, upstream of the cooling coil.

B. Unit shall include a clogged filter switch.

C. Units shall include a Magnehelic gauge mounted in the controls compartment.

2.11 OUTSIDE AIR/ECONOMIZER

A. Unit shall include 0-100% economizer consisting of a motor operated outside air damper and return air damper assembly constructed of extruded aluminum, hollow core, airfoil blades with rubber edge seals and aluminum end seals. Damper blades shall be gear driven and designed to have no more than 15 cfm of leakage per sq. ft. of damper area when subjected to 2 inches w.g. air pressure differential across the damper. Damper assembly shall be controlled by spring return actuator. Unit shall include outside air opening bird screen, outside air hood, and barometric relief dampers.

2.12 CONTROLS

A. On unit, mount weatherproof steel control panel, NEMA EN 10250, containing power and control wiring, molded case disconnect switch, factory wired with single point power connection.

B. For each compressor, provide across-the-line starter, non-recycling compressor overload, starter relay, and control power transformer or terminal for controls power. Provide manual reset current overload protection. For each condenser fan, provide across-the-line starter with starter relay.

C. Provide safety controls arranged so any one will shut down machine:
   1. High discharge pressure switch (manual reset) for each compressor.
   2. Low suction pressure switch (automatic reset) for each compressor.
   3. Oil Pressure switch (manual reset).

D. Variable Speed Drive Fan
   1. The supply fan shall have the capability of variable speed to be used to slow the fan in the cooling mode as the space nears room temperature setpoint in an effort to maximize dehumidification.

E. Provide the following operating controls:
   1. Thermostat located in room cycles compressors activates cylinder unloaders.
   2. One minute off timer prevents compressor from short cycling.
   3. Periodic pump-out timer to pump down on high evaporator refrigerant pressure.
   4. Low ambient temperature controls.
   5. Hot gas bypass sized for minimum compressor loading on one compressor only, bypasses hot refrigerant gas to evaporator.
   6. Lead-lag switch to alternate compressor operation.
   7. Low ambient thermostat to lock out compressor at low ambient temperatures.

F. Provide controls to permit operation down to 0 degrees F ambient temperature.
   1. Thermostat to cycle fan motors in response to outdoor ambient temperature.
   2. Head pressure switch to cycle fan motors in response to refrigerant condensing pressure.
   3. Solid state control to vary speed of one condenser fan motor in response to refrigerant condensing pressure.
   4. Electronic control consisting of mixing damper assembly, controlled to maintain constant refrigerant condensing pressure.

G. Gauges: Prepiped for suction and discharge refrigerant pressures and oil pressure for each compressor.

H. For multiple units, provide remote mounted sequence panel to allow operation with lead-lag switching and time delay timer.

I. Provide low voltage, adjustable thermostat to control heating stages in sequence with delay between stages, compressor stages, and supply fan to maintain temperature setting:
   1. Include:
      a. System selector switch (heat-off-cool).
      b. Fan control switch (auto-on).
   2. Provide double acting thermostat with minimum 2 stage heating and 1 stage cooling.
   3. Locate thermostat in room as indicated.

PART 3 EXECUTION

3.01 INSTALLATION

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

B. Complete structural, mechanical, and electrical connections in accordance with manufacturer's installation instructions.

C. Provide for connection to electrical service. Refer to Section 26 05 83.

D. Install units on vibration isolation. Refer to Section 22 05 48.

E. Provide connection to refrigeration piping system and evaporators. Refer to Section 23 23 00. Comply with ASHRAE Std 15.

3.02 SYSTEM STARTUP

A. Supply initial charge of refrigerant and oil for each refrigeration system. Replace losses of oil or refrigerant prior to end of correction period.

B. Charge system with refrigerant and test entire system for leaks after completion of installation. Repair leaks, put system into operation, and test equipment performance.

C. Shut-down system if initial start-up and testing takes place in winter and machines are to remain inoperative. Repeat start-up and testing operation at beginning of first cooling season.

D. Provide cooling season start-up, and winter season shut-down for first year of operation.

E. Inspect and test for refrigerant leaks every 120 days during first year of operation.

END OF SECTION

SECTION 23 81 28
DUCTLESS AND MINI-SPLIT SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Ductless Split System - Heat Pump

1.02 RELATED REQUIREMENTS

A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Conductor and cable applications.

1.03 REFERENCE STANDARDS

A. AHRI 210/240 - Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment

B. AHRI 270 (SI/I-P) - Sound Performance Rating of Outdoor Unitary Equipment; 2025.

C. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2024, with Addendum (2025).

D. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.

C. Shop Drawings: Indicate assembly, required clearances, and location and size of field connections.

D. Design Data: Indicate refrigerant pipe sizing.

E. Manufacturer's Instructions: Indicate rigging, assembly, and installation instructions.

F. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.

G. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. The system components shall be tested by a Nationally Recognized Testing Laboratory (NRTL) and shall bear the ETL label.

B. All wiring shall be in accordance with the National Electrical Code (N.E.C.).

C. The units shall be rated in accordance with Air-conditioning, Heating and Refrigeration Institute’s (AHRI) Standard 240 and bear the AHRI Certification label.

D. The units shall be manufactured in a facility registered to ISO 9001 and ISO 14001, which is a set of standards applying to product and manufacturing quality and environmental management and protection set by the International Standard Organization (ISO).

E. A dry air holding charge shall be provided in the indoor section.

F. Installer Qualifications: Company specializing in performing the work of this section 3 and approved by manufacturer.

1.06 DELIVERY, STORAGE AND HANDLING

A. Unit shall be stored and carefully handled according to the manufacturer’s recommendations.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. The units shall have a manufacturer's parts and defects warranty for a period five (5) years from date of installation. The compressor shall have an extended warranty of seven (7) years from date of installation.

C. If, during this period, any part should fail to function properly due to defects in workmanship or material, it shall be replaced or repaired at the discretion of the manufacturer. This warranty will not include labor.

PART 2 PRODUCTS

2.01 DUCTLESS SPLIT SYSTEM HEAT PUMP CONDENSING UNIT

A. System Description
   1. The ductless split heat pump system shall consist of a slim silhouette horizontal discharge outdoor unit which shall be of an inverter driven compressor desig matched with a one-way ceiling-recessed cassette indoor unit with wired remote controller.

B. Outdoor Unit
   1. General:
      a. The outdoor units shall be specifically designed to work with the matched indoor units. The outdoor units must have a thermally fused powder coated finish. The outdoor unit shall be completely factory assembled, piped and wired. Each unit shall be run tested at the factory.
      b. Outdoor unit shall have a sound rating no higher than 55 dB(A).
      c. Refrigerant lines from the outdoor unit to the indoor units shall be insulated in accordance with the installation manual.
      d. The outdoor unit shall meet performance requirements per schedule and be within piping limitations & acceptable ambient temperature ranges as described in respective manufacturers' published product catalogs. Non-published product capabilities or performance data are not acceptable.
      e. The outdoor unit shall be provided with a manufacturer supplied 20 gauge hot dipped galvanized snow /hail guard. The snow/hail guard protects the outdoor coil surfaces from hail damage and snow build-up in severe climates.
      f. Four-legged outdoor unit mounting systems shall be provided by manufacturer. Stand shall be made from 7 gauge plate steel with thermally fused polyester powder coat finish that meets ASTM D3451-06 standards. Stands shall be provided with galvanized mounting hardware and meets all ASCE 7 overturning safety requirement.
   2. Unit Cabinet:
      a. The casing shall be fabricated of galvanized steel, bonderized, finished with an electrostatically applied, thermally fused acrylic or polyester powder coating for corrosion protection. Assembly hardware shall be cadmium plated for weather resistance.
      b. Two (2) mild steel mounting feet, traverse mounted across the cabinet base pan, welded mount, providing four (4) slotted mounting holes shall be furnished. Assembly shall withstand lateral wind gust up to 155 MPH to meet applicable weather codes.The casing(s) shall be fabricated of galvanized steel, bonderized and finished.
   3. Fan:
      a. The unit shall be furnished with a direct drive propeller type fan.
      b. The outdoor unit fan motor shall be a direct current (DC) motor and have permanently lubricated bearings.
      c. The fan motor shall be mounted for quiet operation.
      d. The fan shall be provided with a raised guard to prevent contact with moving parts.
      e. The outdoor unit shall have horizontal discharge airflow.
   4. Refrigerant and Refrigerant Piping

a. R32 refrigerant shall be required for systems.
b. Polyolester (POE) oil—widely available and used in conventional domestic systems—shall be required. Prior to bidding, manufacturers using alternate oil types shall submit material safety data sheets (MSDS) and comparison of hygroscopic properties for alternate oil with list of local suppliers stocking alternate oil for approval at least two weeks prior to bidding.
c. Refrigerant piping shall be phosphorus deoxidized copper (copper and copper alloy seamless pipes) of sufficient radial thickness as defined by the equipment manufacturer and installed in accordance with manufacturer recommendations.
d. All refrigerant piping must be insulated with ½" closed cell, CFC-free foam insulation with flame-Spread Index of less than 25 and a smoke-development Index of less than 50 as tested by ASTM E 84 and CAN / ULC S-102. R value of insulation must be at least 3.
e. Refrigerant line sizing shall be in accordance with manufacturer specifications.

5. Coil:
   a. The outdoor unit coil shall be of nonferrous construction with lanced or corrugated plate fins on copper tubing.
   b. The coil fins shall have a factory applied corrosion resistant finish. Uncoated aluminum coils/fins are not allowed.
   c. The coil shall be protected with an integral metal guard.
   d. Refrigerant flow from the outdoor unit shall be regulated by means of an electronically controlled, precision, linear expansion valve.
   e. Outdoor unit shall be pre-charged with sufficient R-410a refrigerant for up to twenty five (25) feet of refrigerant piping for capacities up to 15,000 BTU/h, and up to thirty three (33) feet of refrigerant piping for capacities 18,000 BTU/h and above.
   f. All refrigerant lines between outdoor and indoor units shall be of annealed, refrigeration grade copper tubing, ARC Type, meeting ASTM B280 requirements, individually insulated in twin-tube, flexible, closed-cell, CFC-free (ozone depletion potential of zero), elastomeric material for the insulation of refrigerant pipes and tubes with thermal conductivity equal to or better than 0.27 BTU-inch/hour per Sq Ft / °F, a water vapor transmission equal to or better than 0.08 Perm-inch and superior fire ratings such that insulation will not contribute significantly to fire and up to 1" thick insulation shall have a Flame-Spread Index of less than 25 and a Smoke-development Index of less than 50 as tested by ASTM E 84 and CAN / ULC S-102.
   g. All refrigerant connections between outdoor and indoor units shall be flare type.
6. Compressor:
   a. The compressor shall be a high performance, hermetic, inverter driven, variable speed type.
   b. The compressor motor shall be direct current (DC) type equipped with a factory supplied and installed inverter drive package.
   c. The compressor will be equipped with internal thermal overload protection.
   d. The outdoor unit must have the ability to operate over the full capacity range with a maximum height difference of 40 feet and refrigerant tubing length of 65 feet for capacities up to 15,000 BTU/h and a maximum height difference of 50 feet and refrigerant tubing length of 100 feet for capacities 18,000 BTU/h and above between indoor and outdoor units.
   e. There shall be no need for line size changes. Filters, sight glasses, and traps shall not be used, and no additional refrigerant oil shall be required.
   f. The compressor shall be mounted so as to avoid the transmission of vibration.
7. Operating Temperature Range:
   a. Indoor cooling maximum db / wb: 95° F db / 71° F wb
   b. Indoor cooling minimum db / wb: 67° F db / 57° F wb
   c. Outdoor cooling maximum db: 115° F db

d. Outdoor cooling minimum db: 14° F
e. Indoor heating maximum db / wb: 80° F db / 67° F wb
f. Indoor heating minimum db / wb: 70° F db / 60° F wb
g. Outdoor heating maximum db / wb: 75° F db / 65° F wb
h. Outdoor heating minimum db: -12° F db / -13° F wb

8. Electrical:
   a. The outdoor unit electrical power supply shall be 208/230 volts, 1-phase, 60 hertz.
   b. The unit shall be capable of satisfactory operation within voltage limits of 187 volts to 253 volts.
   c. The outdoor unit shall be controlled by microprocessors located in the indoor unit and outdoor unit. A 12 to 24 volt DC data stream shall communicate between the units providing all necessary information for full function control.
9. Controls:
   a. The control system shall consist of a minimum of one microprocessor on each indoor unit and one in the outdoor unit, communicating via data over power transmission. The microprocessor located in the indoor unit shall have the capability of monitoring return air temperature and indoor coil temperature, receiving and processing commands from the wired or wireless controller, providing emergency operation and controlling the outdoor unit. The control signal between the indoor and outdoor unit shall be pulse signal 24 volts DC. Indoor units shall have the ability to control supplemental heat via a connector and a 12 VDC output.
   b. A three (3) conductor 14 gauge AWG wire with ground shall provide power feed and bi-directional control transmission between the outdoor and indoor units. If code requires a disconnect mounted near the indoor unit, a 3-Pole disconnect shall be used; all three conductors must be interrupted. Install conductors in conduit per Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
   c. The system shall be capable of automatic restart when power is restored after power interruption. The system shall have self-diagnostics ability, including total hours of compressor run time. Diagnostics codes for indoor and outdoor units shall be displayed on the wired controller panel.

C. Indoor Unit: See Paragraph INDOOR UNIT - ONE-WAY CEILING-RECESSED CASSETTE below.

2.02 INDOOR UNIT - ONE-WAY CEILING-RECESSED CASSETTE

A. General:
   1. The one-way cassette indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, an emergency operation function and a test run switch. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory. The unit shall be suitable for use in plenums in accordance with UL1995 ed 4.

B. Unit Cabinet:
   1. One-way grille shall be fixed to bottom of cabinet.
   2. The grille shall allow the unit to be serviceable from the bottom, without the need for an access panel.

C. Fan:
   1. The indoor fan shall be an assembly with one line-flow fan direct driven by a single motor with permanently lubricated bearings.

2. The indoor unit shall include an AUTO fan setting capable of maximizing energy efficiency by adjusting the fan speed based on the difference between controller set-point and space temperature. The indoor fan shall be capable of five (5) speed settings, Quiet, Low, Med, High and Auto.
3. The indoor unit vanes shall have 5 fixed positions and a swing feature that shall be capable of automatically swinging the vanes up and down for uniform air distribution.
4. The vanes shall be capable of swinging left and right for uniform air distribution.

D. Filter:
1. Return air shall be filtered by means of a long-life washable permanent filter.

E. Coil:
1. The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing. The tubing shall have inner grooves for high efficiency heat exchange. All tube joints shall be brazed with phos-copper or silver alloy.
2. The coils shall be pressure tested at the factory.
3. The unit shall be provided with an integral condensate lift mechanism able to raise drain water 19.6 inches above the condensate pan.

F. Electrical:
1. The unit electrical power shall be 208/230 volts, 1-phase, 60 hertz.
2. The system shall be equipped with a system directing that the indoor unit be powered directly from the outdoor unit using a 3-wire, 14 gauge AWG connections plus ground. Install conductors in conduit per Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
3. The indoor unit shall not have any supplemental electrical heat elements.

G. Controls:
1. The unit shall ship with a wired controller for wall mounting.
2. (Heat Pump Systems) Indoor unit shall compensate for the higher temperature sensed by the return air sensor compared to the temperature at level of the occupant when in HEAT mode. Disabling of compensation shall be possible for individual units to accommodate instances when compensation is not required.
3. Control board shall include contacts for control of external heat source. External heat may be energized as second stage when the space temperature is 1.8°F from set point.
4. A factory-installed drain pan sensor shall provide protection against drain pan overflow by sensing a high condensate level in the drain pan. Should this occur the control shuts down the indoor unit before an overflow can occur.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.

B. Verify that proper power supply is available and in correct location.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions and requirements of local authorities having jurisdiction.

B. Install in accordance with NFPA 90A.

C. Insulate liquid and suction refrigerant lines per the manufacturer's installation instructions.

D. Provide a U.V. resistant, paintable lineset cover kit to cover exterior refrigerant linesets.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 26 00 10
ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 WORK INCLUDED

A. Work covered by this specification shall include furnishing all labor, materials, equipment and services required to construct and install the complete electrical system shown on accompanying plans and specified herein, and make final connections to all equipment.

B. This work shall include: The general layout of the complete electrical system; arrangement of feeders, circuits, outlets, switches, controls, panelboards, transformers, service equipment, fixtures, and other work. No rough-in or connection, etc. for mechanical equipment shall be done until coordination is completed with Division 23.

1.03 RELATED WORK

A. The Contractor shall be familiar with any work specified elsewhere in these specifications. Perform this work as specified herein.

1.04 LOCAL CONDITIONS

A. Unless otherwise required or specified under another section of these specifications, cutting and patching will be performed by the Contractor. Division 26 shall furnish sketches showing locations and sizes of all openings, chases, etc. required for the installation of work.

B. Division 26 shall furnish and locate sleeves and inserts required before floors and walls are built or he shall be responsible for the cost of cutting and patching required where such sleeves and inserts are not installed or where incorrectly located. Division 26 shall do all drilling required for installation of the hangers.

C. No cutting shall be permitted to any of the structural members without the written permission of the Architect Engineer.

D. Where openings are cut to permit installation of work, or cut to repair or remodel, any defects that may appear up to expiration of guarantee, patching shall be done by the trade whose work is disturbed, but shall be paid for by the Division cutting openings or causing the damage.

E. Roof curbs for electrical openings shall be provided and flashed by the Contractor. Division 26 shall advise the Contractor as to size, location and details of curbs required.

F. The Contractor shall furnish all foundations and supports required for electrical equipment. Division 26 shall furnish an approved layout of bases and supports to the Contractor.

G. In general, all floor-mounted equipment shall be installed on raised concrete bases. Concrete bases shall be not less than 6 inches high unless otherwise noted, and shall be poured in forms built of new dressed lumber. Foundation corners shall be neatly chamfered by means of sheet metal or triangular wood strips nailed to the form. Foundation bolts shall be placed in forms when concrete is poured; bolts shall be correctly located by means of templates. Allow 1 inch below equipment bases for alignment and grouting. After grouting, the forms will be removed and the surface of the foundations shall be hand-rubbed with carborundum.

H. Division 26 shall give full cooperation to other trades, furnishing, in writing, to the Architect Engineer, any information necessary to permit work of all trades to be installed satisfactorily and with the least possible interference or delay.

I. Where work of this Division will be installed close to work of other trades, or where there is evidence that the work will interfere with work of other trades, the Division 26 shall assist in working out space conditions to make satisfactory adjustment. If the Contractor installs work before coordinating with other trades, he shall make necessary changes in his work to correct the condition without extra charge.

J. Keep work area clean at all times. Daily remove all scraps and debris from work area.

1.05 PERMITS AND INSPECTIONS

A. Give all necessary notices; obtain all permits, and pay all governmental taxes, fees and other costs in connection with work; file all necessary plans; prepare all documents and obtain all necessary approvals of all governmental departments having jurisdiction; obtain required certificates of inspection for his work and deliver same to the Architect Engineer before request for acceptance and final payment of work.

B. Contractor shall include in the work, without extra cost to the Owner, all labor, materials, services, apparatus, drawings, etc. in order to comply with all laws, ordinances, rules and regulations, whether or not shown on the drawings and/or in the specifications.

1.06 CODES AND STANDARDS

A. The following specifications and standards, of issues listed below, but referred to thereafter by basic designation only, form part of these specifications:
   1. National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Amendments and Supplements.
   2. National Electrical Safety Code.
   3. National Fire Protection Association's Recommended Practices.
   4. Local, City and State Codes and Ordinances.
   5. Underwriters Laboratories, Inc.
   6. Illuminating Engineering Society.
   7. Institute of Electrical and Electronic Engineers.
   8. Insulated Cable Engineers Association.
   9. National Electrical Manufacturers Association.
   10. American National Standards Institute.
   11. American Society for Testing Materials.
   12. State Fire Prevention Code.
   13. Occupational Health Safety Act.
   14. National Electrical Contractor Standards..

B. The latest specifications and standards available shall be used for the above.

1.07 REVIEW OF MATERIALS

A. It is the intent of these specifications to establish quality standards of materials and equipment installed. Therefore, specific items are identified by manufacturer, trade name or catalog designation.

B. Should the Contractor propose to furnish material and equipment other than that specified, he shall submit a written request for any or all substitutions to the Architect Engineer. Such request shall be alternatives to the original bid, and shall be submitted complete with descriptive (manufacturer, brand name, catalog number, etc.), and technical data for all items. The Contractor shall submit written answers to the following questions for each substitution request:
   1. Is the substitution of equal, greater or less quality than the design requirements?
   2. If of less quality, what is the difference in value?
   3. If of equal or better quality, what are the advantages to the Owner in accepting the substitution at no change in contract price?

C. Where such substitutions alter the design or space requirements indicated on the drawings, the Contractor shall include all items of cost for the revised design and include cost of all applicable trades involved.

D. Acceptance or rejection of the proposed substitutions shall be subject to the approval of the Architect Engineer. If requested by the Architect Engineer, the Contractor shall submit for inspection samples of both the specified and proposed substitute items.

E. In all cases where substitutions are permitted, the Contractor shall bear any extra cost of evaluating the equality of the material and the equipment to be installed.

F. The Contractor shall submit to the Architect Engineer detailed dimensioned shop drawings covering all items of electrical equipment. No equipment should be put into manufacture or ordered until these shop drawings or brochures have been approved by the Architect Engineer.

G. The Contractor shall submit 5 physical copies or electronic copies of the shop drawings to the Architect Engineer for comment or correction.

H. In the event resubmittal is required, the Contractor shall revise the shop drawings as directed by the Architect Engineer. The Contractor shall then resubmit 5 physical copies or electronic copies of the corrected shop drawings to the Architect Engineer for final approval.

I. As soon as practicable and within 30 days after award of contract, and before beginning fabrication of material or installation of equipment, the Contractor shall submit a complete schedule of materials, equipment, apparatus and appurtenances proposed for installation and/or use in this project to the Architect Engineer for approval.

J. This schedule shall be in the form of a bill of materials and shall include manufacturer's names, catalog numbers, diagrams and other descriptive data as required for approval. Submittal procedure shall be the same as specified above.

K. Upon completion of the project, this Contractor shall prepare and deliver to the Architect Engineer one set of red-lined "RECORD SET" prints, showing actual installed locations of all electrical conduits, ducts and cables outside and inside of the buildings, including the location of all underground junction boxes, pull boxes, handholes and manholes. Make all necessary field measurements during the installation of the electrical work.

1.08 DEVIATIONS

A. The Drawings, which constitute an integral part of the contract, shall indicate the general layout of the complete electrical systems; arrangement of feeders, circuits, outlets, switches, controls, panelboards, transformers, unit substations, service equipment, fixtures and other work.

B. Field verification of scale dimensions on the drawings is directed since actual locations, distances and levels will be governed by actual field conditions.

C. The Contractor shall check architectural, structural, plumbing, heating and ventilating to avert possible installation conflicts. Should drastic changes from original drawings be necessary to resolve such conflicts, the Contractor shall notify the Architect Engineer and secure written approval and agreement on necessary adjustments before the installation is started.

D. The drawings may be superseded by later revised or detailed drawings or specification addenda prepared by the Architect Engineer, and the Contractor shall conform to all reasonable changes without extra cost to the Owner. All items not specifically mentioned in the specifications or noted on the drawings, but which are obviously necessary to make a complete working installation, shall be included.

1.09 SITE UTILITIES

A. Locations and elevations of various utilities, included within the scope of this work, have been obtained from city and utility maps and/or other substantially reliable sources, and are offered separately from contract documents as a general guide only without guarantee as to accuracy. The Contractor shall examine the site and verify to his own satisfaction the locations and elevations of all utilities and shall adequately inform himself of their relations to the work before entering into contract.

B. Voltage that appears on the drawings and elsewhere in these specifications has been obtained from the serving utility company. Before ordering equipment and starting the job, the Contractor shall verify the voltage with the utility company. If voltage differs from that noted on the drawings and in the specifications, the Architect Engineer shall be notified at once. If the Architect Engineer is not notified before equipment is ordered or construction is started, the Contractor shall provide an acceptable and operable system at no additional cost to the Owner.

C. Exterior utilities shall include all conduit and appurtenances outside of the building or as shown on the plans. Unless otherwise noted, utilities shall include complete tie-in with utility lines at no extra cost to the Owner. The Contractor shall pay all costs required by utility company pertaining to construction and tie-in. Deposits required for permanent service shall be paid by the Owner.

1.10 ELECTRICAL LICENSE REQUIREMENT

A. No person shall perform electrical work on the contract without possessing an Arkansas State Master or Journeyman License from the Arkansas State Electrical Examiners Board. All electrical work and apprentice electricians shall be supervised by a Master or Journeyman Electrician on a one to one ratio.

B. All electricians shall have a copy of their license with them and shall be required to show it to an appropriate inspector upon request.

PART 2 - PRODUCTS

2.01 GENERAL

A. Each item of equipment furnished under these specifications is to be essentially the standard product of the manufacturer; however, component parts of equipment need not be products of one manufacturer.

B. All material and equipment shall be new and of the best quality normally used in good commercial practice, being products of reputable manufacture. Each major component shall bear a name plate stating name and address of the manufacturer and catalog number or designation. All materials shall be of the manufacturer's latest design standard, and bear Underwriters Laboratories, Inc. label and the manufacturer's trade mark.

C. Where items of equipment and/or apparatus come under the following general headings; all of the equipment shall be from the same manufacturer:
   1. Busways, circuit breakers, load centers, metering equipment, panelboards, safety switches, starters, substations, switchboards and switchgear.

PART 3 - EXECUTION

3.01 GENERAL

A. All electrical construction work shall be installed under the direction of a competent supervisor who will be at the job site at all times when electrical installations are being made.

B. Installing Contractor will be held responsible for damage to other work resulting from negligence of his workmen. Such repairs shall be performed by the trade originally accomplishing the work but at the expense of Division 26.

C. The Contractor shall utilize only competent and skillful workmen in handling and installing equipment specified.

D. Installation shall be carried out in such a manner that the many components will function as a complete workable system including any accessories required to accomplish such installation. Equipment shall be left properly adjusted and in satisfactory working order. Work is to be executed in conformity with best acceptable standard practices with the equipment being installed to allow for maximum accessibility and best appearance. Installation shall be such that future installations and expansions can be made with a minimum of expenditure.

E. Where possible, work must be scheduled for accomplishment during periods acceptable to the Owner, but when such scheduling is not feasible, work shall be executed at night or over weekends. No additional compensation will be allowed for overtime.

F. Apparatus which is too large to permit access through stairways, doorways or shafts shall be brought to the job site by the Contractor involved and put in place before the closing of the structure.

G. Division 26 shall be responsible for the protection of electrical apparatus from damage and the elements. This shall include the erection of temporary shelters, cribbing, and the covering of apparatus in uncompleted areas of buildings with tarpaulins. Failure to comply with the foregoing by the Contractor to the satisfaction of the Architect Engineer will be sufficient cause for rejection of the piece of apparatus in question.

H. Chases, recesses, and other openings required for the location of conduits or equipment in new construction shall be provided by the Contractor. Division 26 shall advise the Contractor of the size and locations, and furnish all necessary drawings required for his work in sufficient time to allow for provision of chase.

I. After installation is complete, and at such time as the Architect Engineer may direct, the Contractor shall conduct an operating test for approval. Equipment shall be demonstrated to operate in accordance with the requirements of this specification. Test shall be performed in the presence of the Architect Engineer or authorized representative. Division 26 shall furnish instruments and personnel required for the test and Owner will furnish necessary electrical power.

J. The Contractor shall furnish a written certificate guaranteeing materials, equipment and labor furnished to be free of defects for a period of 1 year; except where otherwise indicated, from and after the date of final acceptance of the work by the Owner, and further agrees that if defects appear within stipulated guaranty period same shall be replaced or made good without charge.

3.02 SEISMIC QUALIFICTION OF EQUIPMENT

A. Provide manufacturer's certificate of compliance for the following equipment requiring seismic qualification in accordance with ASCE-7.
   1. Transformers
   2. Panel Boards
   3. Circuit Breakers
   4. Motor Starters
   5. Switch Boards
   6. Light Fixtures

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 26 05 01

THEATRICAL SYSTEMS ELECTRICAL INSTALLATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, other General Requirement Sections, apply to work of this section.

B. Refer to Section 11 61 63 – Stage Lighting Power and Control System and the “TL” Contract Drawings for plans, graphic representations, schedules, and notations showing Stage Lighting Power and Control System work.

C. Refer to the following sections for loose equipment that interfaces with systems provided under Division 11:
   1. Section 11 61 53 – Stage Lighting Fixtures and Portable Equipment

D. Reference related specifications in Division 26.

1.02 SCOPE OF WORK

A. Work in this section includes but is not limited to:
   1. General requirements for provision of electrical services and materials, raceway and outlet box systems, wire, wire pulling, and terminations suitable to accommodate installation of the following systems:
      a. Section 11 61 33 – Stage Rigging and Curtain Systems
      b. Section 11 61 63 – Stage Lighting Power and Control System

B. Provide electrical materials and methods in accordance with all requirements and related sections of Division 26, and as detailed herein.

C. Provide all junction boxes, pull boxes, terminal cabinets, cable trays, conduit, enclosures, standard outlet and device back boxes, and other electrical materials and hardware for a complete theatrical systems electrical infrastructure as specified herein and in quantities and locations as shown on electrical drawings.

D. Provide all disconnects and panelboards for theatrical Systems equipment as specified herein and in quantities as shown on electrical drawings.

E. Provide test reports and verification that wiring installations comply with applicable standards and the requirements set forth in the theatrical systems specification sections listed above, in Division 01, and by the equipment manufacturers.

F. Architectural Lighting controlled by Section 11 61 63
   1. Provide architectural fixtures per Section 26 51 10.
   2. Install DMX-controlled architectural fixtures furnished by Section 11 61 63.
   3. Furnish and install all power and data conduit and back boxes for architectural lighting fixtures.
   4. Furnish and install all power wiring for architectural lighting fixtures. Terminate this wiring at the appropriate devices.
   5. Provide control wire for non-DMX and DMX controlled architectural fixtures, from fixtures to Signal Processing Rack. Division 11 terminates the control wire at the Signal Processing Rack.
   6. Coordinate with Division 11 to address fixtures for control by Section 11 61 63, as required.
   7. Install all emergency transfer equipment associated with architectural lighting systems. (Equipment is furnished under Division 11. Refer to TL Drawings and Section 11 61 63 specifications.)

G. Theatrical Lighting System
   1. Install fixed equipment furnished under Section 11 61 63 – Stage Lighting Power and Control System, including, but not limited to, DMX operated circuit breaker panels, theatrical company switches, and circuit distribution devices per Manufacturers' recommendations and instructions. (Equipment is furnished under Division 11.)
   2. Terminate flexible multi-cable drops and cable management for moving battens with electrical power. Reference Section 11 61 33 – Stage Rigging and Curtain Systems for rigging and Section 11 61 63 – Stage Lighting Power and Control System for drop cable, wiring devices, and terminal boxes. (Equipment is furnished under Division 11.)

H. Theatrical Rigging and Mechanized Systems
   1. Terminate power to motor control cabinets or disconnects for equipment provided under the following sections:
      a. Section 11 61 33 – Stage Rigging and Curtain Systems
   2. Provide strain relief at each condition where cables feed mechanized elements. Coordinate cable lengths and placement requirements with Theatrical Systems sections listed above.

I. Work not included by this section:
   1. Low voltage wiring for Section 11 61 63 – Stage Lighting Power and Control System is provided by Division 11. This includes devices, wire, wire pulling, and terminations for such equipment.
   2. Conduit and power and control wiring for the following Sections, except as noted above:
      a. Section 11 61 33 – Stage Rigging and Curtain Systems

PART 2 PRODUCTS

2.01 RACEWAYS

A. Provide electrical metallic tubing (EMT) or other wireways as specified in the Contract Documents for all Theatrical Systems wiring. Note NEC 520.6 exception to conductor limitation.

B. Provide conductor pull lines in all EMT for low voltage cable provided by Division 11.

C. All wiring for Theatrical Systems shall be contained in raceways.

2.02 BOXES

A. Provide all required pull and junction boxes for the proper routing of cables.

B. All surface mount back boxes shall have faceplates of the same size.

C. All flush mount back boxes shall have faceplates that extend no less than 1/8" past the back box on all sides.

2.03 WIRING DEVICES

A. Provide dedicated Theatrical Lighting System power receptacles and other required wiring devices, complete with associated hardware and wall plates, as specified herein and shown on Electrical Drawings. Verify cover plate finish and color with the Architect.

B. Duplex receptacles shall be standard NEMA 5-20R configurations, unless otherwise noted.

C. Receptacles shall be connected to dedicated circuits as shown on the Drawings.

D. Label cover plates "LIGHTING SYSTEM POWER."

PART 3 EXECUTION

3.01 FOLLOW STANDARD PRACTICES NOTED THROUGHOUT DIVISION 26 SPECIFICATIONS.

3.02 THEATRICAL LIGHTING SYSTEM LOAD WIRING

A. Architectural lighting fixtures shall be addressed and operational through the designed control system prior to commissioning and focus adjustment by Architect's consultant.

B. For all theatrical lighting branch load circuits, all splices and connections to wiring devices shall use compression-type connectors. Spring wire nuts shall not be used for these circuits.

C. All theatrical circuits shall include an individual neutral wire. No common neutrals. No exceptions.

D. All circuits shall be grounded to building electrical ground. No circuit grounds shall be made to conduit, boxes, or structure. Grounds may be shared for lighting circuits.

E. Branch wiring device ground wires as shown in Drawings shall be terminated at the theatrical power panel (TPP) or dimmer rack as indicated.

3.03 ARCHITECTURAL LIGHTING FIXTURE COMMISSIONING

A. Architectural lighting fixtures shall be addressed and operational through the designed control system prior to commissioning and focus adjustment by Architect's consultant.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 26 05 05
SELECTIVE DEMOLITION FOR ELECTRICAL

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Electrical demolition.

1.03 RELATED REQUIREMENTS

A. Section 01 70 00 - Execution and Closeout Requirements: Additional requirements for alterations work.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify field measurements and circuiting arrangements are as indicated.

B. Verify that abandoned wiring and equipment serve only abandoned facilities.

C. Demolition drawings are based on casual field observation and existing record documents.

D. Report discrepancies to Architect Engineer before disturbing existing installation.

E. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

A. Disconnect electrical systems in walls, floors, and ceilings to be removed.

B. Coordinate utility service outages with utility company and Owner.

C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Perform work for removal and disposal of equipment and materials containing toxic substances regulated under the Federal Toxic Substances Control Act (TSCA) in accordance with applicable federal, state, and local regulations. Applicable equipment and materials include, but are not limited to:
   1. PCB-containing electrical equipment, including transformers, capacitors, and switches.
   2. PCB- and DEHP-containing lighting ballasts.
   3. Mercury-containing lamps and tubes, including fluorescent lamps, high intensity discharge (HID), arc lamps, ultra-violet, high pressure sodium, mercury vapor, ignitron tubes, neon, and incandescent.

B. Remove, relocate, and extend existing installations to accommodate new construction.

C. Remove abandoned wiring to source of supply.

D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.

F. Disconnect and remove abandoned panelboards and distribution equipment.

G. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

H. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.

I. Repair adjacent construction and finishes damaged during demolition and extension work.

J. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.

K. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

3.04 CLEANING AND REPAIR

A. See Section 01 74 19 - Construction Waste Management and Disposal for additional requirements.

B. Clean and repair existing materials and equipment that remain or that are to be reused.

C. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

D. Luminaires: Remove existing luminaires for cleaning. Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and wipe dry. Replace lamps, ballasts and broken electrical parts.

END OF SECTION

SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Single conductor building wire.

B. Metal-clad cable.

C. Wiring connectors.

D. Electrical tape.

E. Heat shrink tubing.

F. Wire pulling lubricant.

G. Cable ties.

H. Firestop sleeves.

1.03 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.

B. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.04 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013 (Reapproved 2024).

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2023.

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010, with Editorial Revision (2020).

D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2020).

E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2017.

F. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes; 2020.

G. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

H. NECA 120 - Standard for Installing Armored Cable (AC) and Type Metal-Clad (MC) Cable; 2018.

I. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2021.

J. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2017.

K. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

L. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.

M. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.

N. UL 267 - Outline of Investigation for Wire-Pulling Compounds; Most Recent Edition, Including All Revisions.

O. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.

P. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.

Q. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.

R. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.

S. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.

1.05 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 Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.

C. Field Quality Control Test Reports.

D. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.

1.07 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. 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 conductors and cables in accordance with manufacturer's instructions.

1.09 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 Engineer 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, permitted, or required.

C. Nonmetallic-sheathed cable is not permitted.

D. Underground feeder and branch-circuit cable is not permitted.

E. Service entrance cable is not permitted.

F. Armored cable is not permitted.

G. Metal-clad cable is permitted only as follows:
   1. Where not otherwise restricted, may be used:
      a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
         1) Maximum Length: 6 feet.

H. Manufactured wiring systems are not permitted.

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 26 05 26.

I. 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.

J. 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: 14 AWG.

K. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

L. 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 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
   3. Color Code:
      a. 208Y/120 V, 3 Phase, 4 Wire System:
         1) Phase A: Black.
         2) Phase B: Red.
         3) Phase C: Blue.
         4) Neutral/Grounded: White.
      b. Equipment Ground, All Systems: Green.

c. Travelers for 3-Way and 4-Way Switching: Pink.
d. 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.
e. For control circuits, comply with manufacturer's recommended color code.

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. General Cable Technologies Corporation: www.generalcable.com/#sle.
d. Service Wire Co: www.servicewire.com/#sle.
e. Southwire Company: www.southwire.com/#sle.
f. Substitutions: See Section 01 60 00 - 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 or THHN/THWN-2, except as indicated below.
a. Size 4 AWG and Larger: Type XHHW-2.
b. Fixture Wiring Within Luminaires: Type TFFN/TFN for luminaires with labeled maximum temperature of 90 degrees C; Approved suitable type for luminaires with labeled maximum temperature greater than 90 degrees C.

2.04 METAL-CLAD CABLE

A. 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.

B. Conductor Stranding:
1. Size 10 AWG and Smaller: Solid.
2. Size 8 AWG and Larger: Stranded.

C. Insulation Voltage Rating: 600 V.

D. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.

E. Grounding: Full-size integral equipment grounding conductor.

F. Armor: 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 26 05 26.

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 as a substitute for twist-on insulated spring 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.

H. Mechanical Connectors: Provide bolted type or set-screw type.

I. Compression Connectors: Provide circumferential type or hex type crimp configuration.

J. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.

2.06 ACCESSORIES

A. Electrical Tape:
   1. 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.
   2. 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.
   3. 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.
   4. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil; suitable for continuous temperature environment up to 176 degrees F.
   5. Varnished Cambric Electrical Tape: Cotton cambric fabric tape, with or without adhesive, oil-primed and coated with high-grade insulating varnish; minimum thickness of 7 mil; suitable for continuous temperature environment up to 221 degrees F.
   6. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil.

B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.

C. 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 01 60 00 - 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.

D. Cable Ties: Material and tensile strength rating suitable for application.

E. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.

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. Unless dimensioned, circuit routing indicated is diagrammatic.
2. When circuit destination is indicated without specific routing, determine exact routing required.
3. Arrange circuiting to minimize splices.
4. Include circuit lengths required to install connected devices within 10 ft of location indicated.
5. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
6. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
7. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is not permitted.
8. Common Neutrals: Unless otherwise indicated, 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.

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.
   1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.
   2. Installation in Vertical Raceways: Provide supports where vertical rise exceeds permissible limits.

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.

I. Install conductors with a minimum of 12 inches of slack at each outlet.

J. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet of slack.

K. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

L. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

M. 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.

N. 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.
   1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
      a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
      b. For taped connections likely to require re-entering, including motor leads, first apply varnished cambric electrical tape, followed by adequate amount of rubber splicing electrical tape, followed by outer covering of vinyl insulating electrical tape.
   2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
      a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.

b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.

3. Wet Locations: Use heat shrink tubing.

O. Insulate ends of spare conductors using vinyl insulating electrical tape.

P. 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.

Q. Identify conductors and cables in accordance with Section 26 05 53.

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 01 40 00 - 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 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.

1. Disconnect surge protective devices (SPDs) prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPDs connected.

D. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

1.03 RELATED REQUIREMENTS

A. Section 26 05 19 - 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 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.04 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

B. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2017.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. NFPA 99 - Health Care Facilities Code; 2024, with Errata.

E. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Notify Architect Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Field quality control test reports.

E. Project Record Documents: Record actual locations of grounding electrode system components and connections.

1.07 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.08 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. Unless specifically indicated to be excluded, 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.
   7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
      a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
      b. Metal gas piping.
   8. Provide bonding for interior metal air ducts.
   9. Provide bonding for metal building frame.
   10. Provide bonding for metal siding not effectively bonded through attachment to metal building frame.
   11. Provide bonding and equipment grounding for pools and fountains and associated equipment in accordance with NFPA 70.
   12. Provide redundant grounding and bonding for patient care areas of health care facilities in accordance with NFPA 70 and NFPA 99.

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 26 05 26:
   1. Use insulated copper conductors unless otherwise indicated.
      a. Exceptions:
         1) Use bare copper conductors where installed underground in direct contact with earth.
         2) Use bare copper conductors where directly encased in concrete (not in raceway).
   2. Factory Pre-fabricated Bonding Jumpers: Furnished with factory-installed ferrules; size braided cables to provide equivalent gauge of specified conductors.

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. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
      a. Exceptions:
         1) Use mechanical connectors for connections to electrodes at ground access wells.
   3. Unless otherwise indicated, 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: www.allgfab.com/#sle.
      b. Burndy LLC: www.burndy.com/#sle.
      c. Harger Lightning & Grounding: www.harger.com/#sle.
      d. Thomas & Betts Corporation: www.tnb.com/#sle.
      e. Substitutions: See Section 01 60 00 - Product Requirements.
   5. Manufacturers - Exothermic Welded Connections:
      a. Burndy LLC: www.burndy.com/#sle.
      b. thermOweld, subsidiary of Continental Industries; division of Burndy LLC: www.thermoweld.com/#sle.
      c. Substitutions: See Section 01 60 00 - Product Requirements.

D. Oxide Inhibiting Compound: Comply with Section 26 05 19.

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 26 05 53.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - 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

SECTION 26 05 29
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.03 RELATED REQUIREMENTS

A. Section 26 05 33.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.

B. Section 26 05 33.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.

C. Section 26 05 48 - Vibration and Seismic Controls for Electrical Systems.

D. Section 26 51 00 - Interior Lighting: Additional support and attachment requirements for interior luminaires.

1.04 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.

D. MFMA-4 - Metal Framing Standards Publication; 2004.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 5B - Strut-Type Channel Raceways and Fittings; Current Edition, Including All Revisions.

1.05 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 Engineer 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.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel/strut framing systems, nonpenetrating rooftop supports, and post-installed concrete/masonry anchors.

1.07 QUALITY ASSURANCE

A. Installer Qualifications for Field Welding: See Section 05 50 00.

B. Product Listing Organization Qualifications: Organization recognized by OSHA as Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.08 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. Applicable building code.
      c. 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. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for load to be supported with minimum safety factor of 4. Include consideration for vibration, equipment operation, and shock loads where applicable.
   5. Do not use products for applications other than as permitted by NFPA 70 and product listing.
   6. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
   7. Steel Components: Use corrosion-resistant materials suitable for environment where installed.
      a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
      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. Components for Vibration Isolation and/or Seismic Controls: See Section 26 05 48.

C. Materials for Metal Fabricated Supports: See Section 05 50 00.

D. 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 unless otherwise indicated.

E. Outlet Box Supports: Hangers and brackets suitable for boxes to be supported.
   1. Manufacturers:
      a. Substitutions: See Section 01 60 00 - Product Requirements.

F. 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/Strut Used as Raceway, Where Indicated: Listed and labeled as complying with UL 5B.
4. 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.
5. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch.
6. Minimum Channel Dimensions: 1-5/8 inch wide by 13/16 inch high.

G. Hanger Rods: Threaded, zinc-plated steel unless otherwise indicated.
1. Minimum Size, Unless Otherwise Indicated or Required:
   a. Equipment Supports: 1/2-inch diameter.
   b. Busway Supports: 1/2-inch diameter.
   c. Single Conduit up to 1-inch (27 mm) Trade Size: 1/4-inch diameter.
   d. Single Conduit Larger than 1-inch (27 mm) Trade Size: 3/8-inch diameter.
   e. Trapeze Support for Multiple Conduits: 3/8-inch diameter.
   f. Outlet Boxes: 1/4-inch diameter.
   g. Luminaires: 1/4-inch diameter.

H. Nonpenetrating Rooftop Supports for Low-Slope Roofs:
1. Description: Steel pedestals with thermoplastic or rubber bases that rest on top of roofing membrane, not requiring attachment to roof structure and not penetrating roofing assembly, with support fixtures as specified.
2. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
3. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
4. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.

I. Anchors and Fasteners:
1. Unless otherwise indicated and where not otherwise restricted, use anchor and fastener types indicated for specified applications.
2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
4. Hollow Masonry: Use toggle bolts.
5. Hollow Stud Walls: Use toggle bolts.
6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
7. Sheet Metal: Use sheet metal screws.
8. Wood: Use wood screws.
9. Plastic and lead anchors are not permitted.
10. Powder-actuated fasteners are not permitted.
11. Hammer-driven anchors and fasteners are not permitted.
12. Preset Concrete Inserts: Continuous metal channel/strut and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
   a. Manufacturer: Same as manufacturer of metal channel/strut framing system.
   b. Comply with MFMA-4.
   c. Channel Material: Use galvanized steel.
   d. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch minimum base metal thickness.
13. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.

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. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

D. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

E. Unless specifically indicated or approved by Architect Engineer, do not provide support from suspended ceiling support system or ceiling grid.

F. Unless specifically indicated or approved by Architect Engineer, do not provide support from roof deck.

G. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

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. Unless otherwise indicated, mount floor-mounted equipment on properly sized concrete pad 3 inches in height.
   5. 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 26 05 33.13 for additional requirements.

J. Box Support and Attachment: See Section 26 05 33.16 for additional requirements.

K. Interior Luminaire Support and Attachment: See Section 26 51 00 for additional requirements.

L. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.

M. Secure fasteners in accordance with manufacturer's recommended torque settings.

N. Remove temporary supports.

O. 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 01 40 00 - 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

This page was intentionally left blank for duplex printing.

SECTION 26 05 33.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).

B. Flexible metal conduit (FMC).

C. Liquidtight flexible metal conduit (LFMC).

D. Galvanized steel electrical metallic tubing (EMT).

E. Rigid polyvinyl chloride (PVC) conduit.

1.03 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
   1. Includes additional requirements for fittings for grounding and bonding.

B. Section 26 05 29 - Hangers and Supports for Electrical Systems.

C. Section 26 05 33.16 - Boxes for Electrical Systems.

D. Section 26 05 48 - Vibration and Seismic Controls for Electrical Systems.

E. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.04 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2025.

B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S); 2020.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

D. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2020.

E. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); 2025.

F. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.

G. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Metal Conduit and Intermediate Metal Conduit; 2018.

H. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2020.

I. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2021.

J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

K. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.

L. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.

M. UL 360 - Liquid-Tight Flexible Metal Conduit; Current Edition, Including All Revisions.

N. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

O. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.

P. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

Q. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

R. UL 2419 - Outline of Investigation for Electrically Conductive Corrosion Resistant Compounds; Current Edition, Including All Revisions.

1.05 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 Engineer 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.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.

1.07 QUALITY ASSURANCE

A. Product Listing Organization Qualifications: Organization recognized by OSHA as Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

B. Multi-trade Coordination: In lieu of detailed shop drawings, the Contractor may conduct a pre-installation and coordination meeting, with follow-up meetings to coordinate routing of mechanical, fire protection and electrical elements. Locations and conflict resolutions shall be made during these meetings. Notify Architect-Engineer of meeting times and dates. Do not install any conduit until this meeting has taken place.

1.08 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. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70, manufacturer's instructions, and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use conduit types indicated for specified applications. Where more than one listed application applies, comply with most restrictive requirements. Where conduit type for particular application is not specified, use galvanized steel rigid metal conduit.

C. Underground:
   1. Under Slab on Grade: Use galvanized steel rigid metal conduit (RMC) or rigid PVC conduit.
   2. Exterior, Direct-Buried: Use galvanized steel rigid metal conduit (RMC), PVC-coated galvanized steel rigid metal conduit, or rigid PVC conduit.

3. Exterior, Embedded Within Concrete: Use galvanized steel rigid metal conduit (RMC) or rigid PVC conduit.
4. Where rigid polyvinyl chloride (PVC) conduit is provided, transition to galvanized steel rigid metal conduit (RMC) where emerging from underground.
5. Where rigid polyvinyl (PVC) conduit is provided, use galvanized steel rigid metal conduit (RMC) elbows or PVC-coated galvanized steel rigid metal conduit (RMC) elbows for bends.
6. Where galvanized steel rigid metal conduit (RMC) or galvanized steel intermediate metal conduit (IMC) is installed in direct contact with earth where soil has resistivity of less than 2000 ohm-centimeters or is characterized as severely corrosive based on soils report or local experience, use corrosion protection tape, factory-applied corrosion protection coating, or field-applied corrosion protection compound acceptable to authorities having jurisdiction to provide supplementary corrosion protection.

D. Embedded Within Concrete:
1. Within Slab on Grade: Not permitted.
2. Within Slab Above Ground: Not permitted.
3. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit (RMC) where emerging from concrete.

E. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit (RMC) or galvanized steel electrical metallic tubing (EMT).

F. Concealed Within Hollow Stud Walls: Use galvanized steel rigid metal conduit (RMC) or galvanized steel electrical metallic tubing (EMT).

G. Concealed Above Accessible Ceilings: Use galvanized steel rigid metal conduit (RMC) or galvanized steel electrical metallic tubing (EMT).

H. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit (RMC).

I. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit (RMC) or galvanized steel electrical metallic tubing (EMT).

J. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit (RMC).
1. Locations subject to physical damage include, but are not limited to:
a. Where exposed below 8 feet, except within electrical and communication rooms or closets.
b. Where exposed below 20 feet in warehouse areas.

K. Exposed, Interior, Subject to Severe Physical Damage: Use galvanized steel rigid metal conduit (RMC).
1. Locations subject to severe physical damage include, but are not limited to:
a. High traffic industrial and warehouse areas where exposed below 8 feet, except within electrical and communication rooms or closets.
b. Where exposed below 20 feet in industrial manufacturing areas.

L. Exposed, Exterior, Not Subject to Severe Physical Damage: Use galvanized steel rigid metal conduit (RMC).

M. Exposed, Exterior, Subject to Severe Physical Damage: Use galvanized steel rigid metal conduit (RMC).
1. Exterior locations subject to severe physical damage include, but are not limited to:
a. Where exposed to vehicular traffic below 20 feet.

N. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit (RMC).

O. Corrosive Locations Above Ground: Use stainless steel rigid metal conduit (RMC).

P. 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.
4. Vibrating equipment includes, but is not limited to:
   a. Transformers.
   b. Motors.

Q. Fished in Existing Walls, Where Necessary: Use flexible metal conduit (FMC) or galvanized 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 26 05 26 for additional requirements.

D. Provide conduit, fittings, supports, and accessories required for complete raceway system.

E. Provide products listed, classified, and labeled as suitable for purpose intended.

F. Minimum Conduit Size, Unless Otherwise Indicated:
1. Branch Circuits: 3/4-inch trade size.
2. Branch Circuit Homeruns: 3/4-inch trade size.
3. Control Circuits: 1/2-inch trade size.
4. Flexible Connections to Luminaires: 1/2-inch trade size.
5. Underground, Interior: 1-inch trade size.
6. Underground, Exterior: 1-inch trade size.

G. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

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 01 60 00 - 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. ABB; T&B: www.electrification.us.abb.com/#sle.
   b. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.us/#sle.
   c. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
   d. Emerson Electric Co; O-Z/Gedney: www.emerson.com/#sle.
   e. Substitutions: See Section 01 60 00 - 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. Where not subject to severe corrosive influence, stainless steel fittings may be used.
   b. 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 FLEXIBLE METAL CONDUIT (FMC)

A. Manufacturers:
   1. AFC Cable Systems, Inc: www.afcweb.com.
   2. Flex Tubes: www.flex-tubes.com
   3. Electri-Flex Company: www.electriflex.com.
   4. International Metal Hose: www.metalhose.com.
   5. Substitutions: See Section 01 60 00 - 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. ABB; T&B: www.electrification.us.abb.com/#sle.
      b. Bridgeport Fittings, LLC: www.bptfittings.com/#sle.
      c. Emerson Electric Co; O-Z/Gedney: www.emerson.com/#sle.
      d. Substitutions: See Section 01 60 00 - 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.

2.05 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 01 60 00 - 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. ABB; T&B: www.electrification.us.abb.com/#sle.
      b. Bridgeport Fittings, LLC: www.bptfittings.com/#sle.
      c. Emerson Electric Co; O-Z/Gedney: www.emerson.com/#sle.
      d. Substitutions: See Section 01 60 00 - 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.

2.06 GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers:
   1. Allied Tube & Conduit: www.alliedeg.com.
   2. Nucor Tubular Products: www.nucortubular/#sle.
   3. Western Tube, a division of Zekelman Industries: www.westerntube.com/#sle.
   4. Wheatland Tube Company: www.wheatland.com.
   5. Substitutions: See Section 01 60 00 - 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. ABB; T&B: www.electrification.us.abb.com/#sle.
b. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.us/#sle.
c. Bridgeport Fittings, LLC: www.bptfittings.com/#sle.
d. Emerson Electric Co; O-Z/Gedney: www.emerson.com/#sle.
e. Substitutions: See Section 01 60 00 - 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.
5. Damp or Wet Locations, Where Permitted: Use fittings listed for use in wet locations.

2.07 NONMETALLIC CONDUIT

A. Manufacturers:
1. ABB; Carlon: www.carlon.com/#sle.
2. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com/#sle.
3. Cantex Inc: www.cantexinc.com/#sle.
4. Heritage Plastics, a division of Atkore International: www.heritageplastics.com/#sle.
5. JM Eagle: www.jmeagle.com/#sle.
6. Substitutions: See Section 01 60 00 - 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.

2.08 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. Foam Conduit Sealant:
1. Removable, two-part, closed-cell foam, specifically designed for sealing conduit openings against water, moisture, gases, and dust.
2. Suitable for use with conductors/cables and associated insulation/jackets to be installed.
3. Rated to hold minimum of 10 ft water head pressure.

F. Conduit Mechanical Seals:
1. Listed as complying with UL 514B.
2. Specifically designed for sealing conduit openings against water, moisture, gases, and dust.
3. Suitable for sealing around conductors/cables to be installed.

G. Sealing Compound for Hazardous/Classified Location Sealing Fittings: Listed for use with particular fittings to be installed.

H. 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.

I. Sealing Systems for Roof Penetrations: Premanufactured components and accessories as required to preserve integrity of roofing system and maintain roof warranty; suitable for conduits and roofing system to be installed; designed to accommodate existing penetrations where applicable.
   1. Products:
      a. Menzies Metal Products; Electrical Roof Stack and Cap: www.menzies-metal.com/#sle.
      b. Menzies Metal Products; Electrical Retro Box: www.menzies-metal.com/#sle.
      c. Substitutions: See Section 01 60 00 - Product Requirements.

J. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.
   1. Products:
      a. Quickflash Weatherproofing Products, Inc: www.quickflashproducts.com/#sle.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

K. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.

L. Bore Spacers: Nonmetallic; designed for maintaining conduit/duct spacing for installation within casing; furnished with roller wheels to facilitate installation, openings to facilitate grout flow, and holes for stabilization cable; suitable for casing and conduit/duct arrangement 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.

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.
   5. Unless otherwise approved, do not route exposed conduits:

a. Across floors.
b. Across roofs.
c. Across top of parapet walls.
d. Across building exterior surfaces.

6. Conduits installed underground may be routed in shortest possible manner unless otherwise indicated. Route other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
7. Arrange conduit to maintain adequate headroom, clearances, and access.
8. Arrange conduit to provide no more than equivalent of four 90-degree bends between pull points.
9. Arrange conduit to provide no more than 150 feet between pull points.
10. Route conduits above water and drain piping where possible.
11. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
12. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
13. 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.
14. 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 26 05 29.
2. Provide required vibration isolation and/or seismic controls; see Section 26 05 48.
3. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
4. 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.
5. 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.
6. Use metal channel/strut with accessory conduit clamps to support multiple parallel surface-mounted conduits.
7. Use conduit clamp to support single conduit from beam clamp or threaded rod.
8. Use trapeze hangers assembled from threaded rods and metal channel/strut with accessory conduit clamps to support multiple parallel suspended conduits.
9. Use nonpenetrating rooftop supports to support conduits routed across rooftops, where approved.
10. Use of spring steel conduit clips for support of conduits is not permitted.
11. Use of wire for support of conduits is not permitted.
12. 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 unless otherwise indicated.
3. Provide sleeves for penetrations as indicated or 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 as required to maintain integrity of membrane.
7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty.
8. Provide metal escutcheon plates for conduit penetrations exposed to public view.
9. Install firestopping to preserve fire resistance rating of partitions and other elements.

J. Underground Installation:
1. Minimum Cover, Unless Otherwise Indicated or Required:
   a. Underground, Exterior: 24 inches.
2. Provide underground warning tape along entire conduit length; see Section 26 05 53.

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.
   c. Where conduits penetrate coolers or freezers.

3. Where conduits cross boundaries of hazardous/classified locations, provide identified/listed sealing fittings or conduit mechanical seals as approved by authorities having jurisdiction; locate as indicated or in accordance with NFPA 70.

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 26 05 26.

O. Identify conduits; see Section 26 05 53.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - 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

SECTION 26 05 33.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 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.

1.03 RELATED REQUIREMENTS

A. Section 26 05 29 - Hangers and Supports for Electrical Systems.

B. Section 26 05 33.13 - Conduit for Electrical Systems:
   1. Conduit bodies and other fittings.
   2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.

C. Section 26 05 48 - Vibration and Seismic Controls for Electrical Systems.

D. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

E. Section 26 27 26 - Wiring Devices:
   1. Wall plates.
   2. Additional requirements for locating boxes for wiring devices.

F. Section 27 10 00 - Structured Cabling: Additional requirements for communications systems outlet boxes.

1.04 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.

C. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.

D. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.

E. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013.

F. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports; 2013 (Reaffirmed 2020).

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

I. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

J. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.

K. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

L. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers; Current Edition, Including All Revisions.

1.05 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 Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures.

1.07 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70 (NEC).

1.08 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 or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
   3. Use cast iron boxes or cast aluminum boxes where exposed galvanized steel rigid metal conduit or exposed intermediate metal conduit (IMC) is used.
   4. Use nonmetallic boxes where exposed rigid PVC conduit is used.
   5. Use suitable concrete type boxes where flush-mounted in concrete.
   6. Use suitable masonry type boxes where flush-mounted in masonry walls.

7. Use raised covers suitable for the type of wall construction and device configuration where required.
8. Use shallow boxes where required by the type of wall construction.
9. Do not use "through-wall" boxes designed for access from both sides of wall.
10. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
11. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
12. Nonmetallic Boxes: Comply with NEMA OS 2, and list and label as complying with UL 514C.
13. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
14. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
15. Minimum Box Size, Unless Otherwise Indicated:
    a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 1-1/2 inch deep (100 by 38 mm) trade size.
    b. Communications Systems Outlets: Comply with Section 27 10 00.
    c. Ceiling Outlets: 4 inch octagonal or square by 1-1/2 inch deep (100 by 38 mm) trade size.
16. Wall Plates: Comply with Section 26 27 26.
17. Manufacturers:
    a. Cooper Crouse-Hinds, a division of Eaton Corporation: www.cooperindustries.com/#sle.
    b. Hubbell Incorporated; Bell Products: www.hubbell-rtb.com.
    c. Hubbell Incorporated; RACO Products: www.hubbell-rtb.com.
    d. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
    e. Thomas & Betts Corporation: www.tnb.com/#sle.
    f. Substitutions: See Section 01 60 00 - 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.
3. Junction and Pull Boxes Larger Than 100 cubic inches:
    a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
4. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
5. Manufacturers:
    a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com/#sle.
    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 01 60 00 - Product Requirements.

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. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.

E. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.

F. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.

G. Box Locations:
   1. Locate boxes to be accessible.
   2. Unless dimensioned, box locations indicated are approximate.
   3. Locate boxes as required for devices installed under other sections or by others.
      a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 26 27 26.
      b. Communications Systems Outlets: Comply with Section 27 10 00.
   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 as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 26 05 33.13.
   11. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:
      a. Concealed above accessible suspended ceilings.
      b. Within joists in areas with no ceiling.
      c. Electrical rooms.
      d. Mechanical equipment rooms.

H. Box Supports:
   1. Secure and support boxes in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
   2. Provide required seismic controls in accordance with Section 26 05 48.
   3. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.

4. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
5. Use far-side support to secure flush-mounted boxes supported from single stud in hollow stud walls. Repair or replace supports for boxes that permit excessive movement.

I. Install boxes plumb and level.

J. 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.
3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.

K. Install boxes as required to preserve insulation integrity.

L. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

M. Install firestopping to preserve fire resistance rating of partitions and other elements.

N. Close unused box openings.

O. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

P. Provide grounding and bonding in accordance with Section 26 05 26.

Q. Identify boxes in accordance with Section 26 05 53.

R. Do not mount boxes back-to-back.

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

This page was intentionally left blank for duplex printing.

SECTION 26 05 33.23
SURFACE RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Surface raceway systems.

B. Wireways.

1.03 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

B. Section 26 05 29 - Hangers and Supports for Electrical Systems.

C. Section 26 05 33.13 - Conduit for Electrical Systems.

D. Section 26 05 33.16 - Boxes for Electrical Systems.

E. Section 26 27 26 - Wiring Devices: Receptacles.

1.04 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

B. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 5 - Surface Metal Raceways and Fittings; Current Edition, Including All Revisions.

E. UL 5A - Nonmetallic Surface Raceways and Fittings; Current Edition, Including All Revisions.

F. UL 870 - Wireways, Auxiliary Gutters, and Associated Fittings; Current Edition, Including All Revisions.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the placement of raceways with millwork, furniture, equipment, etc. installed under other sections or by others.
   2. Coordinate rough-in locations of outlet boxes provided under Section 26 05 33.16 and conduit provided under Section 26 05 33.13 as required for installation of raceways provided under this section.
   3. Verify minimum sizes of raceways with the actual conductors and components to be installed.
   4. Notify Architect Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install raceways until final surface finishes and painting are complete.
   2. Do not begin installation of conductors and cables until installation of raceways is complete between outlet, junction and splicing points.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including dimensions, knockout sizes and locations, materials, fabrication details, finishes, service condition requirements, and accessories.

1. Surface Raceway Systems: Include information on fill capacities for conductors and cables.

1.07 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 RACEWAY REQUIREMENTS

A. Provide all components, fittings, supports, and accessories required for a complete raceway system.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Do not use raceways for applications other than as permitted by NFPA 70 and product listing.

2.02 SURFACE RACEWAY SYSTEMS

A. Manufacturers:
1. Hubbell Incorporated: www.hubbell.com/#sle.
2. Legrand North America, Inc: www.legrand.us/#sle.
3. MonoSystems, Inc: www.monosystems.com/#sle.
4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Surface Metal Raceways: Listed and labeled as complying with UL 5.

C. Surface Nonmetallic Raceways: Listed and labeled as complying with UL 5A.

2.03 WIREWAYS

A. Manufacturers:
1. Eaton Corporation: www.eaton.com/#sle.
2. Enduro Composites: www.endurocomposites.com/#sle.
3. nVent HOFFMAN: www.nvent.com/#sle.
4. Schneider Electric: www.se.com/#sle.
5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Description: Lay-in wireways and wiring troughs with removable covers; listed and labeled as complying with UL 870.

C. Wireway Type, Unless Otherwise Indicated:
1. Indoor Clean, Dry Locations: NEMA EN 10250, Type 1, painted steel with screw-cover.

D. Finish for Painted Steel Wireways: Manufacturer's standard grey unless otherwise indicated.

E. Minimum Wireway Size: 2.5 by 2.5 inches unless otherwise indicated.

F. Where wireway size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.04 SOURCE QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Factory test each production unit for pre-wired surface raceway systems to verify proper wiring.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes and conduit terminations are installed in proper locations and are properly sized in accordance with NFPA 70 to accommodate raceways.

C. Verify that mounting surfaces are ready to receive raceways and that final surface finishes are complete, including painting.

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. Install raceways plumb and level.

D. Arrange wireways and associated raceway connections to comply with NFPA 70, including but not limited to requirements for deflected conductors and wireways used as pullboxes. Increase size of wireway where necessary.

E. Secure and support raceways in accordance with Section 26 05 29 at intervals complying with NFPA 70 and manufacturer's requirements.

F. Close unused raceway openings.

G. Provide grounding and bonding in accordance with Section 26 05 26.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect raceways for damage and defects.

C. Surface Raceway Systems with Integrated Devices: Test each wiring device to verify operation and proper polarity.

D. Correct wiring deficiencies and replace damaged or defective raceways.

3.04 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.05 PROTECTION

A. Protect installed raceways from subsequent construction operations.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 26 05 48
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. Seismic restraint systems.

1.02 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.

1.03 REFERENCE STANDARDS

A. ASCE 19 - Structural Applications of Steel Cables for Buildings; 2016.

B. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications; Most Recent Edition Cited by Referring Code or Reference Standard.

C. 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; 2024a.

D. FEMA 413 - Installing Seismic Restraints for Electrical Equipment; 2004.

E. FEMA E-74 - Reducing the Risks of Nonstructural Earthquake Damage; 2012.

F. ICC-ES AC156 - Acceptance Criteria for Seismic Certification by Shake-Table Testing of Nonstructural Components; 2010, with Editorial Revision (2020).

G. MFMA-4 - Metal Framing Standards Publication; 2004.

H. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

J. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems; 2008.

1.04 SUBMITTALS

A. See Section 01 30 00 - 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 mounting conditions required for equipment seismic qualification.
   3. Identify anchor manufacturer, type, minimum embedment, minimum spacing, minimum member thickness, and minimum edge distance requirements.
   4. Indicate proposed arrangement of distributed system trapeze support groupings.

5. Indicate proposed locations for distributed system flexible fittings and/or connections.
6. 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.

1.05 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with applicable building code.

C. Seismic Controls Designer Qualifications: Registered professional engineer licensed in the State in which the Project is located and with minimum five years experience designing seismic restraints for nonstructural components.

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: As indicated on drawings.

C. Component Importance Factor (Ip): Electrical components to be assigned a component importance factor (Ip) of 1.5 unless otherwise indicated.

D. Component Importance Factor (Ip): Electrical 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. Electrical components required to function for life safety purposes after an earthquake.
2. Electrical components that support or otherwise contain hazardous substances.

E. Seismic Qualification of Equipment:
1. Provide special certification for electrical 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 Engineer 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.

F. 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) Discrete electrical components that are positively attached to the structure where either of the following apply:
(a) The component weighs 400 pounds or less, has a center of mass located 4 feet or less above the adjacent floor level, flexible connections are provided between the component and associated ductwork, piping, and conduit, and the component importance factor (Ip) is 1.0.

(b) The component weighs 20 pounds or less or, in the case of a distributed system, 5 pounds per foot or less.

b. Conduit, Cable Tray, and Raceway Exemptions, All Seismic Design Categories:
   1) Raceways with component importance factor (Ip) of 1.0 where flexible connections are provided between cable tray or raceway and associated components, where cable tray or raceway is positively attached to the structure, and where one of the following apply:
      (a) Trapeze supported conduits, cable trays, or raceways with trapeze assemblies using 3/8 inch diameter rod hangers not exceeding 12 inches in length from support point connection to the supporting structure, and the total weight supported by any single trapeze is 100 pounds or less.
      (b) Trapeze supported conduits, cable trays, or raceways with trapeze assemblies using 1/2 inch diameter rod hangers not exceeding 12 inches in length from support point connection to the supporting structure, and the total weight supported by any single trapeze is 200 pounds or less.
      (c) Trapeze supported conduits, cable trays, or raceways with trapeze assemblies using 1/2 inch diameter rod hangers not exceeding 24 inches in length from support point connection to the supporting structure, and the total weight supported by any single trapeze is 100 pounds or less.
      (d) Hanger supported conduits, cable trays, or raceways with individual rod hangers 3/8 inch or 1/2 inch in diameter not exceeding 12 inches in length from support point connection to the supporting structure, and the total weight supported by any single rod is 50 pounds or less.
   2) Conduits less than 2-1/2 inch trade size.

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.

G. 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.

H. 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.

I. 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. 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.

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 CODE-REQUIRED SPECIAL INSPECTIONS

A. Arrange work to accommodate tests and/or inspections performed by Special Inspection Agency employed by Owner or Architect Engineer in accordance with Section 01 45 33 and statement of special inspections as required by applicable building code.

B. Frequency of Special Inspections: Where special inspections are designated as continuous or periodic, arrange work accordingly.
1. Continuous Special Inspections: Special Inspection Agency to be present in the area where the work is being performed and observe the work at all times the work is in progress.
2. Periodic Special Inspections: Special Inspection Agency to be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

C. Seismic special inspections include, but are not limited to:
1. Seismically Qualified Equipment: Verification that label, anchorage, and mounting comply with certificate of compliance.
2. Anchorage of electric equipment for emergency and standby power systems for Seismic Design Categories C, D, E, and F; periodic inspection.

D. Prior to starting work, Contractor to submit written statement of responsibility to authorities having jurisdiction and to Owner acknowledging awareness of special requirements contained in the statement of special inspections.

E. Special Inspection Agency services do not relieve Contractor from performing inspections and testing specified elsewhere.

3.03 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.

END OF SECTION

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Wire and cable markers.

D. Conduit and raceway markers.

E. Underground warning tape.

F. Warning signs and labels.

G. Instruction signs.

1.03 RELATED REQUIREMENTS

A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

B. Section 26 05 73 - Power System Studies: Arc flash hazard warning labels.

C. Section 27 10 00 - Structured Cabling: Identification for communications cabling and devices.

1.04 REFERENCE STANDARDS

A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs; 2023.

B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2023.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.05 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.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittals procedures.

1.07 QUALITY ASSURANCE

A. Comply with requirements of the National Electrical Code - NFPA 70 (NEC).

1.08 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 identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
      a. Switchboards:
         1) Identify ampere rating.
         2) Identify voltage and phase.
         3) Identify power source and circuit number. Include location when not within sight of equipment.
         4) Use identification nameplate to identify main overcurrent protective device.
         5) Use identification nameplate to identify load(s) served for each branch device. Identify spares and spaces.
      b. Panelboards:
         1) Identify ampere rating.
         2) Identify voltage and phase.
         3) Identify power source and circuit number. Include location when not within sight of equipment.
         4) Identify main overcurrent protective device. Use identification label for panelboards with a door. For power distribution panelboards without a door, use identification nameplate.
         5) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
         6) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
      c. Enclosed switches, circuit breakers, and motor controllers:
         1) Identify voltage and phase.
         2) Identify power source and circuit number. Include location when not within sight of equipment.
         3) Identify load(s) served. Include location when not within sight of equipment.
   2. Service Equipment:
      a. Use identification nameplate to identify each service disconnecting means.
      b. For buildings or structures supplied by more than one service, or any combination of branch circuits, feeders, and services, use identification nameplate or means of identification acceptable to authority having jurisdiction at each service disconnecting means to identify all other services, feeders, and branch circuits supplying that building or structure. Verify format and descriptions with authority having jurisdiction.
   3. Use voltage marker to identify highest voltage present for each piece of electrical equipment.
   4. Use identification nameplate to identify equipment utilizing series ratings, where permitted, in accordance with NFPA 70.
   5. Use identification nameplate to identify switchboards and panelboards utilizing a high leg delta system in accordance with NFPA 70.
   6. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.
   7. Use identification label or handwritten text using indelible marker on inside of door at each fused switch to identify required NEMA fuse class and size.
   8. Use identification label or handwritten text using indelible marker 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.
   9. Use identification label to identify overcurrent protective devices for branch circuits serving fire alarm circuits. Identify with text "FIRE ALARM CIRCUIT".

10. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.
    a. Service equipment.
    b. Industrial control panels.
    c. Motor control centers.
    d. Elevator control panels.
    e. Industrial machinery.
11. Arc Flash Hazard Warning Labels: Comply with Section 26 05 73.

B. Identification for Conductors and Cables:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.
2. Identification for Communications Conductors and Cables: Comply with Section 27 10 00.
3. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
4. 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:
5. Use underground warning tape to identify direct buried cables.

C. Identification for Boxes:
1. Use voltage markers to identify highest voltage present.
2. Use identification labels or handwritten text using indelible marker to identify circuits enclosed.
    a. For exposed boxes in public areas, use only identification labels.
3. Use warning labels to identify electrical hazards for boxes containing exposed live parts or exposed conductors operating at over 600 V nominal with the word message "DANGER; HIGH VOLTAGE; KEEP OUT".

D. Identification for Devices:
1. Identification for Communications Devices: Comply with Section 27 10 00.
2. Wiring Device and Wallplate Finishes: Comply with Section 26 27 26.
3. Use identification label to identify fire alarm system devices.
4. Use identification label or engraved wallplate to identify serving branch circuit for all receptacles.
    a. For receptacles in areas as directed by Architect, provide identification on inside surface of wallplate.
5. Use identification label or engraved wallplate to identify load controlled for wall-mounted control devices controlling loads that are not visible from the control location and for multiple wall-mounted control devices installed at one location.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:
1. Materials:
    a. Indoor Clean, Dry Locations: Use plastic nameplates.
    b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
    a. Exception: Provide minimum thickness of 1/8 inch when any dimension is greater than 4 inches.
3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.

4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
5. 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/#sle.
   b. Brother International Corporation: www.brother-usa.com/#sle.
   c. Panduit Corp: www.panduit.com/#sle.
   d. Substitutions: See Section 01 60 00 - 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 factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:
1. Minimum Size: 1 inch by 2.5 inches.
2. Legend:
   a. System designation where applicable:
      1) Fire Alarm System: Identify with text "FIRE ALARM".
   b. Equipment designation or other approved description.
   c. Other information as indicated.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height:
   a. System Designation: 1 inch.
   b. Equipment Designation: 1/2 inch.
   c. Other Information: 1/4 inch.
5. Color:
   a. Normal Power System: White text on black background.
   b. Fire Alarm System: White text on red background.

D. Format for General Information and Operating Instructions:
1. Minimum Size: 1 inch by 2.5 inches.
2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 1/4 inch.
5. Color: Black text on white background unless otherwise indicated.
   a. Exceptions:
      1) Provide white text on red background for general information or operational instructions for fire alarm systems.

E. Format for Caution and Warning Messages:
1. Minimum Size: 2 inches by 4 inches.
2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 1/2 inch.
5. Color: Black text on yellow background unless otherwise indicated.

F. Format for Receptacle Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
2. Legend: Power source and circuit number or other designation indicated.

a. Include voltage and phase for other than 120 V, single phase circuits.

3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 3/16 inch.
5. Color: Black text on clear background.

G. Nameplate Inscription:

1. Nameplates must adequately describe the function or use of the particular equipment to which it is attached. Where nameplates are detailed on the drawings, inscription and size of leters shall be as shown. Nameplates for panelboards and switchboards shall include the panel designation, voltage and phase of the supply. Example: "Panel A, 277/480 v, 3-phase, 4-wire".
2. The name of the machine on the motor nameplates for a particular machine shall be the same as the one used on all motor starters, disconnect and PB station nameplates for that machine.
3. Use 1-7/8 inch letters for identifying signs on enclosures containing high voltage equipment. Signs shall read "DANGER - HIGH VOLTAGE".
4. Warning signs (items 3 & 4 above) to be of standard manufacture, fabricated of 18 ga. steel, or heavier, with a porcelain enamel finish. Letters shall be red on white background.

2.03 WIRE AND CABLE MARKERS

A. Manufacturers:

1. Brady Corporation: www.bradyid.com/#sle.
2. HellermannTyton: www.hellermanntyton.com/#sle.
3. Panduit Corp: www.panduit.com/#sle.
4. Seton Identification Products: www.seton.com/aec.
5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve 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 factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.

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/#sle.
2. Brimar Industries, Inc: www.brimar.com/#sle.
3. Seton Identification Products: www.seton.com/#sle.
4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Markers for Conduits: Use factory pre-printed self-adhesive vinyl, self-adhesive vinyl cloth, or vinyl snap-around type markers.

C. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.

D. Minimum Size:

1. Markers for Equipment: 1 1/8 by 4 1/2 inches.
2. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches.
3. 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 unless otherwise indicated.

2.05 UNDERGROUND WARNING TAPE

A. Manufacturers:
1. Brady Corporation: www.bradyid.com/#sle.
2. Brimar Industries, Inc: www.brimar.com/#sle.
3. Seton Identification Products: www.seton.com/#sle.
4. The C. H Hanson Co.: www.chhanson.com
5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
1. Exception: Use foil-backed detectable type tape where required by serving utility or where directed by Owner.

C. Non-detectable Type Tape: 6 inches wide, with minimum thickness of 4 mil.

D. Foil-backed Detectable Type Tape: 3 inches wide, with minimum thickness of 5 mil, unless otherwise required for proper detection.

E. Legend: Type of service, continuously repeated over full length of tape.

F. 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. Manufacturers:
1. Brimar Industries, Inc: www.brimar.com/#sle.
2. Clarion Safety Systems, LLC: www.clarionsafety.com/#sle.
3. Seton Identification Products: www.seton.com/#sle.
4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

C. 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 aluminum signs.
2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
3. Minimum Size: 7 by 10 inches unless otherwise indicated.

D. 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 unless otherwise indicated.

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. Unless otherwise indicated, locate products as follows:
   1. Surface-Mounted Equipment: Enclosure front.
   2. Flush-Mounted Equipment: Inside of equipment door.
   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. Branch Devices: Adjacent to device.
   6. Interior Components: Legible from the point of access.
   7. Boxes: Outside face of cover.
   8. Conductors and Cables: Legible from the point of access.
   9. 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 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.

H. Mark all handwritten text, where permitted, to be neat and legible.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

C. Install wire, cable and underground markers per manufacturers' instructions.

D. Install conduit, raceway and instructions signs parallel to lines and surrounding surfaces. Install instruction signs in a clearly visible location, straight and square to surroundings.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 26 05 73
POWER SYSTEM STUDIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Short-circuit study.

B. Protective device coordination study.

C. Arc flash and shock risk assessment.
   1. Includes arc flash hazard warning labels.

D. Criteria for the selection and adjustment of equipment and associated protective devices not specified in this section, as determined by studies to be performed.

1.03 RELATED REQUIREMENTS

A. Section 26 05 53 - Identification for Electrical Systems: Additional requirements for arc flash hazard warning labels.

B. Section 26 24 13 - Switchboards.

C. Section 26 24 16 - Panelboards.

1.04 REFERENCE STANDARDS

A. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2023.

B. IEEE 141 - IEEE Recommended Practice for Electric Power Distribution for Industrial Plants; 1993 (Reaffirmed 1999).

C. IEEE 242 - IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems; 2001, with Errata (2003).

D. IEEE 399 - IEEE Recommended Practice for Industrial and Commercial Power Systems Analysis; 1997.

E. IEEE 551 - IEEE Recommended Practice for Calculating Short-Circuit Currents in Industrial and Commercial Power Systems; 2006.

F. IEEE 1584 - IEEE Guide for Performing Arc-Flash Hazard Calculations; 2018, with Errata (2019).

G. NEMA MG 00001 - Motors and Generators; 2024.

H. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2017.

I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

J. NFPA 70E - Standard for Electrical Safety in the Workplace; 2021.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Existing Installations: Coordinate with equipment manufacturer(s) to obtain data necessary for completion of studies.
   2. Coordinate the work to provide equipment and associated protective devices complying with criteria for selection and adjustment, as determined by studies to be performed.
   3. Notify Architect Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Pre-Study Meeting: Conduct meeting with Owner to discuss system operating modes and conditions to be considered in studies.

C. Sequencing:
1. Submit study reports prior to or concurrent with product submittals.
2. Do not order equipment until matching study reports and product submittals have both been evaluated by Architect Engineer.
3. Verify naming convention for equipment identification prior to creation of final drawings, reports, and arc flash hazard warning labels (where applicable).

D. Scheduling:
1. Arrange access to existing facility for data collection with Owner.
2. Where work of this section involves interruption of existing electrical service, arrange service interruption with Owner.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Study preparer's qualifications.

C. Study reports, stamped or sealed and signed by study preparer.

D. Product Data: In addition to submittal requirements specified in other sections, include manufacturer's standard catalog pages and data sheets for equipment and protective devices indicating information relevant to studies.
1. Clearly indicate whether proposed short circuit current ratings are fully rated or, where acceptable, series rated systems.
2. Include documentation of listed series ratings upon request.
3. Identify modifications made in accordance with studies that:
a. Can be made at no additional cost to Owner.
b. As submitted will involve a change to the contract sum.

1.07 POWER SYSTEM STUDIES

A. Scope of Studies:
1. Perform analysis of new electrical distribution system as indicated on drawings.
2. Except where study descriptions below indicate exclusions, analyze system at each bus from primary protective devices of utility source down to each piece of equipment involved, including parts of system affecting calculations being performed (e.g. fault current contribution from motors).
3. Include in analysis alternate sources and operating modes (including known future configurations) to determine worst case conditions.

B. General Study Requirements:
1. Comply with NFPA 70.
2. Perform studies utilizing computer software complying with specified requirements; manual calculations are not permitted.

C. Data Collection:
1. Compile information on project-specific characteristics of actual installed equipment, protective devices, feeders, etc. as necessary to develop single-line diagram of electrical distribution system and associated input data for use in system modeling.
a. Utility Source Data: Include primary voltage, maximum and minimum three-phase and line-to-ground fault currents, impedance, X/R ratio, and primary protective device information.
1) Obtain up-to-date information from Utility Company.
b. Motors: Include manufacturer/model, type (e.g. induction, synchronous), horsepower rating, voltage rating, full load amps, and locked rotor current or NEMA MG 00001 code letter designation.

c. Transformers: Include primary and secondary voltage ratings, kVA rating, winding configuration, percent impedance, and X/R ratio.
d. Protective Devices:
1) Circuit Breakers: Include manufacturer/model, type (e.g. thermal magnetic, electronic trip), frame size, trip rating, voltage rating, interrupting rating, available field-adjustable trip response settings, and features (e.g. zone selective interlocking).
2) Fuses: Include manufacturer/model, type/class (e.g. Class J), size/rating, and speed (e.g. time delay, fast acting).
e. Protective Relays: Include manufacturer/model, type, settings, current/potential transformer ratio, and associated protective device.
f. Conductors: Include feeder size, material (e.g. copper, aluminum), insulation type, voltage rating, number per phase, raceway type, and actual length.

D. Short-Circuit Study:
1. Comply with IEEE 551 and applicable portions of IEEE 141, IEEE 242, and IEEE 399.
2. For purposes of determining equipment short circuit current ratings, consider conditions that may result in maximum available fault current, including but not limited to:
a. Maximum utility fault currents.
b. Maximum motor contribution.
c. Known operating modes (e.g. utility as source, generator as source, utility/generator in parallel, bus tie breaker open/close positions).
3. For each bus location, calculate the maximum available three-phase bolted symmetrical and asymmetrical fault currents. For grounded systems, also calculate the maximum available line-to-ground bolted fault currents.

E. Protective Device Coordination Study:
1. Comply with applicable portions of IEEE 242 and IEEE 399.
2. Analyze alternate scenarios considering known operating modes (e.g. utility as source, generator as source, utility/generator in parallel, bus tie breaker open/close positions).
3. Analyze protective devices and associated settings for suitable margins between time-current curves to provide adequate protection for equipment and conductors while achieving best possible coordination.

F. Arc Flash and Shock Risk Assessment:
1. Comply with NFPA 70E.
2. Perform incident energy and arc flash boundary calculations in accordance with IEEE 1584 (as referenced in NFPA 70E Annex D), where applicable.
a. For single-phase systems, study preparer to perform calculations assuming three-phase system in accordance with IEEE 1584 using single phase bolted fault current, yielding conservative results.
3. For equipment with main devices mounted in separate compartmentalized sections, perform calculations on both the line and load side of the main device.
4. Analyze alternate scenarios considering conditions that may result in maximum incident energy, including but not limited to:
a. Maximum and minimum utility fault currents.
b. Maximum and minimum motor contribution.
c. Known operating modes (e.g. utility as source, generator as source, utility/generator in parallel, bus tie breaker open/close positions).

G. Study Reports:
1. General Requirements:
a. Identify date of study and study preparer.
b. Identify study methodology and software product(s) used.

c. Identify scope of studies, assumptions made, implications of possible alternate scenarios, and any exclusions from studies.
d. Identify base used for per unit values.
e. Include single-line diagram and associated input data used for studies; identify buses on single-line diagram as referenced in reports, and indicate bus voltage.
f. Include conclusions and recommendations.

2. Short-Circuit Study:
   a. For each scenario, identify at each bus location:
      1) Calculated maximum available symmetrical and asymmetrical fault currents (both three-phase and line-to-ground where applicable).
      2) Fault point X/R ratio.
      3) Associated equipment short circuit current ratings.
   b. Identify locations where the available fault current exceeds the equipment short circuit current rating, along with recommendations.
3. Protective Device Coordination Study:
   a. For each scenario, include time-current coordination curves plotted on log-log scale graphs.
   b. For each graph include (where applicable):
      1) Partial single-line diagram identifying the portion of the system illustrated.
      2) Protective Devices: Time-current curves with applicable tolerance bands for each protective device in series back to the source, plotted up to the maximum available fault current at the associated bus.
      3) Conductors: Damage curves.
      4) Transformers: Inrush points and damage curves.
      5) Generators: Full load current, overload curves, decrement curves, and short circuit withstand points.
      6) Motors: Full load current, starting curves, and damage curves.
      7) Capacitors: Full load current and damage curves.
   c. For each protective device, identify fixed and adjustable characteristics with available ranges and recommended settings.
      1) Circuit Breakers: Include long time pickup and delay, short time pickup and delay, and instantaneous pickup.
      2) Include ground fault pickup and delay.
      3) Include fuse ratings.
      4) Protective Relays: Include current/potential transformer ratios, tap, time dial, and instantaneous pickup.
   d. Identify cases where either full selective coordination or adequate protection is not achieved, along with recommendations.
4. Arc Flash and Shock Risk Assessment:
   a. For the worst case for each scenario, identify at each bus location:
      1) Calculated incident energy and associated working distance.
      2) Calculated arc flash boundary.
      3) Bolted fault current.
      4) Arcing fault current.
      5) Clearing time.
      6) Arc gap distance.
   b. For purposes of producing arc flash hazard warning labels, summarize the maximum incident energy and associated data reflecting the worst case condition of all scenarios at each bus location.
   c. Include recommendations for reducing the incident energy at locations where the calculated maximum incident energy exceeds 8 calories per sq cm.

1.08 QUALITY ASSURANCE

A. Study Preparer Qualifications: Professional electrical engineer licensed in the State in which the Project is located and with minimum five years experience in preparation of studies of similar type and complexity using specified computer software.
   1. Study preparer may be employed by manufacturer of electrical distribution equipment.

B. Field Testing Agency Qualifications: Independent testing organization specializing in testing, analysis, and maintenance of electrical systems with minimum five years experience; NETA Accredited Company.

C. Computer Software for Study Preparation: Use the latest edition of commercially available software utilizing specified methodologies.
   1. Products:
      a. EasyPower LLC: www.easypower.com/#sle.
      b. ETAP/Operation Technology, Inc: www.etap.com/#sle.
      c. EDSA Micro Corporation: www.edsa.com.
      d. Power Analytics Corporation: www.poweranalytics.com/#sle.
      e. SKM Systems Analysis, Inc: www.skm.com/#sle.
      f. Substitutions: See Section 01 60 00 - Product Requirements.

PART 2 PRODUCTS

2.01 ARC FLASH HAZARD WARNING LABELS

A. Provide warning labels complying with ANSI Z535.4 to identify arc flash hazards for each work location analyzed by the arc flash and shock risk assessment.
   1. Materials: Comply with Section 26 05 53.
   2. Minimum Size: 4 by 6 inches.
   3. Legend: Provide custom legend in accordance with NFPA 70E based on equipment-specific data as determined by arc flash and shock risk assessment.
      a. Include orange header that reads "WARNING" unless otherwise indicated.
      b. Include the text "Arc Flash and Shock Hazard; Appropriate PPE Required" or approved equivalent.
      c. Include the following information:
         1) Arc flash boundary.
         2) Available incident energy and corresponding working distance.
         3) Site-specific PPE (personnel protective equipment) requirements.
         4) Nominal system voltage.
         5) Limited approach boundary.
         6) Restricted approach boundary.
         7) Equipment identification.
         8) Study preparer, report reference, and date calculations were performed.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install arc flash warning labels in accordance with Section 26 05 53.

3.02 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Adjust equipment and protective devices for compliance with studies and recommended settings.

D. Notify Architect Engineer of any conflicts with or deviations from studies. Obtain direction before proceeding.

END OF SECTION

SECTION 26 05 83
WIRING CONNECTIONS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Electrical connections to equipment.

1.03 RELATED REQUIREMENTS

A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.

B. Section 26 05 33.13 - Conduit for Electrical Systems.

C. Section 26 05 33.16 - Boxes for Electrical Systems.

D. Section 26 27 26 - Wiring Devices.

1.04 REFERENCE STANDARDS

A. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2020).

B. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2021.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.05 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.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide wiring device manufacturer’s catalog information showing dimensions, configurations, and construction.

1.07 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70 (NEC).

B. Products: Listed, classified, and labeled as suitable for the purpose intended.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
   1. Colors: Comply with NEMA WD 1.
   2. Cord Construction: NFPA 70, Type SO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
   3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

B. Disconnect Switches: As specified in Division 23 and in individual equipment sections.

C. Wiring Devices: As specified in Section 26 27 26.

D. Flexible Conduit: As specified in Section 26 05 33.13.

E. Wire and Cable: As specified in Section 26 05 19.

F. Boxes: As specified in Section 26 05 33.16.

2.02 EQUIPMENT CONNECTIONS

A. Coordinate Requirements with Division 23 (15):
   1. Electrical Connection: Flexible conduit.
   2. Provide field-installed disconnect switch where required.

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

SECTION 26 09 23
LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Occupancy sensors.

B. Accessories.

1.03 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

B. Section 26 05 29 - Hangers and Supports for Electrical Systems

C. Section 26 05 33.16 - Boxes for Electrical Systems.

D. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

E. Section 26 27 26 - Wiring Devices: Devices for manual control of lighting, including wall switches and wall dimmers.
   1. Includes finish requirements for wall controls specified in this section.

F. Section 26 51 00 - Interior Lighting.

1.04 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.

C. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; 2023.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the placement of lighting control devices with millwork, furniture, equipment, etc. installed under other sections or by others.
   2. Coordinate the placement of wall switch occupancy sensors with actual installed door swings.
   3. Coordinate the placement of occupancy sensors with millwork, furniture, equipment or other potential obstructions to motion detection coverage installed under other sections or by others.
   4. Notify Architect Engineer of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

B. Sequencing:
   1. Do not install lighting control devices until final surface finishes and painting are complete.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.

1. Occupancy Sensors: Include detailed motion detection coverage range diagrams.

C. Field Quality Control Reports.

D. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

E. Operation and Maintenance Data: Include detailed information on device programming and setup.

1.07 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.08 DELIVERY, STORAGE, AND PROTECTION

A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

1.09 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.10 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer warranty for all occupancy sensors.

PART 2 PRODUCTS

2.01 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

C. Products for Switching of Electronic Ballasts/Drivers: Tested and rated to be suitable for peak inrush currents specified in NEMA 410.

2.02 OCCUPANCY SENSORS

A. Manufacturers:
1. Greengate/Cooper.
2. Hubbell Incorporated: www.hubbell.com/#sle.
3. Lutron Electronics Company, Inc: www.lutron.com/sle.
4. WattStopper: www.wattstopper.com/#sle.
5. Substitutions: See Section 01 60 00 - Product Requirements.
6. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.

B. All Occupancy Sensors:
1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated.
2. Sensor Technology:
a. Passive Infrared/Ultrasonic Dual Technology Occupancy Sensors: Designed to detect occupancy using a combination of both passive infrared and ultrasonic technologies.

3. Provide LED to visually indicate motion detection with separate color LEDs for each sensor type in dual technology units.
4. Operation: Unless otherwise indicated, occupancy sensor to turn load on when occupant presence is detected and to turn load off when no occupant presence is detected during an adjustable turn-off delay time interval.
5. Dual Technology Occupancy Sensors: Field configurable turn-on and hold-on activation with settings for activation by either or both sensing technologies.
6. Passive Infrared Lens Field of View: Field customizable by addition of factory masking material, adjustment of integral blinders, or similar means to block motion detection in selected areas.
7. Turn-Off Delay: Field adjustable, with time delay settings up to 30 minutes.
8. Sensitivity: Field adjustable.
9. Adaptive Technology: Field selectable; capable of self-adjusting sensitivity and time delay according to conditions.
10. Compatibility (Non-Dimming Sensors): Suitable for controlling incandescent lighting, low-voltage lighting with electronic and magnetic transformers, fluorescent lighting with electronic and magnetic ballasts, and fractional motor loads, with no minimum load requirements.
11. Load Rating for Line Voltage Occupancy Sensors: As required to control the load indicated on drawings.
12. Isolated Relay for Low Voltage Occupancy Sensors: SPDT dry contacts, ratings as required for interface with system indicated.

C. Wall Switch Occupancy Sensors:
   1. All Wall Switch Occupancy Sensors:
      a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.
      b. Unless otherwise indicated or required to control the load indicated on drawings, provide line voltage units with self-contained relay.
      c. Where indicated, provide two-circuit units for control of two separate lighting loads, with separate manual controls and separately programmable operation for each load.
      d. Operation: Field selectable to operate either as occupancy sensor (automatic on/off) or as vacancy sensor (manual-on/automatic off).
      e. Manual-Off Override Control: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.
      f. Provide selectable audible alert to notify occupant of impending load turn-off.
      g. Finish: Match finishes specified for wiring devices in Section 26 27 26, unless otherwise indicated.
   2. Passive Infrared/Ultrasonic Dual Technology Wall Switch Occupancy Sensors: Capable of detecting motion within an area of 900 square feet.

D. Wall Dimmer Occupancy Sensors:
   1. General Requirements:
      a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated dimming control capability , and no leakage current to load in off mode.
      b. Operation: Field selectable to operate either as occupancy sensor (automatic on/off) or as vacancy sensor (manual-on/automatic off).
      c. Dimmer: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, and listed as complying with UL 1472; type and rating suitable for load controlled.

d. Provide field adjustable dimming preset for occupied state.
e. Finish: Match finishes specified for wiring devices in Section 26 27 26, unless otherwise indicated.

E. Ceiling Mounted Occupancy Sensors:
1. All Ceiling Mounted Occupancy Sensors:
a. Description: Low profile occupancy sensors designed for ceiling installation.
b. Unless otherwise indicated or required to control the load indicated on drawings, provide low voltage units, for use with separate compatible accessory power packs.
c. Provide field selectable setting for disabling LED motion detector visual indicator.
d. Occupancy sensor to be field selectable as either manual-on/automatic-off or automatic on/off.
e. Finish: White unless otherwise indicated.
2. Passive Infrared/Ultrasonic Dual Technology Ceiling Mounted Occupancy Sensors:
a. Standard Range Sensors: Capable of detecting motion within an area of 450 square feet at a mounting height of 9 feet, with a field of view of 360 degrees.
b. Extended Range Sensors: Capable of detecting motion within an area of 1,200 square feet at a mounting height of 9 feet, with a field of view of 360 degrees.

F. Power Packs for Low Voltage Occupancy Sensors:
1. Description: Plenum rated, self-contained low voltage class 2 transformer and relay compatible with specified low voltage occupancy sensors for switching of line voltage loads.
2. Provide quantity and configuration of power and slave packs with all associated wiring and accessories as required to control the load indicated on drawings.
3. Input Supply Voltage: Dual rated for 120/277 V ac.
4. Load Rating:
a. Incandescent Load: Not less than 15 A.
b. Fluorescent Load: Not less than 20 A.

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 openings for outlet boxes are neatly cut and will be completely covered by devices or wall plates.

D. Verify that final surface finishes are complete, including painting.

E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting control devices.

F. Verify that the service voltage and ratings of lighting control devices are appropriate for the service voltage and load requirements at the location to be installed.

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. Install lighting control devices 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 26 05 33.16 as required for installation of lighting control devices provided under this section.
   1. Mounting Heights: Unless otherwise indicated, as follows:
      a. Wall Switch Occupancy Sensors: 48 inches above finished floor.
   2. Orient outlet boxes for vertical installation of lighting control devices unless otherwise indicated.
   3. Locate wall switch occupancy sensors on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect Engineer to obtain direction prior to proceeding with work.

C. Install lighting control devices in accordance with manufacturer's instructions.

D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

E. Install lighting control devices plumb and level, and held securely in place.

F. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 26 27 26.

G. Provide required supports in accordance with Section 26 05 29.

H. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface 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. Do not use oversized wall plates in lieu of meeting this requirement.

I. Occupancy Sensor Locations:
   1. Location Adjustments: Locations indicated are diagrammatic and only intended to indicate which rooms or areas require devices. Provide quantity and locations as required for complete coverage of respective room or area based on manufacturer's recommendations for installed devices.
   2. Locate ultrasonic and dual technology passive infrared/ultrasonic occupancy sensors a minimum of 4 feet from air supply ducts or other sources of heavy air flow and as per manufacturer's recommendations, in order to minimize false triggers.

J. Lamp Burn-In: Operate lamps at full output for minimum of 100 hours or prescribed period per manufacturer's recommendations prior to use with any dimming controls. Replace lamps that fail prematurely due to improper lamp burn-in.

K. Unless otherwise indicated, install power packs for lighting control devices above accessible ceiling or above access panel in inaccessible ceiling near the sensor location.

L. Where indicated, install separate compatible wall switches for manual control interface with lighting control devices or associated power packs.

M. Unless otherwise indicated, install switches on load side of power packs so that switch does not turn off power pack.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect each lighting control device for damage and defects.

C. Test occupancy sensors to verify proper operation, including time delays and ambient light thresholds where applicable. Verify optimal coverage for entire room or area. Record test results in written report to be included with submittals.

D. Correct wiring deficiencies and replace damaged or defective lighting control devices.

3.05 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

B. Adjust occupancy sensor settings to minimize undesired activations while optimizing energy savings, and to achieve desired function as indicated or as directed by Architect Engineer.

C. Where indicated or as directed by Architect, install factory masking material or adjust integral blinders on passive infrared (PIR) and dual technology occupancy sensor lenses to block undesired motion detection.

3.06 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.07 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

B. See Section 01 79 00 - Demonstration and Training, for additional requirements.

C. Demonstration: Demonstrate proper operation of lighting control devices to Architect Engineer, and correct deficiencies or make adjustments as directed.

D. Training: Train personnel on operation, adjustment, programming, and maintenance of lighting control devices.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
   2. Provide minimum of two hours of training.
   3. Instructor: Qualified contractor familiar with the project and with sufficient knowledge of the installed lighting control devices.
   4. Location: At project site.

END OF SECTION

SECTION 26 21 00
LOW-VOLTAGE ELECTRICAL SERVICE ENTRANCE

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

B. Section 26 05 29 - Hangers and Supports for Electrical Systems.

C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.02 REFERENCE STANDARDS

A. IEEE C2 - National Electrical Safety Code; 2017.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 ADMINISTRATIVE REQUIREMENTS

A. No later than two weeks following date of the Agreement, notify Utility Company of anticipated date of service.

B. Coordination:
   1. Verify the following with Utility Company representative:
      a. Utility Company requirements, including division of responsibility.
      b. Exact location and details of utility point of connection.
      c. Utility easement requirements.
      d. Utility Company charges associated with providing service.
   2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for electrical service and associated equipment.
   3. Coordinate arrangement of service entrance equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   4. Notify Architect Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

C. Arrange for Utility Company to provide permanent electrical service. Prepare and submit documentation required by Utility Company.

D. Utility Company charges associated with providing permanent service to be paid by Contractor..

E. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Utility Company representative.

F. Scheduling:
   1. Where work of this section involves interruption of existing electrical service, arrange service interruption with Owner.
   2. Arrange for inspections necessary to obtain Utility Company approval of installation.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product. Include ratings, configurations, standard wiring diagrams, outline and support point dimensions, finishes, weights, service condition requirements, and installed features.

1.05 QUALITY ASSURANCE

A. Comply with the following:
   1. IEEE C2 (National Electrical Safety Code).

2. NFPA 70 (National Electrical Code).
3. The requirements of the Utility Company.

B. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

B. Store products indoors in a clean, dry space having a uniform temperature to prevent condensation (including outdoor rated products which are not weatherproof until completely and properly installed). Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle products carefully to avoid damage to internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 ELECTRICAL SERVICE REQUIREMENTS

A. Provide new electrical service consisting of all required conduits, conductors, equipment, metering provisions, supports, accessories, etc. as necessary for connection between Utility Company point of supply and service entrance equipment.

B. Electrical Service Characteristics:
1. Service Type: Underground.
2. Service Voltage: 208Y/120 V, 3 phase, 60 Hz.

C. Products Furnished by Contractor: Comply with Utility Company requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that ratings and configurations of service entrance equipment are consistent with the indicated requirements.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Verify and mark locations of existing underground utilities.

3.03 INSTALLATION

A. Install products in accordance with manufacturer's instructions and Utility Company requirements.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Arrange equipment to provide minimum clearances and required maintenance access.

D. Provide required support and attachment components in accordance with Section 26 05 29.

E. Provide grounding and bonding for service entrance equipment in accordance with Section 26 05 26.

F. Identify service entrance equipment, including main service disconnect(s) in accordance with Section 26 05 53.

3.04 PROTECTION

A. Protect installed equipment from subsequent construction operations.

END OF SECTION

SECTION 26 22 00
LOW-VOLTAGE TRANSFORMERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General-purpose transformers.

B. K-factor transformers rated for nonlinear loads.

C. Shielded transformers.

1.02 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

B. Section 26 05 29 - Hangers and Supports for Electrical Systems.

C. Section 26 05 33.13 - Conduit for Electrical Systems: Flexible conduit connections.

D. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. 10 CFR 431 - Energy Efficiency Program for Certain Commercial and Industrial Equipment - Distribution Transformers; Current Edition.

B. IEEE C57.94 - IEEE Recommended Practice for Installation, Application, Operation, and Maintenance of Dry-Type Distribution and Power Transformers; 2015.

C. IEEE C57.96 - IEEE Standard Guide for Loading Dry-Type Distribution and Power Transformers; 2013.

D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

E. NECA 409 - Standard for Installing and Maintaining Dry-Type Transformers; 2015.

F. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.

G. NEMA ST 20 - Dry Type Transformers for General Applications; 2021.

H. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2017.

I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

J. UL 506 - Standard for Specialty Transformers; Current Edition, Including All Revisions.

K. UL 1561 - Standard for Dry-Type General Purpose and Power Transformers; Current Edition, Including All Revisions.

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 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 the work with placement of supports, anchors, etc. required for mounting.
   4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
   5. Notify Architect Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Include voltage, kVA, impedance, tap configurations, insulation system class and rated temperature rise, efficiency, sound level, enclosure ratings, outline and support point dimensions, weight, required clearances, service condition requirements, and installed features.
   1. K-factor Rated Transformers: Include K-factor ratings.

C. Shop Drawings: Provide dimensioned plan and elevation views of transformers and adjacent equipment with all required clearances indicated.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

E. Maintenance Data: Include recommended maintenance procedures and intervals.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

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 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 in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to transformer internal components, enclosure, and finish.

1.08 FIELD CONDITIONS

A. Ambient Temperature: Do not exceed the following maximum temperatures during and after installation of transformers.
   1. Greater than 10 kVA: 104 degrees F maximum.
   2. Less than 10 kVA: 77 degrees F maximum.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Eaton Corporation: www.eaton.com.

B. Schneider Electric: www.se.com/#sle.

C. Siemens Industry, Inc: www.usa.siemens.com.

D. Substitutions: See Section 01 60 00 - Product Requirements.

E. Source Limitations: Provide transformers produced by same manufacturer as other electrical distribution equipment used for project and obtained from single supplier.

2.02 TRANSFORMERS - GENERAL REQUIREMENTS

A. Description: Factory-assembled, dry type transformers for 60 Hz operation designed and manufactured in accordance with NEMA ST 20 and listed, classified, and labeled as suitable for the purpose intended.

B. Unless noted otherwise, transformer ratings indicated are for continuous loading according to IEEE C57.96 under the following service conditions:
   1. Altitude: Less than 3,300 feet.
   2. Ambient Temperature:
      a. Greater than 10 kVA: Not exceeding 104 degrees F.
      b. Less than 10 kVA: Not exceeding 77 degrees F.

C. Core: High grade, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Keep magnetic flux densities substantially below saturation point, even at 10 percent primary overvoltage. Tightly clamp core laminations to prevent plate movement and maintain consistent pressure throughout core length.

D. Impregnate core and coil assembly with non-hydroscopic thermo-setting varnish to effectively seal out moisture and other contaminants.

E. Basic Impulse Level: 10 kV.

F. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.

G. Isolate core and coil from enclosure using vibration-absorbing mounts.

H. Nameplate: Include transformer connection data, ratings, wiring diagrams, and overload capacity based on rated winding temperature rise.

2.03 GENERAL PURPOSE TRANSFORMERS

A. Description: Self-cooled, two winding transformers listed and labeled as complying with UL 506 or UL 1561; ratings as indicated on the drawings.

B. Insulation System and Allowable Average Winding Temperature Rise:
   1. Less than 15 kVA: Class 180 degrees C insulation system with 115 degrees C average winding temperature rise.
   2. 15 kVA and Larger: Class 220 degrees C insulation system with 150 degrees C average winding temperature rise.

C. Coil Conductors: Continuous copper windings with terminations brazed or welded.

D. Winding Taps:
   1. Less than 3 kVA: None.
   2. 3 kVA through 15 kVA: Two 5 percent full capacity primary taps below rated voltage.
   3. 15 kVA through 300 kVA: Two 2.5 percent full capacity primary taps above and four 2.5 percent full capacity primary taps below rated voltage.
   4. 500 kVA and Larger: Two 2.5 percent full capacity primary taps above and two 2.5 percent full capacity primary taps below rated voltage.

E. Energy Efficiency: Comply with 10 CFR 431, Subpart K.

F. Sound Levels: Standard sound levels complying with NEMA ST 20

G. Mounting Provisions:
   1. Less than 15 kVA: Suitable for wall mounting.
   2. 15 kVA through 75 kVA: Suitable for wall, floor, or trapeze mounting.
   3. Larger than 75 kVA: Suitable for floor mounting.

H. Transformer Enclosure: Comply with NEMA ST 20.
   1. Environment Type per NEMA EN 10250: Unless otherwise indicated, as specified for the following installation locations:
   2. Construction: Steel.
      a. Less than 15 kVA: Totally enclosed, non-ventilated.
      b. 15 kVA and Larger: Ventilated.
   3. Finish: Manufacturer's standard grey, suitable for outdoor installations.
   4. Provide lifting eyes or brackets.

I. Accessories:
   1. Mounting Brackets: Provide manufacturer's standard brackets.
   2. Weathershield Kits: Provide for ventilated transformers installed outdoors to provide a listed NEMA EN 10250, type 3R assembly.
   3. Lug Kits: Sized as required for termination of conductors as indicated on the drawings.

2.04 K-FACTOR TRANSFORMERS RATED FOR NONLINEAR LOADS

A. Description: Self-cooled, two winding transformers listed and labeled as complying with UL 1561, and designed to supply nonlinear loads to the degree designated by the UL defined K-factor; ratings as indicated on the drawings.

B. Primary Voltage: 208 volts delta, 3 phase.

C. Secondary Voltage: 208Y/120 volts, 3 phase.

D. K-factor Rating: K-13

E. Insulation System and Allowable Average Winding Temperature Rise: Class 220 degrees C insulation system with 150 degrees C average winding temperature rise.

F. Coil Conductors: Continuous copper windings with terminations brazed or welded. Individually insulate secondary conductors and arrange to minimize hysteresis and eddy current losses at harmonic frequencies. Size secondary neutral conductor at twice the secondary phase conductor ampacity.

G. Winding Taps: Two 2.5 percent full capacity primary taps above and four 2.5 percent full capacity primary taps below rated voltage.

H. Neutral Bus: Sized to accommodate twice the rated secondary current.

I. Energy Efficiency: Comply with 10 CFR 431, Subpart K.

J. Sound Levels: Standard sound levels complying with NEMA ST 20

K. Mounting Provisions:
   1. Up to 75 kVA: Suitable for wall, floor, or trapeze mounting.
   2. Larger than 75 kVA: Suitable for floor mounting.

L. Transformer Enclosure: Comply with NEMA ST 20.
   1. Environment Type per NEMA EN 10250: Unless otherwise indicated, as specified for the following installation locations:
   2. Construction: Steel, ventilated.
   3. Finish: Manufacturer's standard grey, suitable for outdoor installations.
   4. Provide lifting eyes or brackets.

M. Accessories:
   1. Mounting Brackets: Provide manufacturer's standard brackets.
   2. Weathershield Kits: Provide for ventilated transformers installed outdoors to provide a listed NEMA EN 10250, type 3R assembly.
   3. Lug Kits: Sized as required for termination of conductors as indicated on the drawings.

2.05 SHIELDED TRANSFORMERS

A. Description: Self-cooled, two winding, shielded isolation transformers listed and labeled as complying with UL 506 or UL 1561; ratings as indicated on the drawings.

B. Insulation System and Allowable Average Winding Temperature Rise:
   1. Less than 15 kVA: Class 180 degrees C insulation system with 115 degrees C average winding temperature rise.
   2. 15 kVA and Larger: Class 220 degrees C insulation system with 150 degrees C average winding temperature rise.

C. Coil Conductors: Continuous copper windings with terminations brazed or welded.

D. Winding Taps:
   1. Less than 3 kVA: None.
   2. 3 kVA through 15 kVA: Two 5 percent full capacity primary taps below rated voltage.
   3. 15 kVA through 300 kVA: Two 2.5 percent full capacity primary taps above and four 2.5 percent full capacity primary taps below rated voltage.
   4. 500 kVA and Larger: Two 2.5 percent full capacity primary taps above and two 2.5 percent full capacity primary taps below rated voltage.

E. Energy Efficiency: Comply with 10 CFR 431, Subpart K.

F. Sound Levels: Standard sound levels complying with NEMA ST 20

G. Winding Shield: Double electrostatic, with separate insulated grounding connection.

H. Mounting Provisions:
   1. Less than 15 kVA: Suitable for wall mounting.
   2. 15 kVA through 75 kVA: Suitable for wall, floor, or trapeze mounting.
   3. Larger than 75 kVA: Suitable for floor mounting.

I. Transformer Enclosure: Comply with NEMA ST 20.
   1. Environment Type per NEMA EN 10250: Unless otherwise indicated, as specified for the following installation locations:
   2. Construction: Steel.
      a. Less than 15 kVA: Totally enclosed, non-ventilated.
      b. 15 kVA and Larger: Ventilated.
   3. Finish: Manufacturer's standard grey, suitable for outdoor installations.
   4. Provide lifting eyes or brackets.

2.06 SOURCE QUALITY CONTROL

A. Factory test transformers according to NEMA ST 20.

B. Sound Level Tests: Perform factory test designated in NEMA ST 20 as "design" test on each production unit.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that suitable support frames and anchors are installed where required and that mounting surfaces are ready to receive transformers.

C. Perform pre-installation tests and inspections on transformers per manufacturer's instructions and as specified in NECA 409. Correct deficiencies prior to installation.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Install transformers in accordance with NECA 409 and IEEE C57.94.

D. Use flexible conduit, under the provisions of Section 26 05 33.13, 2 feet minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.

E. Arrange equipment to provide minimum clearances as specified on transformer nameplate and in accordance with manufacturer's instructions and NFPA 70.

F. Install transformers plumb and level.

G. Transformer Support:

1. Provide required support and attachment in accordance with Section 26 05 29, where not furnished by transformer manufacturer.
2. Use integral transformer flanges, accessory brackets furnished by manufacturer, or field-fabricated supports to support wall-mounted transformers.
3. Unless otherwise indicated, mount floor-mounted transformers on properly sized 3 inch high concrete pad.
4. Use trapeze hangers assembled from threaded rods and metal channel (strut) to support suspended transformers. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

H. Provide grounding and bonding in accordance with Section 26 05 26.

I. Remove shipping braces and adjust bolts that attach the core and coil mounting bracket to the enclosure according to manufacturer's recommendations in order to reduce audible noise transmission.

J. Where not factory-installed, install lugs sized as required for termination of conductors as indicated.

K. Where furnished as a separate accessory, install transformer weathershield per manufacturer's instructions.

L. Identify transformers in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - 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 Sections 7.2.1.1 and 7.2.1.2. Tests and inspections listed as optional are not required.

3.04 ADJUSTING

A. Measure primary and secondary voltages and make appropriate tap adjustments.

B. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.05 CLEANING

A. Clean dirt and debris from transformer components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 26 24 13
SWITCHBOARDS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Low-voltage (600 V and less) switchboards and associated accessories for service and distribution applications.

B. Overcurrent protective devices for switchboards.

1.03 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

B. Section 26 05 29 - Hangers and Supports for Electrical Systems.

C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

D. Section 26 05 73 - Power System Studies: Additional criteria for the selection and adjustment of equipment and associated protective devices specified in this section.

E. Section 26 43 00 - Surge Protective Devices.

1.04 REFERENCE STANDARDS

A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; 2013e (Amended 2017).

B. IEEE C57.13 - IEEE Standard Requirements for Instrument Transformers; 2016.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

D. NECA 400 - Standard for Installing and Maintaining Switchboards; 2007.

E. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.

F. NEMA PB 2 - Deadfront Distribution Switchboards; 2011.

G. NEMA PB 2.1 - General Instructions for Proper Handling, Installation, Operation, and Maintenance of Deadfront Distribution Switchboards Rated 600 Volts or Less; 2013.

H. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2017.

I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

J. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.

K. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

L. UL 891 - Switchboards; Current Edition, Including All Revisions.

1.05 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 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. Coordinate with manufacturer to provide shipping splits suitable for the dimensional constraints of the installation.
5. Notify Architect Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Service Entrance Switchboards:
1. Coordinate with Utility Company to provide switchboards with suitable provisions for electrical service and utility metering, where applicable.
2. Coordinate with Owner to arrange for Utility Company required access to equipment for installation and maintenance.
3. Obtain Utility Company approval of switchboard prior to fabrication.
4. Arrange for inspections necessary to obtain Utility Company approval of installation.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for switchboards, enclosures, overcurrent protective devices, and other installed components and accessories.
1. Include characteristic trip curves for each type and rating of overcurrent protective device upon request.

C. Shop Drawings: Indicate dimensions, voltage, bus ampacities, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
1. Include dimensioned plan and elevation views of switchboards and adjacent equipment with all required clearances indicated.
2. Include wiring diagrams showing all factory and field connections.
3. Clearly indicate whether proposed short circuit current ratings are fully rated or, where acceptable, series rated systems.
4. Include documentation of listed series ratings upon request.
5. Include documentation demonstrating selective coordination upon request.

D. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 60 00 - Product Requirements, for additional provisions.
2. Enclosure Keys: Two of each different key.

1.07 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store switchboards in accordance with manufacturer's instructions, NECA 400, and NEMA PB 2.1.

B. Store in a clean, dry space having a uniform temperature to prevent condensation (including outdoor switchboards, which are not weatherproof until completely and properly installed). Where necessary, provide temporary enclosure space heaters or temporary power for permanent factory-installed space heaters.

C. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

D. Handle carefully to avoid damage to switchboard internal components, enclosure, and finish.

1.09 FIELD CONDITIONS

A. Maintain field conditions within required service conditions during and after installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Switchboards:
1. ABB/GE: www.geindustrial.com/#sle.
2. Eaton Corporation: www.eaton.com/#sle.
3. Schneider Electric: www.se.com/#sle.
4. Siemens Industry, Inc: www.new.siemens.com/#sle.
5. Source Limitations: Provide switchboards and associated components produced by same manufacturer as other electrical distribution equipment used for project and obtained from single supplier.

2.02 SWITCHBOARDS

A. Provide switchboards consisting of all required components, control power transformers, instrumentation and control wiring, accessories, etc. as necessary for a complete operating system.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Description: Dead-front switchboard assemblies complying with NEMA PB 2, and listed and labeled as complying with UL 891; ratings, configurations and features as indicated on the drawings.

D. Front-Connected Switchboards:
1. Main Device(s): Panel/group-mounted or individually-mounted.
2. Feeder Devices: Panel/group-mounted or individually-mounted.
3. Arrangement: Front and rear accessible, front and rear aligned.
4. Gutter Access: Bolted covers.

E. Service Entrance Switchboards:
1. Listed and labeled as suitable for use as service equipment according to UL 869A.
2. For solidly-grounded wye systems, provide factory-installed main bonding jumper between neutral and ground busses, and removable neutral disconnecting link for testing purposes.
3. Comply with Utility Company requirements for electrical service.

F. Service Conditions:
1. Provide switchboards and associated components suitable for operation under the following service conditions without derating:
a. Altitude: Less than 6,600 feet.
b. Ambient Temperature:
1) Switchboards Containing Molded Case or Insulated Case Circuit Breakers: Between 23 degrees F and 104 degrees F.
2. Provide switchboards and associated components suitable for operation at indicated ratings under the service conditions at the installed location.

G. Short Circuit Current Rating:

1. Provide switchboards with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 26 05 73.

H. Main Devices: Configure for top or bottom incoming feed as indicated or as required for the installation. Provide separate pull section and/or top-mounted pullbox as indicated or as required to facilitate installation of incoming feed.

I. Bussing: Sized in accordance with UL 891 temperature rise requirements.
   1. Through bus (horizontal cross bus) to be fully rated through full length of switchboard (non-tapered). Tapered bus is not permitted.
   2. Provide fully rated neutral bus, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
   3. Provide solidly bonded equipment ground bus through full length of switchboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
   4. Phase and Neutral Bus Material: Copper.
   5. Ground Bus Material: Copper.

J. Conductor Terminations: Suitable for use with the conductors to be installed.
   1. Line Conductor Terminations:
      a. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
      b. Main and Neutral Lug Type: Mechanical.
   2. Load Conductor Terminations:
      a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
      b. Lug Type:

K. Enclosures:
   1. Environment Type per NEMA EN 10250: Unless otherwise indicated, as specified for the following installation locations:
      a. Indoor Clean, Dry Locations: Type 1 or Type 2 (drip-proof).
      b. Outdoor Locations: Type 3R.
   2. Finish: Manufacturer's standard unless otherwise indicated.
   3. Enclosure Space Heaters:
      a. Provide in each switchboard section installed outdoors and in unconditioned indoor spaces.
      b. Size according to manufacturer's recommendations for worst case ambient temperature to prevent condensation.
      c. Heater Control: Thermostat.
      d. Heater Power Source: Provide connection to transformer factory-installed in switchboard or suitable external branch circuit as indicated or as required.
   4. Outdoor Enclosures:
      a. Enclosure Type: Non-walk-in type unless otherwise indicated.
      b. Color: Manufacturer's standard.
      c. Access Doors: Lockable, with all locks keyed alike.

L. Future Provisions:
   1. Prepare designated spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.
   2. Equip distribution sections with full height vertical bussing to accommodate maximum utilization of space for devices.
   3. Arrange and equip through bus and ground bus to accommodate future installation of additional switchboard sectionswhere indicated.

M. Surge Protective Devices: Where factory-installed, internally mounted surge protective devices are provided in accordance with Section 26 43 00, list switchboards as a complete assembly including surge protective device.

N. Arc Flash Energy-Reducing Maintenance Switching: For circuit breakers rated 1200 A or higher, provide a local accessory switch with status indicator light that permits selection of a maintenance mode with alternate electronic trip unit settings for reduced fault clearing time.

O. Owner Metering:
   1. Provide microprocessor-based digital electrical metering system including all instrument transformers, wiring, and connections necessary for measurements specified.
   2. Measured Parameters:
      a. Voltage (Volts AC): Line-to-line, line-to-neutral for each phase.
      b. Current (Amps): For each phase and neutral.
      c. Frequency (Hz).
      d. Real power (kW): For each phase, 3-phase total.
      e. Reactive power (kVAR): For each phase, 3-phase total.
      f. Apparent power (kVA): For each phase, 3-phase total.
      g. Power factor.
      h. Real energy (kWh).
      i. Current demand.
   3. Meter Accuracy: Plus/minus 1.0 percent.
   4. Features:
      a. Remote monitoring capability via PC.
      b. Historical data logging.

P. Instrument Transformers:
   1. Comply with IEEE C57.13.
   2. Select suitable ratio, burden, and accuracy as required for connected devices.
   3. Current Transformers: Connect secondaries to shorting terminal blocks.
   4. Potential Transformers: Include primary and secondary fuses with disconnecting means.

2.03 OVERCURRENT PROTECTIVE DEVICES

A. Circuit Breakers:
   1. Interrupting Capacity:
      a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than specified minimum requirements.
      b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
   2. Molded Case Circuit Breakers:
      a. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers; listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
         1) Provide thermal magnetic circuit breakers unless otherwise indicated.
         2) Provide electronic trip circuit breakers for circuit breaker frame sizes 1200 amperes and above.
      b. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
         1) Provide field-adjustable magnetic instantaneous trip setting for circuit breaker frame sizes 225 amperes and larger.
         2) Provide interchangeable trip units where indicated.
      c. Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units.

1) Provide the following field-adjustable trip response settings:
   (a) Long time pickup, adjustable by replacing interchangeable trip unit or by setting dial.
   (b) Long time delay.
   (c) Short time pickup and delay.
   (d) Instantaneous pickup.
   (e) Ground fault pickup and delay where ground fault protection is indicated.

2.04 SOURCE QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Factory test switchboards according to NEMA PB 2, including the following production (routine) tests on each switchboard assembly or component:
   1. Dielectric tests.
   2. Mechanical operation tests.
   3. Grounding of instrument transformer cases test.
   4. Electrical operation and control wiring tests, including polarity and sequence tests.
   5. Ground-fault sensing equipment test.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that the ratings and configurations of the switchboards and associated components are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive switchboards.

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 switchboards in accordance with NECA 1 (general workmanship), NECA 400, and NEMA PB 2.1.

C. Arrange equipment to provide required clearances and maintenance access, including accommodations for any drawout devices.

D. Where switchboard is indicated to be mounted with inaccessible side against wall, provide minimum clearance of 1/2 inch between switchboard and wall.

E. Provide required support and attachment in accordance with Section 26 05 29.

F. Install switchboards plumb and level.

G. Unless otherwise indicated, mount switchboards on properly sized 4 inch high concrete pad.

H. Provide grounding and bonding in accordance with Section 26 05 26.

I. Install all field-installed devices, components, and accessories.

J. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.

K. Set field-adjustable circuit breaker tripping function settings as determined by overcurrent protective device coordination study performed in accordance with Section 26 05 73.

L. Provide filler plates to cover unused spaces in switchboards.

M. Identify switchboards in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Disconnect surge protective devices (SPDs) prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPDs connected.

C. Before energizing switchboard, perform insulation resistance testing in accordance with NECA 400 and NEMA PB 2.1.

D. Inspect and test in accordance with NETA ATS, except Section 4.

E. Perform inspections and tests listed in NETA ATS, Section 7.1.

F. Molded Case and Insulated Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers. Tests listed as optional are not required.

G. Meters: Perform inspections and tests listed in NETA ATS, Section 7.11.2.

H. Instrument Transformers: Perform inspections and tests listed in NETA ATS, Section 7.10. The dielectric withstand tests on primary windings with secondary windings connected to ground listed as optional are not required.

I. Correct deficiencies and replace damaged or defective switchboards or associated components.

3.04 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

B. Adjust alignment of switchboard covers and doors.

3.05 CLEANING

A. Clean dirt and debris from switchboard enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred surfaces to match original factory finish.

3.06 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

B. See Section 01 79 00 - Demonstration and Training, for additional requirements.

C. Training: Train Owner's personnel on operation, adjustment, and maintenance of switchboard and associated devices.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
   2. Provide minimum of two hours of training.
   3. Instructor: Manufacturer's authorized representative.
   4. Location: At project site.

3.07 PROTECTION

A. Protect installed switchboards from subsequent construction operations.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 26 24 16
PANELBOARDS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Lighting and appliance panelboards.

B. Overcurrent protective devices for panelboards.

1.03 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

B. Section 26 05 29 - Hangers and Supports for Electrical Systems.

C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.04 REFERENCE STANDARDS

A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; 2013e (Amended 2017).

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

C. NECA 407 - Standard for Installing and Maintaining Panelboards; 2025.

D. NEMA BS 31047 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); 2013 (Reaffirmed 2023).

E. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.

F. NEMA PB 1 - Panelboards; 2011.

G. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less; 2013.

H. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2017.

I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

J. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

K. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

L. UL 67 - Panelboards; Current Edition, Including All Revisions.

M. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.

N. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

O. UL 1053 - Ground-Fault Sensing and Relaying Equipment; Current Edition, Including All Revisions.

P. UL 1699 - Arc-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.05 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 the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
5. Notify Architect Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.
   1. Include characteristic trip curves for each type and rating of overcurrent protective device upon request.

C. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
   1. Include dimensioned plan and elevation views of panelboards and adjacent equipment with all required clearances indicated.

D. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.

E. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Panelboard Keys: Two of each different key.

1.07 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.

B. 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.

C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

1.09 FIELD CONDITIONS

A. Maintain ambient temperature within the following limits during and after installation of panelboards:

1. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. ABB/GE: www.geindustrial.com/#sle.

B. Eaton Corporation: www.eaton.com/#sle.

C. Schneider Electric; Square D Products: www.schneider-electric.us/#sle.

D. Siemens Industry, Inc: www.usa.siemens.com/#sle.

E. Substitutions: See Section 01 60 00 - Product Requirements.

F. Source Limitations: Furnish panelboards and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 PANELBOARDS - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
   1. Altitude: Less than 6,600 feet.
   2. Ambient Temperature:
      a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.

C. Short Circuit Current Rating:
   1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
   2. Listed series ratings are not acceptable.

D. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.

E. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.

F. Bussing: Sized in accordance with UL 67 temperature rise requirements.
   1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
   2. Provide 200 percent rated neutral bus and lugs where indicated, where oversized neutral conductors are provided, or where panelboards are fed from K-rated transformers.
   3. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
   4. Provide separate isolated/insulated ground bus where indicated or where isolated grounding conductors are provided.

G. Conductor Terminations: Suitable for use with the conductors to be installed.

H. 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 3R.
   2. Boxes: Galvanized steel unless otherwise indicated.
      a. Provide wiring gutters sized to accommodate the conductors to be installed.
      b. Increase gutter space as required where sub-feed lugs, feed-through lugs, gutter taps, or oversized lugs are provided.
      c. Provide painted steel boxes for surface-mounted panelboards, finish to match fronts.

3. Fronts:
   a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
   b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
4. Lockable Doors: All locks keyed alike unless otherwise indicated.

I. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

J. Ground Fault Protection: Where ground-fault protection is indicated, provide system listed and labeled as complying with UL 1053.
1. Where electronic circuit breakers equipped with integral ground fault protection are used, provide separate neutral current sensor where applicable.
2. Where accessory ground fault sensing and relaying equipment is used, equip companion overcurrent protective devices with ground-fault shunt trips.
   a. Use zero sequence ground fault detection method unless otherwise indicated.
   b. Provide test panel and field-adjustable ground fault pick-up and delay settings.
   c. Provide zone selective interlocking capability where indicated, capable of communicating with other electronic trip circuit breakers and external ground fault sensing systems to control ground fault delay functions for system coordination purposes.

K. Arc Flash Energy-Reducing Maintenance Switching: For circuit breakers rated 1200A or higher, provide a local accessory switch with status indicator light that permits selection of a maintenance mode with alternate electronic trip unit settings for reduced fault clearing time.

L. Selectivity: Where the requirement for selectivity is indicated, furnish products as required to achieve selective coordination.

M. Multi-Section Panelboards: Provide enclosures of the same height, with feed-through lugs or sub-feed lugs and feeders as indicated or as required to interconnect sections.

N. Load centers are not acceptable.

O. Provide the following features and accessories where indicated or where required to complete installation:
1. Feed-through lugs.
2. Sub-feed lugs.

2.03 LIGHTING AND APPLIANCE PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
2. Phase and Neutral Bus Material: Copper.
3. Ground Bus Material: Copper.

D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.

E. Enclosures:
1. Provide surface-mounted or flush-mounted enclosures as indicated.

2. Fronts: Provide lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
3. Provide clear plastic circuit directory holder mounted on inside of door.

2.04 OVERCURRENT PROTECTIVE DEVICES

A. Molded Case Circuit Breakers:
1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
2. Interrupting Capacity:
   a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
      1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
      2) 14,000 rms symmetrical amperes at 480 VAC.
   b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
3. Conductor Terminations:
   a. Provide mechanical lugs unless otherwise indicated.
   b. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
   a. Provide field-adjustable magnetic instantaneous trip setting for circuit breaker frame sizes 225 amperes and larger.
5. Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units.
   a. Provide the following field-adjustable trip response settings:
      1) Long time pickup, adjustable by replacing interchangeable trip unit or by setting dial.
      2) Long time delay.
      3) Short time pickup and delay.
      4) Instantaneous pickup.
      5) Ground fault pickup and delay where ground fault protection is indicated.
   b. Provide zone selective interlocking capability where indicated, capable of communicating with other electronic trip circuit breakers and external ground fault sensing systems to control short time delay and ground fault delay functions for system coordination purposes.
   c. Provide communication capability where indicated: Compatible with system indicated.
6. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
7. Provide the following circuit breaker types where indicated:
   a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
   b. Ground Fault Equipment Protection Circuit Breakers: Designed to trip at 30 mA for protection of equipment.
   c. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Combination type listed as complying with UL 1699.
   d. 100 Percent Rated Circuit Breakers: Listed for application within the panelboard where installed at 100 percent of the continuous current rating.
   e. Current Limiting Circuit Breakers: Without using fusible elements, designed to limit the let-through energy to a value less than the energy of a one-half cycle wave of the symmetrical prospective current when operating within its current limiting range.

8. Provide listed switching duty rated circuit breakers with SWD marking for all branch circuits serving fluorescent lighting.
9. Do not use tandem circuit breakers.
10. Do not use handle ties in lieu of multi-pole circuit breakers.
11. Provide multi-pole circuit breakers for multi-wire branch circuits as required by NFPA 70.
12. Provide the following features and accessories where indicated or where required to complete installation:
    a. Shunt Trip: Provide coil voltage as required for connection to indicated trip actuator.
    b. Handle Pad-Lock Provision: For locking circuit breaker handle in OFF position.
    c. Auxiliary Switch: SPDT switch suitable for connection to system indicated for indicating when circuit breaker has tripped or been turned off.
    d. Undervoltage Release: For tripping circuit breaker upon predetermined drop in coil voltage with field-adjustable time delay to prevent nuisance tripping.
    e. Alarm Switch: SPDT switch suitable for connection to system indicated for indicating when circuit breaker has tripped.

2.05 SOURCE QUALITY CONTROL

A. Factory test panelboards according to NEMA PB 1.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive panelboards.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.

D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

E. Provide required support and attachment in accordance with Section 26 05 29.

F. Install panelboards plumb.

G. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.

H. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.

I. Mount floor-mounted power distribution panelboards on properly sized 3 inch high concrete pad.

J. Provide minimum of four spare 1 inch trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling and below floor.

K. Provide grounding and bonding in accordance with Section 26 05 26.
    1. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on isolated/insulated ground bus.
    2. Terminate branch circuit isolated grounding conductors on isolated/insulated ground bus only. Do not terminate on solidly bonded equipment ground bus.

L. Install all field-installed branch devices, components, and accessories.

M. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.

N. Multi-Wire Branch Circuits: Group grounded and ungrounded conductors together in the panelboard as required by NFPA 70.

O. Set field-adjustable circuit breaker tripping function settings as determined by overcurrent protective device coordination study performed according to Section 26 05 73.

P. Set field-adjustable ground fault protection pickup and time delay settings as indicated.

Q. Provide filler plates to cover unused spaces in panelboards.

R. Provide circuit breaker lock-on devices to prevent unauthorized personnel from de-energizing essential loads where indicated.

S. Identify panelboards in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1for all main circuit breakers. Tests listed as optional are not required.

D. Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.
   1. Perform inspections and tests listed in NETA ATS, Section 7.14. The insulation-resistance test on control wiring listed as optional is not required.

E. Test GFCI circuit breakers to verify proper operation.

F. Test AFCI circuit breakers to verify proper operation.

G. Test shunt trips to verify proper operation.

H. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.04 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

B. Adjust alignment of panelboard fronts.

C. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 20 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

3.05 CLEANING

A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 26 27 26
WIRING DEVICES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Wall switches.

B. Wall dimmers.

C. Receptacles.

D. Wall plates.

1.03 RELATED REQUIREMENTS

A. Section 26 05 33.16 - Boxes for Electrical Systems.

B. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

C. Section 26 09 23 - Lighting Control Devices: Devices for automatic control of lighting, including occupancy sensors.

D. Section 27 10 00 - Structured Cabling: Voice and data jacks.

1.04 REFERENCE STANDARDS

A. FS W-C-596 - Connector, Electrical, Power, General Specification for; 2017h.

B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification); 2017g.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

D. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.

E. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2020).

F. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2021.

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.

I. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.

J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.

K. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

L. UL 1310 - Class 2 Power Units; Current Edition, Including All Revisions.

M. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.

1.05 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. Coordinate the core drilling of holes for poke-through assemblies with the work covered under other sections.
6. Notify Architect Engineer 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.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

C. Project Record Documents: Record actual installed locations of wiring devices.

1.07 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70 (NEC).

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.08 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 APPLICATIONS

A. Provide wiring devices suitable for intended use and with ratings adequate for load served.

B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.

C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.

D. Provide GFCI protection for receptacles installed within 6 feet of sinks.

E. Provide GFCI protection for receptacles installed in kitchens.

F. Provide GFCI protection for receptacles serving electric drinking fountains.

G. Unless noted otherwise, do not use combination switch/receptacle devices.

2.02 WIRING DEVICE FINISHES

A. Provide wiring device finishes as described below unless otherwise indicated.

B. Wiring Devices, Unless Otherwise Indicated: Coordinate with architect.

2.03 WALL SWITCHES

A. Manufacturers:
1. Greengate/Cooper.
2. Hubbell Incorporated: www.hubbell.com/#sle.
3. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20and where applicable FS W-S-896; types as indicated on the drawings.

1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.

C. Standard Wall Switches: Commercial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

2.04 WALL DIMMERS

A. Manufacturers:
1. Greengate/Cooper.
2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
3. Lutron Electronics Company, Inc; Maestro Series: www.lutron.com/#sle.
4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Wall Dimmers - General Requirements: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 1472; types and ratings suitable for load controlled as indicated on the drawings.

2.05 RECEPTACLES

A. Manufacturers:
1. Hubbell Incorporated: www.hubbell.com/#sle.
2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
3. Lutron Electronics Company, Inc; Designer Style: www.lutron.com/#sle.
4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498and where applicable FS W-C-596; 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.

C. Convenience Receptacles:
1. Standard Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
2. Tamper Resistant Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; single or duplex as indicated on the drawings.

D. GFCI Receptacles:
1. GFCI Receptacles - General Requirements: Self-testing, with 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: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
3. Weather Resistant GFCI Receptacles: Commercial 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.
4. Tamper Resistant GFCI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type.

5. Tamper Resistant and Weather Resistant GFCI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations.

E. USB Charging Devices:
   1. USB Charging Devices - General Requirements: Listed as complying with UL 1310.
      a. Charging Capacity - Two-Port Devices: 2.1 A, minimum.
   2. USB Charging/Tamper Resistant Receptacle Combination Devices: Two-port (Type A) USB charging device and receptacle, commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; rectangular decorator style.

2.06 WALL PLATES

A. Manufacturers:
   1. Hubbell Incorporated: www.hubbell-wiring.com/#sle.
   2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
   3. Lutron Electronics Company, Inc: www.lutron.com/sle.
   4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
   5. Substitutions: See Section 01 60 00 - Product Requirements.

B. 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.

C. Nylon Wall Plates: Smooth finish, high-impact thermoplastic.

D. Weatherproof Covers for Wet or 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 26 05 33.16 as required for installation of wiring devices provided under this section.
   1. Mounting Heights: Unless otherwise indicated, as follows:

a. Wall Switches: 48 inches above finished floor.
b. Wall Dimmers: 48 inches above finished floor.
c. Receptacles: 18 inches above finished floor or 6 inches above counter.

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 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect Engineer to obtain direction prior to proceeding with work.

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. Where required, 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. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.

G. Unless otherwise indicated, 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. Install wiring devices plumb and level with mounting yoke held rigidly in place.

J. Install wall switches with OFF position down.

K. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.

L. Do not share neutral conductor on branch circuits utilizing wall dimmers.

M. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.

N. 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. Do not use oversized wall plates in lieu of meeting this requirement.

O. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

P. Identify wiring devices in accordance with Section 26 05 53.

Q. Do not install devices back-to-back.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect each wiring device for damage and defects.

C. Operate each wall switch, wall dimmer, and fan speed controller 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. 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

SECTION 26 28 16.13
ENCLOSED CIRCUIT BREAKERS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Enclosed circuit breakers.

1.03 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

B. Section 26 05 29 - Hangers and Supports for Electrical Systems.

C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

D. Section 26 05 73 - Power System Studies: Additional criteria for the selection and adjustment of equipment and associated protective devices specified in this section.

1.04 REFERENCE STANDARDS

A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; 2013e (Amended 2017).

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

C. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.

D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2017.

E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

G. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

H. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.

I. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

J. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

K. UL 1053 - Ground-Fault Sensing and Relaying Equipment; Current Edition, Including All Revisions.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within 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 Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for circuit breakers, enclosures, and other installed components and accessories.
   1. Include characteristic trip curves for each type and rating of circuit breaker upon request.

C. Field Quality Control Test Reports.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

E. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

1.07 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

1.08 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 circuit breaker internal components, enclosure, and finish.

1.09 FIELD CONDITIONS

A. Maintain ambient temperature between 23 degrees F and 104 degrees F during and after installation of enclosed circuit breakers.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. ABB/GE: www.electrification.us.abb.com/#sle.

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: See Section 01 60 00 - Product Requirements.

F. Source Limitations: Provide enclosed circuit breakers and associated components produced by same manufacturer as other electrical distribution equipment used for project and obtained from single supplier.

2.02 ENCLOSED CIRCUIT BREAKERS

A. Description: Units consisting of molded case circuit breakers individually mounted in enclosures.

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 23 degrees F and 104 degrees F.

D. Short Circuit Current Rating:
   1. Provide enclosed circuit breakers with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 26 05 73.
   2. Listed series ratings are not acceptable.

E. Enclosed Circuit Breakers Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.

F. Conductor Terminations: Suitable for use with the conductors to be installed.

G. Provide thermal magnetic circuit breakers unless otherwise indicated.

H. Provide insulated, groundable fully rated solid neutral assembly where a neutral connection is required, with a suitable lug for terminating each neutral conductor.

I. Provide solidly bonded equipment ground bus in each enclosed circuit breaker, with a suitable lug for terminating each equipment grounding conductor.

J. 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 3R.
   2. Finish for Painted Steel Enclosures: Manufacturer's standard, factory applied grey unless otherwise indicated.
   3. Provide surface-mounted enclosures unless otherwise indicated.

K. Provide externally operable handle with means for locking in the OFF position.

L. Ground Fault Protection: Where ground-fault protection is indicated, provide system listed and labeled as complying with UL 1053.
   1. Where electronic circuit breakers equipped with integral ground fault protection are used, provide separate neutral current sensor where applicable.

M. Selectivity: Where the requirement for selectivity is indicated, furnish products as required to achieve selective coordination.

2.03 MOLDED CASE CIRCUIT BREAKERS

A. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.

B. Interrupting Capacity:
   1. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
      a. 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
      b. 14,000 rms symmetrical amperes at 480 VAC.
   2. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.

C. Conductor Terminations:
   1. Provide mechanical lugs unless otherwise indicated.
   2. Provide compression lugs where indicated.
   3. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.

D. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.

E. Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units.
   1. Provide the following field-adjustable trip response settings:
      a. Long time pickup, adjustable by replacing interchangeable trip unit or by setting dial.
      b. Long time delay.
      c. Short time pickup and delay.

d. Instantaneous pickup.
e. Ground fault pickup and delay where ground fault protection is indicated.

F. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.

G. Provide the following circuit breaker types where indicated:
1. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
2. Ground Fault Equipment Protection Circuit Breakers: Designed to trip at 30 mA for protection of equipment.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that the ratings of the enclosed circuit breakers are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive enclosed circuit breakers.

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 26 05 29.

E. Install enclosed circuit breakers plumb.

F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed circuit breakers such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.

G. Provide grounding and bonding in accordance with Section 26 05 26.

H. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.

I. Set field-adjustable ground fault protection pickup and time delay settings as indicated.

J. Identify enclosed circuit breakers in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect and test in accordance with manufacturer's instructions and NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for circuit breakers used for service entrance and for circuit breakers larger than 800 amperes. Tests listed as optional are not required.

D. Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.

E. Test GFCI circuit breakers to verify proper operation.

F. Correct deficiencies and replace damaged or defective enclosed circuit breakers.

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 circuit breaker enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 26 28 16.16
ENCLOSED SWITCHES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Enclosed safety switches.

1.03 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

B. Section 26 05 29 - Hangers and Supports for Electrical Systems.

C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.04 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

B. NEMA BS 31047 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); 2013 (Reaffirmed 2023).

C. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.

D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2017.

E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

G. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

H. UL 98 - Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.

I. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

1.05 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 Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.06 SUBMITTALS

A. See Section 01 30 00 - 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 and adjacent equipment with all required clearances indicated.
   2. Include wiring diagrams showing all factory and field connections.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

E. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

1.07 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

1.08 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.

1.09 FIELD CONDITIONS

A. Maintain ambient temperature between -22 degrees F and 104 degrees F during and after installation of enclosed switches.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. ABB/GE: www.electrification.us.abb.com/#sle.

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: See Section 01 60 00 - Product Requirements.

F. Source Limitations: Provide enclosed switches and associated components produced by same manufacturer as other electrical distribution equipment used for project and obtained from single supplier.

2.02 ENCLOSED SAFETY SWITCHES

A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty; 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 not less than the available fault current at the installed location 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. Conductor Terminations: Suitable for use with the conductors to be installed.

J. Provide insulated, groundable fully rated solid neutral assembly where a neutral connection is required, with a suitable lug for terminating each neutral conductor.

K. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.

L. 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 3R.
   2. Finish for Painted Steel Enclosures: Manufacturer's standard, factory applied grey unless otherwise indicated.

M. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.

N. Heavy Duty Switches:
   1. Comply with NEMA BS 31047.
   2. Conductor Terminations:
      a. Provide mechanical lugs unless otherwise indicated.
      b. Provide compression lugs where indicated.
      c. 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.
      a. Provide means for locking handle in the ON position where indicated.

O. Provide the following features and accessories where indicated or where required to complete installation:
   1. Hubs: As required for environment type; sized to accept conduits to be installed.

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 26 05 29.

E. Install enclosed switches plumb.

F. 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.

G. Provide grounding and bonding in accordance with Section 26 05 26.

H. Identify enclosed switches in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - 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

SECTION 26 43 00
SURGE PROTECTIVE DEVICES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Surge protective devices for service entrance locations.

B. Surge protective devices for distribution locations.

C. Surge protective devices for branch panelboard locations.

1.03 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

B. Section 26 24 13 - Switchboards.

C. Section 26 24 16 - Panelboards.

1.04 ABBREVIATIONS AND ACRONYMS

A. EMI/RFI: Electromagnetic Interference/Radio Frequency Interference.

B. SPD: Surge Protective Device.

1.05 REFERENCE STANDARDS

A. MIL-STD-220 - Method of Insertion Loss Measurement; 2009c (Validated 2014).

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

C. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.

D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2017.

E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. UL 1283 - Standard for Electromagnetic Interference Filters; Current Edition, Including All Revisions.

G. UL 1449 - Standard for Surge Protective Devices; Current Edition, Including All Revisions.

1.06 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate size and location of overcurrent device compatible with the actual surge protective device and location to be installed. Notify Architect Engineer of any conflicts or deviations from Contract Documents to obtain direction prior to ordering equipment.

1.07 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Include detailed component information, voltage, surge current ratings, repetitive surge current capacity, voltage protection rating (VPR) for all protection modes, maximum continuous operating voltage (MCOV), nominal discharge current (I-n), short circuit current rating (SCCR), connection means including any required external overcurrent protection, enclosure ratings, outline and support point dimensions, weight, service condition requirements, and installed features.

1. SPDs with EMI/RFI filter: Include noise attenuation performance.

C. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Operation and Maintenance Data: Include information on status indicators and recommended maintenance procedures and intervals.

1.08 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.09 DELIVERY, STORAGE, AND PROTECTION

A. Store in a clean, dry space in accordance with manufacturer's written instructions.

1.10 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.11 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Manufacturer's Warranty: Provide minimum five year warranty covering repair or replacement of surge protective devices showing evidence of failure due to defective materials or workmanship.

C. Exclude surge protective devices from any clause limiting warranty responsibility for acts of nature, including lightning, stated elsewhere.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Field-Installed, Externally Mounted Surge Protective Devices:
   1. ABB/GE: www.geindustrial.com/#sle.
   2. Schneider Electric; Square D Brand Surgelogic Products: www.surgelogic.com.
   3. Same manufacturer as equipment being protected.

B. Factory-installed, Internally Mounted Surge Protective Devices:
   1. Same as manufacturer of equipment containing surge protective device, to provide complete listed assembly including SPD.

C. Substitutions: See Section 01 60 00 - Product Requirements.

D. Source Limitations: Provide surge protective devices produced by single manufacturer and obtained from single supplier.

2.02 SURGE PROTECTIVE DEVICES - GENERAL REQUIREMENTS

A. Description: Factory-assembled surge protective devices (SPDs) for 60 Hz service; listed, classified, and labeled as suitable for the purpose intended; system voltage as indicated on the drawings.

B. Unless otherwise indicated, provide field-installed, externally-mounted or factory-installed, internally-mouonted SPDs.

C. List and label as complying with UL 1449, Type 1 when connected on line side of service disconnect overcurrent device and Type 1 or 2 when connected on load side of service disconnect overcurrent device.

D. Protected Modes:
   1. Wye Systems: L-N, L-G, N-G, L-L.

E. UL 1449 Voltage Protection Ratings (VPRs):
   1. 208Y/120V System Voltage: Not more than 1,000 V for L-N, L-G, and N-G modes and 1,200 V for L-L mode.

F. UL 1449 Maximum Continuous Operating Voltage (MCOV): Not less than 115% of nominal system voltage.

G. Enclosure Environment Type per NEMA EN 10250: Unless otherwise indicated, as specified for the following installation locations:
   1. Indoor clean, dry locations: Type 1.
   2. Outdoor locations: Type 3R.

H. Mounting for Field-installed, Externally Mounted SPDs: Unless otherwise indicated, as specified for the following locations:
   1. Provide surface-mounted SPD where mounted in non-public areas or adjacent to surface-mounted equipment.
   2. Provide flush-mounted SPD where mounted in public areas or adjacent to flush-mounted equipment.

I. Equipment Containing Factory-installed, Internally Mounted SPDs: Listed and labeled as a complete assembly including SPD.
   1. Switchboards: See Section 26 24 13.
   2. Panelboards: See Section 26 24 16.

2.03 SURGE PROTECTIVE DEVICES FOR SERVICE ENTRANCE LOCATIONS

A. Surge Protective Device:
   1. Protection Circuits: Field-replaceable modular or non-modular.
   2. Surge Current Rating: Not less than 120 kA per mode/240 kA per phase.
   3. Repetitive Surge Current Capacity: Not less than 5,000 impulses.
   4. UL 1449 Nominal Discharge Current (I-n): 20 kA.
   5. UL 1449 Short Circuit Current Rating (SCCR): Not less than the available fault current at the installed location as indicated on the drawings.
   6. EMI/RFI Filtering: Provide EMI/RFI filter to attenuate electrical noise; listed as complying with UL 1283 for Type 2 SPDs (UL 1283 listing not available for Type 1 SPDs).
      a. Noise Attenuation: Not less than 40 dB at 100 kHz using MIL-STD-220 insertion loss test method.
   7. Diagnostics:
      a. Protection Status Monitoring: Provide indicator lights to report the protection for each phase.
      b. Alarm Notification: Provide indicator light and audible alarm to report alarm condition. Provide button to manually silence audible alarm.
      c. Remote Status Monitoring: Provide Form C dry type contacts (normally open and normally closed) for remote annunciation of status.
      d. Surge Counter: Provide surge event counter with manual reset button, surge count retention upon power loss, and six digit LCD display that indicates quantity of surge events.
   8. Provide surge rated integral disconnect switch for SPDs not connected to a dedicated circuit breaker or fused switch or not direct bus connected.

2.04 SURGE PROTECTIVE DEVICES FOR DISTRIBUTION LOCATIONS

A. Surge Protective Device:
   1. Protection Circuits: Field-replaceable modular or non-modular.
   2. Surge Current Rating: Not less than 80 kA per mode/160 kA per phase.

3. Repetitive Surge Current Capacity: Not less than 3,500 impulses.
4. UL 1449 Nominal Discharge Current (I-n): 20 kA.
5. UL 1449 Short Circuit Current Rating (SCCR): Not less than the available fault current at the installed location as indicated on the drawings.
6. EMI/RFI Filtering: Provide EMI/RFI filter to attenuate electrical noise; listed as complying with UL 1283 for Type 2 SPDs (UL 1283 listing not available for Type 1 SPDs).
   a. Noise Attenuation: Not less than 40 dB at 100 kHz using MIL-STD-220 insertion loss test method.
7. Diagnostics:
   a. Protection Status Monitoring: Provide indicator lights to report the protection status for each phase.
   b. Alarm Notification: Provide indicator light and audible alarm to report alarm condition. Provide button to manually silence audible alarm.
   c. Surge Counter: Provide surge event counter with manual reset button, surge count retention upon power loss, and six digit LCD display that indicates quantity of surge events.
8. Provide surge rated integral disconnect switch for SPDs not connected to a dedicated circuit breaker or fused switch or not direct bus connected.

2.05 SURGE PROTECTIVE DEVICES FOR BRANCH PANELBOARD LOCATIONS

A. Surge Protective Device:
   1. Protection Circuits: Field-replaceable modular or non-modular.
   2. Surge Current Rating: Not less than 60 kA per mode/120 kA per phase.
   3. Repetitive Surge Current Capacity: Not less than 2,000 impulses.
   4. UL 1449 Nominal Discharge Current (I-n): 20 kA.
   5. UL 1449 Short Circuit Current Rating (SCCR): Not less than the available fault current at the installed location as indicated on the drawings.
   6. EMI/RFI Filtering: Provide EMI/RFI filter to attenuate electrical noise; listed as complying with UL 1283 for Type 2 SPDs (UL 1283 listing not available for Type 1 SPDs).
      a. Noise Attenuation: Not less than 40 dB at 100 kHz using MIL-STD-220 insertion loss test method.
   7. Diagnostics:
      a. Protection Status Monitoring: Provide indicator lights to report the protection status for each phase.
      b. Alarm Notification: Provide indicator light and audible alarm to report alarm condition. Provide button to manually silence audible alarm.
      c. Surge Counter: Provide surge event counter with manual reset button, surge count retention upon power loss, and six digit LCD display that indicates quantity of surge events.
   8. Provide surge rated integral disconnect switch for SPDs not connected to a dedicated circuit breaker or fused switch or not direct bus connected.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that the service voltage and configuration marked on the SPD are consistent with the service voltage and configuration at the location to be installed.

C. Verify system grounding and bonding is in accordance with Section 26 05 26, including bonding of neutral and ground for service entrance and separately derived systems where applicable. Do not energize SPD until deficiencies have been corrected.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

C. Unless indicated otherwise, connect service entrance surge protective device on load side of service disconnect main overcurrent device.

D. Provide conductors with minimum ampacity as required by NFPA 70, as required by NFPA 70, and as required by NFPA 70.

E. Install conductors between SPD and equipment terminations as short and straight as possible, not exceeding manufacturer's recommended maximum conductor length. Breaker locations may be reasonably rearranged in order to provide leads as short and straight as possible. Twist conductors together to reduce inductance.

F. Do not energize SPD until bonding of neutral and ground for service entrance and separately derived systems is complete in accordance with Section 26 05 26 where applicable. Replace SPDs damaged by improper or missing neutral-ground bond.

G. Disconnect SPD prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPD connected.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - 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 7.19.1.

D. Procure services of a qualified manufacturer's representative to observe installation and assist in inspection, testing, and adjusting. Include manufacturer's reports with field quality control submittals.

3.04 CLEANING

A. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 26 51 00
INTERIOR LIGHTING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Interior luminaires.

B. Emergency lighting units.

C. Exit signs.

D. Ballasts and drivers.

E. Accessories.

1.03 RELATED REQUIREMENTS

A. Section 26 05 29 - Hangers and Supports for Electrical Systems.

B. Section 26 05 33.16 - Boxes for Electrical Systems.

C. Section 26 05 48 - Vibration and Seismic Controls for Electrical Systems.

D. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

E. Section 26 09 23 - Lighting Control Devices.
   1. Includes automatic controls for lighting including occupancy sensors.

F. Section 26 27 26 - Wiring Devices: Manual wall switches and wall dimmers.

1.04 REFERENCE STANDARDS

A. ANSI C78.379 - American National Standard for Electric Lamps -- Reflector Lamps -- Classification of Beam Patterns; 2006.

B. ANSI C82.1 - American National Standard for Lamp Ballast - Line Frequency Fluorescent Lamp Ballast; 2004.

C. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products; 2024.

D. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources; 2021.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

F. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; 2006.

G. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.

H. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; 2023.

I. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; 2023.

J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

K. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

L. UL 844 - Luminaires for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

M. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.

N. UL 1598 - Luminaires; Current Edition, Including All Revisions.

O. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
   2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
   3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
   4. Notify Architect Engineer of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings:
   1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
   2. Provide photometric calculations where luminaires are proposed for substitution upon request.

C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
   1. LED Luminaires:
      a. Include estimated useful life, calculated based on IES LM-80 test data.
   2. Lamps: Include rated life, color temperature, color rendering index (CRI), and initial and mean lumen output.

D. Certificates for Dimming Ballasts: Manufacturer's documentation of compatibility with dimming controls to be installed.

E. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.

G. Project Record Documents: Record actual connections and locations of luminaires and any associated remote components.

1.07 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.08 DELIVERY, STORAGE, AND PROTECTION

A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.

B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.09 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.10 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide 3-year manufacturer warranty for LED luminaires, including drivers.

C. Provide 5-year pro-rata warranty for batteries for emergency lighting units.

D. Provide 10-year pro-rata warranty for batteries for self-powered exit signs.

1.11 EXTRA MATERIALS

A. See Section 016000 - Product Requirements, for additional provisions.

B. Furnish two of each plastic lens type.

C. Furnish one replacement lamps for each lamp type.

D. Furnish two of each ballast type.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the drawings.

B. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 LUMINAIRES

A. Provide products that comply with requirements of NFPA 70.

B. Provide products that are listed and labeled as complying with UL 1598, where applicable.

C. Provide products that comply with requirements of NFPA 70 and NFPA 101.

D. Provide products listed, classified, and labeled as suitable for the purpose intended.

E. Provide products complying with Federal Energy Management Program (FEMP) requirements.

F. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

G. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.

H. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

I. Recessed Luminaires:
   1. Ceiling Compatibility: Comply with NEMA LE 4.
   2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.
   3. Luminaires Recessed in Sloped Ceilings: Provide suitable sloped ceiling adapters.

J. Hazardous (Classified) Location Luminaires: Listed and labeled as complying with UL 844 for the classification of the installed location.

K. LED Luminaires:
   1. Components: UL 8750 recognized or listed as applicable.
   2. Tested in accordance with IES LM-79 and IES LM-80.

3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

L. Luminaires Mounted in Continuous Rows: Provide quantity of units required for length indicated, with all accessories required for joining and aligning.

2.03 EMERGENCY LIGHTING UNITS

A. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.

B. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.

C. Battery:
1. Sealed maintenance-free lead calcium unless otherwise indicated.
2. Size battery to supply all connected lamps, including emergency remote heads where indicated.

D. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.

E. Provide low-voltage disconnect to prevent battery damage from deep discharge.

F. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101; provide indicator light(s) to report test and diagnostic status.

G. Accessories:
1. Provide compatible accessory mounting brackets where indicated or required to complete installation.
2. Provide compatible accessory high impact polycarbonate vandal shields where indicated.
3. Provide compatible accessory wire guards where indicated.
4. Where indicated, provide emergency remote heads that are compatible with the emergency lighting unit they are connected to and suitable for the installed location.

2.04 EXIT SIGNS

A. Description: Exit signs complying with NFPA 101 and applicable state and local codes, and listed and labeled as complying with UL 924.
1. Number of Faces: Single- or double-face as indicated or as required for installed location.
2. Directional Arrows: As indicated or as required for installed location.

B. Powered Exit Signs: Internally illuminated with LEDs unless otherwise indicated.
1. Self-Powered Exit Signs:
a. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
b. Battery: Sealed, maintenance-free, nickel cadmium unless otherwise indicated.
c. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
d. Provide low-voltage disconnect to prevent battery damage from deep discharge.
e. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101; provide indicator light(s) to report test and diagnostic status.

C. Accessories:
1. Provide compatible accessory high-impact polycarbonate vandal shields where indicated.

2. Provide compatible accessory wire guards where indicated.
3. Substitutions: See Section 016000 - Product Requirements.
4. Provide fixtures complying with NFPA 101.
5. Style: Translucent glass face with green letters on white background.
6. Housing: Extruded aluminum.
7. Lamps: LED.
8. Directional Arrows: Universal type for field adjustment.
9. Mounting: As indicated.
10. Battery: 6 volt, nickel-cadmium type, with 1.5 hour capacity.
11. Battery Charger: Dual-rate type, with sufficient capacity to recharge discharged battery to full charge within twelve hours.
12. Input Voltage: 120 volts.

2.05 BALLASTS AND DRIVERS

A. Ballasts/Drivers - General Requirements:
   1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
   2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
   3. Electronic Ballasts/Drivers: Inrush currents not exceeding peak currents specified in NEMA 410.

B. Dimmable LED Drivers:
   1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.
   2. Control Compatibility: Fully compatible with the dimming controls to be installed.

2.06 ACCESSORIES

A. Stems for Suspended Luminaires: Steel tubing, minimum 1/2" size, factory finished to match luminaire or field-painted as directed.

B. Threaded Rods for Suspended Luminaires: Zinc-plated steel, minimum 1/4" size, field-painted as directed.

C. Provide accessory plaster frames for luminaires recessed in plaster ceilings.

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 conductors in accordance with NFPA 70.

C. Verify that suitable support frames are installed where required.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.

E. 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. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of luminaires provided under this section.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install products in accordance with manufacturer's instructions.

D. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).

E. Provide required support and attachment in accordance with Section 26 05 29.

F. Provide required seismic controls in accordance with Section 26 05 48.

G. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

H. Suspended Ceiling Mounted Luminaires:
   1. Do not use ceiling tiles to bear weight of luminaires.
   2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
   3. Secure surface-mounted and recessed luminaires to ceiling support channels or framing members or to building structure.
   4. Secure pendant-mounted luminaires to building structure.
   5. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
   6. In addition to ceiling support wires, provide two galvanized steel safety wire(s), minimum 12 gauge, connected from opposing corners of each recessed luminaire to building structure.
   7. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.

I. Recessed Luminaires:
   1. Install trims tight to mounting surface with no visible light leakage.
   2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
   3. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.

J. Suspended Luminaires:
   1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
   2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
   3. Provide minimum of two supports for each luminaire equal to or exceeding 4 feet nominal length, with no more than 4 feet between supports.
   4. Install canopies tight to mounting surface.
   5. Unless otherwise indicated, support pendants from swivel hangers.

K. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.

L. Install fixtures securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting).

M. Install accessories furnished with each luminaire.

N. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within fixture; use flexible conduit.

O. Bond products and metal accessories to branch circuit equipment grounding conductor.

P. Emergency Lighting Units:
   1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.

Q. Exit Signs:

1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.

R. Remote Ballasts: Install in accessible location as indicated or as required to complete installation, using conductors per manufacturer's recommendations not exceeding manufacturer's recommended maximum conductor length to luminaire.

S. Identify luminaires connected to emergency power system in accordance with Section 26 05 53.

T. Install lamps in each luminaire.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect each product for damage and defects.

C. Perform field inspection in accordance with Section 014000.

D. Operate each luminaire after installation and connection to verify proper operation.

E. Test self-powered exit signs and emergency lighting units to verify proper operation upon loss of normal power supply.

F. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect Engineer.

3.05 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect Engineer. Secure locking fittings in place.

B. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Architect Engineer or authority having jurisdiction.

C. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect Engineer or authority having jurisdiction.

D. Aim and adjust fixtures as indicated.

E. Position exit sign directional arrows as indicated.

3.06 CLEANING

A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

B. Clean electrical parts to remove conductive and deleterious materials.

C. Remove dirt and debris from enclosures.

D. Clean finishes and touch up damage.

3.07 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

B. See Section 01 79 00 - Demonstration and Training, for additional requirements.

C. Demonstration: Demonstrate proper operation of luminaires to Architect Engineer, and correct deficiencies or make adjustments as directed.

D. Just prior to Substantial Completion, replace all lamps, ballasts, modules, drivers, etc that have failed..

3.08 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

END OF SECTION

SECTION 26 51 10
INTERIOR LIGHTING FIXTURES, LAMPS, & DRIVERS

PART 1 - GENERAL

1.01 SCOPE

A. All materials, components, and services necessary to provide a complete system indicated in this Section, as specified herein and shown on related Drawings, including:

1. Verification of dimensions and conditions at the job site to ensure proper fitting of the work.
2. Preparation and submission of complete fixture specification submittals and samples for approval prior to fabrication.
3. Shipment of equipment to the job site.
4. Installation and completion in accordance with these Specifications, related Drawings, the Equipment Manufacturer's recommendations, established trade criteria, and all applicable code requirements.
5. Focusing and adjustment of fixtures under the direction of Theatre Consultant.
6. Preparation and submission of complete record drawings.
7. Warranty coverage as required herein.
8. Delivery to Owner of spare lamps and equipment.

1.02 WORK INCLUDED

A. Lighting fixtures, accessories, and lamps, including spare lamps.

B. All materials, accessories, and equipment necessary for a complete lighting fixture installation shall be provided by the Contractor.

C. Integral and remote drivers and/or transformers as required.

The above is for reference only and is not intended to define the limits of the work for a complete installation.

1.03 RELATED WORK IN OTHER SECTIONS

A. General requirements for all electrical work

B. Electrical service

C. Wiring devices for electrical distribution

D. Supporting devices

E. Emergency and Exit Lighting

F. Stage Lighting Systems

G. Performance Audio Visual Systems

The above is for reference only and is not intended to define the limits of the work for a complete installation.

1.04 SUBMITTALS

A. <u>Pre-Bid.</u>

1. Substitutions.

a. Requests for fixture and lamp substitutions shall be made no less than ten (10) business days prior to bid due date. No requests for substitutions shall be considered

after this time. Requests for substitutions shall be submitted in accordance with the requirements of section 1.04.C.

b. Specified products are known to be available at the time of construction. Should the Contractor discover that any equipment may be unavailable, it is the Contractor's responsibility to notify the Architect not less than ten (10) business days prior to bid.

c. Proposed substitute Manufacturers shall have at least ten (10) years' experience in lighting fixture design and fabrication. If requested, the Manufacturer shall submit a representative list of at least 3 projects completed during the above period. Detailed drawings and photographs of the finished products shall be made part of the completed project reference list.

d. Owner Directed Changes. If the Owner directs the Contractor to submit alternate fixtures for the purpose of reducing the costs, substitutions shall meet or exceed the quality and capabilities of the specified equipment. Such requests for substitutions shall be submitted in accordance with the requirements of section 1.04.C.

e. If a proposed substitute fails to comply with the Specification requirements, the Contractor shall furnish the acceptable fixture at no additional cost to the Owner, and with no delay to the project.

B. With Bid.

1. All deviations and exceptions from this Specification must be revealed with bid. Deviations and exceptions from the Specification submitted after this time shall not be accepted, whether or not these variations have been formally or informally accepted by the Architect or Theatre Consultant.

2. Manufacturers' catalog numbers listed in the lighting fixture schedule are included to aid in fixture identification. These numbers are subject to periodic change by manufacturers and therefore need to be used in conjunction with the fixture descriptions. Incomplete or obsolete catalog numbers do not indemnify the Contractor from providing equipment as described in the lighting fixture schedule and in this Specification.

3. Fixture Lead Times. Many light fixtures require substantial lead times for delivery. It is the Contractor's responsibility to verify all fixture lead times and to notify the Architect within 2 weeks of contract award if any lead time will not allow them to meet the schedule for project completion.

C. Fixture submittal. The Contractor shall submit shop drawings to the Architect and the Theatre Consultant for review prior to fabrication. Shop drawings prepared solely by a Distributor or Contractor are unacceptable – some Manufacturers will not release orders for submittals they did not prepare. If the Theatre Consultant is required to review submittals prepared by a Distributor / Contractor, and is then required to re-review submittals for the same equipment prepared by a Manufacturer / Manufacturers Representative, the Contractor shall reimburse the Theatre Consultant, at their current hourly rates, for the duplicate time and expenses incurred.

D. Shop drawings shall contain, at a minimum, the following information:

1. Dimensions, components, weight, and finishes of all equipment and accessories.

2. Indication of fixture mounting conditions and trim type.

3. For continuous linear fixtures, including illuminated handrails, coves, neon and cold cathode, and hollow lightguide systems, submit detailed, dimensioned drawings that indicate lamp, fixture, and ballast/driver configurations, specifications, and locations within their architectural context. Drawings shall be to scale.

4. Complete information on the lamp and/or LED type to be used in each fixture, including manufacturer, current, voltage, wattage, envelope shape and size, envelope type

(clear/frosted), beam spread, rated life, correlated color temperature, color rendering index (CRI), color consistency, lumen output, and compatibility with fixtures.

5. Complete photometric performance data as reported by a certified testing laboratory including:
   a. Coefficient of utilization table.
   b. Candlepower data presented in tabular and graphical format.
   c. Zonal lumen summary.
   d. Luminance summary.

   For LED fixtures, provide absolute photometry.
6. Indication of lead time for delivery.
7. Indication by boxed caption of any and all variations from contract Drawings and Specifications, whether or not these variations have been formally or informally accepted by the Architect or Theatre Consultant.
8. Standard catalog cut sheets with insufficient information will not be accepted.
9. Submittals must be prepared by the Manufacturer and/or their local Representative. Submittals prepared by the Distributor or Contractor without the assistance of the Manufacturer and/or their local Representative will not be reviewed or accepted.
10. If requested by the Theatre Consultant, provide samples.

E. Pending Items. The Contractor shall submit a schedule of lead times for pending items such as color filters, patterns, etc.

F. Final submittal. As a condition for final approval, the Contractor shall submit to the Architect:
1. Five (5) sets of "As built and approved" drawings showing all systems and components as installed, including all field modifications.
2. “As built and approved” drawings shall include the following information:
   a. Lighting Fixture Schedule.
   b. Approved lighting fixture shop drawings, indicating specifications for all fixtures, lamps, ballasts/transformers, accessories, finishes, manufacturers, catalog numbers, wattages, voltages, and fixture locations.
   c. Manufacturer names and their contact information.
3. Certificates of warranty, as set forth below.

1.05 FINAL REVIEW

A. Upon completion of installation work, the Contractor shall certify in writing that the work is complete and ready for final review.

B. The final review shall be conducted by the Owner, Architect, and Theatre Consultant within fourteen (14) days of the Contractor's notice of completion.

1.06 GENERAL REQUIREMENTS

A. General Conditions of the project contract, work schedules, and site regulations apply to this work.

B. This work shall comply with applicable local codes and the NEC. Fixtures shall carry labels of a Nationally Recognized Testing Laboratory (NRTL), such as UL or ETL.

C. Warranty.

1. The Contractor shall unconditionally warrant all equipment and systems provided under this Section to be free from defects in materials and workmanship for a period of at least twelve (12) months from the date of final acceptance of all work of this Section. Replacement of faulty materials and the cost of labor required for the replacement shall be the responsibility of the Contractor. Lamps and normal wear and tear are exempted.

2. Warranty service shall be performed by personnel in the employ of the Contractor and shall not be sub-contracted or assigned to another company, service, or individual unless the Owner has approved such assignment in writing, in which event the Contractor shall nevertheless be responsible to the Owner for such work.

3. LED Fixtures.

a. Fixture Manufacturer shall provide a minimum 5-year warranty for all components.

b. Replacement components shall match all of the performance characteristics of the originally-installed fixtures and LEDs.

c. Replacement components shall be fully compatible with the original components.

D. State-of-the-art Assurance.

1. All products specified shall be the Manufacturer's most recent iteration and most recent product. No products shall be accepted if they have been discontinued or superseded at the time of shipment. Should the Manufacturer develop products of comparable function above and beyond the specification of the listed product, the Contractor shall notify the Architect and the Theatre Consultant of any developments to the specified products and shall note any change in the requirements of building infrastructure(s) to support the developments. The Architect and Theatre Consultant shall then determine whether upgraded products shall be accepted.

PART 2 - PRODUCTS

2.01 GENERAL

A. Refer to the Lighting Fixture Schedule in the Drawings for fixture and lamp specifications.

B. Verify ceiling type, ceiling thickness, fixture mounting conditions, clearances, and structural suspension system prior to the procurement of fixtures.

C. Provide sufficient clearance surrounding lighting fixtures to meet manufacturers' minimum recommendations and to ensure that fixture operating temperature remains within acceptable limits.

D. Provide mounting hardware as required for a complete installation.

E. Verify the ability to orient adjustable and directional fixtures as indicated on the drawings prior to the procurement of fixtures.

F. Notify the Architect immediately of any conflicts between the specified equipment and the actual mounting conditions.

G. Verify if any recessed fixtures require Plenum rating. Contractor shall notify the Architect prior to purchasing any fixture that may be in violation of any pertinent building codes, including Plenum requirements.

H. Materials shall be new and free from defects that in any manner may impair their character, appearance, strength, durability, and function. Materials shall be effectively protected from any damage from the time of fabrication until final acceptance of the work.

I. Provide light fixtures complete with lamps, ballasts/drivers/transformers, and accessories as required, as shown on the Drawings, in the Lighting Fixture Schedule, and as required by this Specification.

J. Fixtures shall carry labels of a Nationally Recognized Testing Laboratory (NRTL), such as UL or ETL. Such labels shall be permanently attached in a conspicuous location that does not affect fixture performance or aesthetics.

K. Unless otherwise noted, provide all fixtures that will be installed outside with wet label listings.

L. Fixtures shall carry labels identifying the Manufacturer name and contact information, model number, and serial number. Such labels shall be permanently attached in a conspicuous location that does not affect fixture performance or aesthetics.

M. Re-lamping labels. Manufacturer shall provide a special re-lamping label inside each lamp-based fixture. Labels shall meet the following criteria:

1. Locate labels in a highly visible area inside the housing, preferably adjacent to the socket. Manufacturer shall indicate in the fixture submittal where the label will be located in or on the fixture housing. Labels shall not be placed on the reflector, or in any other location where the performance may be affected.

2. Manufacture labels using high temperature label stock, and markings shall be made using high temperature ink to ensure the longevity of the markings. Manufacturer shall submit a sample of the label and markings for the review and approval of the Theatre Consultant prior to fabrication.

3. Indicate the project's fixture type designation and lamp manufacturer / specification on each label. Also include a blank space along the bottom of each label to allow for additional notes and/or corrections to be marked in the field. An example of a label is as follows:

FIXTURE TYPE SG
Philips CDM35/PAR20/M/SP/3K
(Blank space for hand-written marking in field)

N. For remote drivers, the Contractor shall verify the maximum allowable distance between the drivers and LED assemblies.

2.02 LAMPS

A. Acceptable manufacturers shall be as specified in the Lighting Fixture Schedule. Requests for lamp substitutions shall be in accordance with the “Submittals” section of this Specification.

B. Provide lamps that meet all of the specified characteristics such as type, base, envelope, wattage, manufacturer, color temperature, color rendering index, lamp life, L.C.L. (light center length), and M.O.L. (maximum overall length).

C. If multiple fixture types have the same lamp specified, all lamps shall be of the same manufacturer, unless noted otherwise in the Lighting Fixture Schedule.

D. Incandescent, tungsten (quartz) halogen, and LED retrofit lamps shall be 120V unless noted otherwise in the Lighting Fixture Schedule.

E. LED Retrofit Lamps.

1. LED retrofit lamps shall have:

a. Labels of a Nationally Recognized Testing Laboratory (NRTL), such as UL or ETL.

b. Correlated color temperature (CCT) as specified in the Lighting Fixture Schedule.

c. Color consistency of each specified fixture type shall be within 3 MacAdam ellipses or better, centered on the black body curve, through L70 and entire dimming range.

d. Minimum color rendering index (CRI) of 80 or as specified in the Lighting Fixture Schedule.

e. Rated life, typically L70, is defined as the point in time when the LED lumen output is 70% of the initial lumen output, as tested in accordance with IES LM-80. Minimum rated life at L70 (or greater, i.e. L80, L85, etc.) shall be:

1) A, MR, and R/BR/PAR LED lamps: 25,000 hours or greater

2) All other LED lamp types: 15,000 hours or greater

f. No power consumption in the “off” state.

g. Smooth, continuous dimming throughout the specified dimming range without flicker or “stepping”, if specified as dimmable.

h. No audible noise when energized at “full”, or when dimmed (if applicable). Meet or exceed sound class rating of A.

2. Confirm with manufacturers that LED retrofit lamps are compatible with fixtures and associated equipment.

3. LED retrofit lamps shall comply with the LED testing procedures outlined in “LED Fixtures” Section of this Specification.

4. Provide samples if requested by the Theatre Consultant.

5. Contractor shall purchase all specified lamps, including spare lamps, from the same batch to ensure consistent performance.

F. Provide spare lamps, including LED modules (where applicable), for all fixture types. Quantities shall be equal to not less than 10% of the fixture quantity of each type, but in no case less than two (2) lamps per fixture type. Deliver to Owner in clearly labeled cartons.

2.03 FIXTURES - GENERAL

A. Acceptable manufacturers shall be as specified in the Lighting Fixture Schedule. Requests for fixture substitutions shall be in accordance with section 1.04, “Submittals.”

B. Housings shall be so constructed that all electrical components are easily accessible and replaceable without removing fixtures from the mountings or disassembling adjacent construction.

C. Fixtures shall be completely wired at the factory.

D. Fixtures shall be designed to prevent light leaks from around lenses, trim rings and/or frames.

E. Castings shall be free of sand pits, blemishes, scales, and rust, and shall be smoothly finished. Tolerance shall be provided for any shrinkage of the metal castings so that the finished castings will accurately fit in their designated locations.

F. Welds shall be continuous unless specifically approved otherwise by Architect and Theatre Consultant. Welds shall be located and completed so as to present a smooth and unbroken appearance on visual examination of the fixture housing.

G. Incandescent fixtures shall be wired with heat resistant wire as required.

H. Final electrical connections for outdoor fixtures shall utilize silicone-filled wire nuts.

I. Recessed fixtures installed in inaccessible ceilings shall be NRTL listed for through wiring with the junction box accessible from the fixture opening.

J. Recessed fixtures shall be equipped with thermal protection devices.

K. Pendant hardware and method of construction shall ensure that fixtures are prevented from rotating from their correct orientation.

L. Mechanically adjustable lighting fixtures shall have reliable heavy-duty locking devices for tilt and rotation.

M. Fixtures that have lamps with oval-shaped beams shall contain locking devices to maintain lamp orientation during lamp replacement or fixture maintenance.

N. Louver, hood and lens devices shall be removable, but positively engaged to the fixture so that they will not drop away during fixture maintenance.

O. The Contractor shall provide the Fixture Manufacturer's concrete-pour housings for fixtures that are recessed in concrete. Housings shall be capable of being installed and wired prior to installing the fixtures. The Contractor shall provide temporary housing covers to protect the housings from moisture, dirt, bugs, etc. until the fixtures are installed.

2.04 OPTICAL SYSTEMS

A. Optical systems may use one or more of the following components:

1. Lenses
2. Reflectors
3. Louvers
4. Hoods / snoots

B. Optical systems shall:

1. Produce a smooth distribution of light, absent of striations, color separation, or other aberrations
2. Not alter the color of the light source
3. Be UV stable
4. Be positively retained within the fixture
5. Be resistant to vibration
6. Produce cutoff angles as specified
7. Interchangeable in the field (where specified)
8. Not reduce the rated life of the light source due to heat or other factors

C. For fixtures that require the optical system to be removed to accommodate the fixture installation, the optical system design shall ensure it can only be re-installed in the correct orientation and position.

2.05 OPTICAL ACCESSORIES (LENSES, PATTERNS, AND FILTERS)

A. If patterns, lenses, and/or filters are broken, wrinkled, or damaged in any way during delivery and/or construction, replacement patterns, lenses, and/or filters shall be provided at no additional cost to the Owner.

B. Provide spare lenses and filters for all lens and filter types and colors. Quantities shall be equal to not less than 10% of the lens / filter quantity of each type, but in no case less than two (2) lenses / filters per type. Deliver to Owner in clearly labeled cartons.

C. Refer to the Lighting Fixture Schedule for filter and pattern specifications.

2.06 LED (LIGHTING EMITTING DIODE) FIXTURES

A. LED fixtures may be configured in one of several ways:

1. Fixtures that utilize field-replaceable LEDs
2. Fixtures that do not utilize field-replaceable LEDs
3. Fixtures that utilize LED retrofit lamps (refer to “Lamps” section of this Specification for additional information)

B. An LED fixture may include the following components:

1. LED
2. Thermal Management System
3. Optical System
4. Driver and/or Power Supply
5. Connectors
6. Control Interface

C. LEDs and fixture components shall be listed by a Nationally Recognized Testing Laboratory (NRTL) such as UL or ETL.

D. LEDs.

1. White light LEDs.
    a. White LED fixtures shall utilize one of the following systems:
        1) Chip-on-board – phosphor is applied directly to LED chip(s)
        2) Remote phosphor – air gap between LED chip(s) and phosphor
    b. Static White LEDs.
        1) Static white LEDs have a fixed correlated color temperature regardless of output.
        2) Correlated color temperature (CCT) as specified in the Lighting Fixture Schedule. Specified CCT shall indicate delivered light from fixture, including any CCT shifting from LED coatings, lenses, etc.
        3) Color consistency of each specified fixture type shall be within 3 MacAdam ellipses or better, centered on the black body curve, through L70 and entire dimming range.
        4) Color rendering index (CRI) greater than or equal to 80 through L70, or as specified in the Lighting Fixture Schedule.
    c. Tunable White LEDs.
        1) Types.
            a) Dynamic white. Correlated color temperature can be adjusted anywhere along the Planckian locus within the specified range, independent of the output.
            b) Dim to warm. Correlated color temperature becomes lower/warmer as output is reduced to simulate the look of halogen dimming.
        2) Correlated color temperature (CCT) range as specified in the Lighting Fixture Schedule. Specified CCT shall indicate delivered light from fixture, including any CCT shifting from LED coatings, lenses, etc.

3) Color consistency of each specified fixture type shall be within 3 MacAdam ellipses or better, centered on the black body curve, through L70 and entire CCT and dimming range.

4) Color rendering index (CRI) greater than or equal to 80 through the entire specified CCT range and L70, or as specified in the Lighting Fixture Schedule.

d. Fixture manufacturer shall keep a record of the LED chip manufacturer, bin, production date, CCT, lumen output, mA rating, power consumption, and LM-80 data for all products they provide to help ensure that future replacements are consistent with the original LEDs used.

2. Colored Light LEDs.

a. Static Color LEDs.

1) Static color LEDs shall have fixed color regardless of output.

2) Color / dominant wavelength (nm) as specified in the Lighting Fixture Schedule. Specified LED colors shall indicate delivered light from fixture, including any color / dominant wavelength shifting from LED coatings, lenses, etc.

3) Color consistency of each specified fixture type shall be within 3 MacAdam ellipses or better, through L70 and entire dimming range.

b. Color-Changing LEDs.

1) Color-changing LEDs shall use various static color LEDs that are dimmed and mixed together to create a dynamic range of colored light.

2) Configurations:

a) RGB – red, green, and blue LEDs

b) RGBW – red, green, blue, and white LEDs

c) RGBA – red, green, blue, and amber LEDs

d) RGBWA – red, green, blue, white, and amber LEDs

e) Other LED combinations as specified in the Lighting Fixture Schedule

3) White LEDs in color-changing systems shall meet the requirements of the “White Lights LEDs” section above.

3. Construct fixtures so as to allow the LEDs to be easily accessed and replaced without being removed from the mountings or disassembling adjacent construction.

4. For fixtures with replaceable components, Manufacturer shall offer replacement LED components that match all of the characteristics of the components being replaced. Replacement components shall not void the fixture NRTL listing.

5. For fixtures without replaceable components, Manufacturer shall offer replacement LED fixture that matches all of the characteristics of the fixture being replaced.

E. LED Thermal Management Systems.

1. Fixture and remote devices, if any, shall not exceed component manufacturer’s recommended maximum operating temperatures.

2. Confirm that specified orientation of fixture and mounting methods are approved by the fixture Manufacturer.

3. Provide supplemental thermal management devices / accessories as recommended by manufacturer.

4. Fixture manufacturer shall confirm that specified accessories and finishes do not compromise thermal management.
5. Fixtures shall not rely upon powered, mechanical components, such as fans or SynJet devices, for cooling. Fixtures shall utilize passive cooling methods. Do not substitute specified passive cooling products with active cooling products.
6. Cooling devices shall have a sound class rating of A.

F. LED Optical Systems.

1. Refer to the “Optical Systems” section of this Specification for additional information.

G. LED Drivers and/or Power Supplies.

1. The Driver and Power Supply may be separate components or combined within a single enclosure.
2. The Driver and Power Supply shall manage the power and control the current flow to LEDs.
3. Performance Requirements:
   a. Power output of the Driver and/or Power Supply shall operate LEDs within the specifications provided by the LED chip manufacturer:
      1) AC or DC current to LEDs as required.
      2) Line voltage or low voltage to LEDs as required.
      3) Constant current or constant voltage to LEDs as required
   b. Operate from a 60Hz source of 120 or 277 volts as specified in the Electrical Drawings.
   c. Minimum input power factor of 90%.
   d. Maximum total harmonic distortion (THD) of 20%.
   e. Minimum efficiency of 70% at full rated load of the driver.
   f. Short circuit and overload protection.
   g. Maximum inrush current shall not exceed values established by NEMA standard 410.
   h. Minimum starting temperature of 32°F / 0°C for indoor applications, and -4°F / -20°C for outdoor applications.
   i. Meet or exceed a sound class rating of A.
   j. Comply with the requirements of the Federal Communications Commission (FCC) rules and regulations.
4. Dimming Requirements:
   a. Meet or exceed the dimming range specified in the Lighting Fixture Schedule.
   b. Dim LEDs smoothly and continuously throughout the specified dimming range without flicker or “stepping.”
      1) Minimum frequency of 60 Hz
      2) Maximum modulation percentage of 0.08 multiplied by the frequency

c. Drivers and/or Power Supplies shall be controlled using one of the following control protocols:
   1) Line voltage dimming:
      a) Two-wire forward phase
      b) Two-wire reverse phase
      c) Three-wire forward phase
   2) 0-10V
   3) DMX
   4) DALI
   5) Wireless

d. Drivers and/or Power Supplies shall dim LEDs using one of the following methods:
   1) Pulse width modulation (PWM)
   2) Constant current reduction
   3) Constant amperage reduction
   4) Hybrid

e. Allow the light output to be maintained at the lowest control setting (prior to off) without dropping out.

f. Refer to Specification Sections 26 0933 and 26 0961 for additional information regarding control requirements.

5. Mounting.
   a. Integral to fixture.
      1) Driver shall be installed within or attached to housing by the fixture Manufacturer.
      2) Manufacturer shall ensure that driver has sufficient heat dissipation.
      3) Driver shall be accessible and removable without the use of tools.
      4) Driver shall be field-replaceable without voiding NRTL listing.
   b. Remote from fixture.
      1) Driver shall be installed where located in the Drawings. Install in accessible locations with sufficient heat dissipation.
      2) Do not exceed manufacturer's maximum recommended distance between the LED and driver.
      3) Provide plenum rated enclosure where required.
      4) Provide wet-listed enclosure where required.

H. LED Interconnected Fixtures.
   1. Applies to LED systems where multiple fixtures or segments are daisy-chained together in the field (cove uplights, task lights, tape light, etc.).
   2. Fixtures or segments shall be mounted side-by-side for a consistent LED diode pitch (spacing).
   3. Provide manufacturer's recommended gap between fixtures to accommodate thermal expansion and accessory installation.

4. Cables shall:
    a. Have NRTL listing that is clearly marked on the cable
    b. Have plenum rating, where required
    c. Have NRTL and/or IP rating that matches fixture rating, where applicable
    d. Leader cables:
        1) Located at the start of a fixture run to connect fixtures back to power supply and/or power source.
        2) Where required, provide an approved wiring compartment in lieu of a leader cable.
    e. Interconnecting cables:
        1) Located in-between fixtures or segments within a single run.
        2) Where required, provide fixtures with permanently-attached cables or conduit connections.
    f. Be installed within conduit, where required
    g. Be secured to the mounting surface and concealed from view
    h. Be provided and assembled by fixture manufacturer
    i. Comply with applicable codes
    j. Finish per Architect
5. Connectors shall:
    a. Have NRTL listing that is clearly marked on the connector
    b. Have plenum rating, where required
    c. Have NRTL and/or IP rating that matches fixture rating, where applicable
    d. Have locking-type assembly, when available
    e. Be provided and assembled by fixture manufacturer. Connectors shall not be soldered on-site
    f. Comply with applicable codes
    g. Finish per Architect

I. LED Control Interfaces.

1. LED Control Interfaces convert control protocols so that the lighting control system and LED drivers can communicate with one another.
2. Utilize one of the following protocols:
    a. 0-10V
    b. DMX
    c. DALI
    d. Wireless

    Coordinate with the lighting control system manufacturer to ensure that fixtures and controls are compatible.
3. LED Control Interfaces may communicate with individual or multiple fixtures.

4. Mounting.
    a. Integral to fixture.
        1) Interface shall be installed within or attached to housing by the fixture Manufacturer.
        2) Manufacturer shall ensure that interface has sufficient heat dissipation.
        3) Interface shall be accessible and removable without the use of tools.
    b. Remote from fixture.
        1) Interface shall be installed where located in the Drawings. Install in accessible locations that provide sufficient heat dissipation.
        2) Do not exceed manufacturer's maximum recommended distance between the LED and interface.
        3) Provide plenum and/or wet-listed enclosures where required.

J. LED End-of-Life.
1. LED fixtures shall have a minimum rated life of 50,000 hours at L70, L80, or greater. L70 is the point in time when the LED output is 70% of the initial lumen output, as tested in accordance with IES LM-80.
2. System shall automatically notify occupants when LEDs reach their rated life (L70) through one of the following methods:
    a. Timer function within fixture driver:
        1) Driver sends a signal to the lighting control system.
        2) Contrasting color indicator turns on within fixture and remains on until the LED has been replaced.
    b. Timer function within lighting control system:
        1) Lighting Control System notifies user that LEDs need to be replaced.

K. LED Manufacturers.
1. The following LED manufacturers shall be acceptable assuming they are capable of meeting or exceeding the specifications in this Section and the Lighting Fixture Schedule:
    a. Bridgelux
    b. Citizen
    c. Cree
    d. General Electric
    e. Lumenetix
    f. Lumileds
    g. Nichia
    h. Osram Sylvania
    i. Philips
    j. Samsung
    k. Soraa
    l. Toshiba

m. Xicato

Other manufacturers may be considered with the prior review of the Theatre Consultant. Manufacturers seeking review must contact the Theatre Consultant no later than ten (10) days prior to bid date.

2. The following LED Driver and/or Power Supply manufacturers shall be acceptable assuming they are capable of meeting or exceeding the specifications in this Section and the Lighting Fixture Schedule:

   a. EldoLED

   b. General Electric

   c. Lutron

   d. Osram Sylvania

   e. Philips Advance

   Other manufacturers may be considered with the prior review of the Theatre Consultant. Manufacturers seeking review must contact the Theatre Consultant no later than ten (10) days prior to bid date.

L. LED Testing.

1. Fixtures and components shall be manufactured and tested based on Approved Methods as stated in the following standards:

   a. IES LM-79 - “Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products.”

   b. IES LM-80 – “Approved Method for Measuring Lumen Maintenance of LED Light Sources.”

   c. IES TM-21 – “Lumen Depreciation Lifetime Estimation Method for LED Light Sources.”

2. Manufacturers shall provide this testing data if requested by the Theatre Consultant.

2.07 ELECTRICAL COMPONENTS

A. Electrical components shall carry labels of a Nationally Recognized Testing Laboratory (NRTL), such as UL or ETL., shall be of substantial construction, and shall meet or exceed industry standards and trade practices.

B. Lampholders shall be suitable for outdoor applications when properly enclosed in a fixture that is NRTL listed for wet location.

C. Lead wires and lampholders shall have a minimum temperature rating of 200°C. Lead wires shall be rated at or above the lampholder rating.

D. Incandescent lampholders.

1. Lampholders shall be porcelain body with heavy-duty nickel-plated brass contacts.

2. Lampholders for low voltage lamps shall be ceramic, metal, or thermoplastic.

E. Internal Fixture Wiring.

1. Wiring methods shall meet or exceed the requirements as established by NEC and approved standards organizations.

2. Wiring shall maintain earth ground to all components. Conductors shall not be smaller than 18-gauge.

3. Electrical connection shall be through mounting brackets as shown in the Drawings.
4. Normal and Emergency conductors and all associated electrical components shall be isolated from each other when housed in the same fixture.
5. Fixtures that are wired with Normal and Emergency power shall be fed separately. Manufacturer shall keep all wiring and associated electrical components in separate compartments and raceways. Compartments shall be separated with a barrier as recommended by the Manufacturer.
6. Fixture voltage(s) per the specifications in the Electrical Drawings.
7. Circuiting as shown in the Drawings. All circuits shall be 2-wire, with no common neutrals. For fixtures with multiple circuits, Manufacturer shall clearly label conductors with circuit numbers.
8. Lead wires shall be provided 12 in. in length beyond fixture entry point.

2.08 TRANSFORMERS

A. Transformers shall carry labels of a Nationally Recognized Testing Laboratory (NRTL), such as UL or ETL. Such labels shall be permanently attached in a conspicuous location that does not affect performance or aesthetics.

B. Transformers shall have a sound rating of Class A (maximum of 24 dB) and shall maintain their sound rating for the full range of dimming.

C. Transformer secondary wiring shall adhere to NEC Article 411 and shall be sized to provide recommended operating voltage at every lamp.

D. Transformers shall have integral thermal breakers for safety and longer life. Thermal breakers shall be UL-listed bimetallic switches capable of automatic reset.

E. Transformers shall have integral magnetic circuit breakers to protect against overload and short circuit conditions.

F. Electronic transformers.

1. Transformer shall operate lamp at rated secondary voltage +/- 2.5%, regardless of primary voltage.
2. Transformers shall comply with Part 15 of the FCC Rules (Radio Frequency Devices) as stated in Title 47 of the Code of Federal Regulations.
3. Transformer shall have integral protection against overloads and short circuits, and shall be capable of automatic reset.

G. Electromagnetic transformers.

1. Transformer shall operate lamp at rated secondary voltage +/- 2.5% at 115 volts primary input.
2. Transformer shall have integral thermal protector for safety and longer life
3. Transformer shall have dual-tap feature to provide proper operating voltage for dimmed or undimmed loads.
4. For fixtures requiring remote transformers, transformers shall have 5 taps on the secondary. All secondary taps shall have magnetic circuit breakers, which shall be sized in accordance with NEC Article 411 and all applicable local codes.
5. For fixtures requiring remote transformers, provide multi-tap transformers that provide secondary taps at 1-volt intervals. The highest voltage tap shall provide 25% higher

secondary voltage than the recommended lamp voltage for the source farthest away from the transformer.

H. Provide dimmers that are compatible with transformer types.

I. Transformer enclosures shall be designed to allow transformers to operate within their operating temperature range as recommended by the transformer manufacturer.

J. Remote transformer enclosures shall be plenum rated and/or wet listed, where required.

K. Integral transformers shall be located and mounted to prevent the transfer of vibration to the fixture body and supporting structure.

L. Remote transformers shall be located and mounted with acoustic dampeners if necessary to prevent the transfer of vibration to the supporting structure.

M. Remote transformer locations are as shown in the Drawings. Transformers shall be in accessible, ventilated locations.

2.09 MOUNTING HARDWARE

A. Structural Channels (Unistrut).

1. Unistrut shall be manufactured by Unistrut Corporation of Itasca, Illinois.
2. Unistrut and unistrut mounting hardware shall meet all applicable ASTM specifications.
3. Unistrut shall be 12 gauge steel (unless noted otherwise in the Drawings or Lighting Fixture Schedule, or as determined by the Contractor).
4. For harsh environments, unistrut shall be “hot dipped galvanized” 12 gauge steel (unless noted otherwise in the Drawings or Lighting Fixture Schedule, or as determined by the Contractor).
5. Determine the unistrut loading to verify the appropriate gauge steel, channel series, and configuration.
6. Unistrut shall be surface and/or pendant mounted as specified in the Drawings. Verify the appropriate means of support and spacing to accommodate the overall load. Confirm with the Architect and Theatre Consultant prior to installation.
7. In order for fixtures to retain their full range of motion, fixture yokes shall be bolted to the unistrut with one bolt through the center hole of the yoke.
8. Fixture shall be provided with the following mounting hardware, sized as appropriate to the unistrut configuration:
    a. Channel nut with springs
    b. Bolt
    c. Square flat plate fitting
    d. Washer
9. Visible surfaces of the unistrut and mounting hardware shall be field painted as specified. Mask the interior of the unistrut to ensure that no paint gets inside. Paint color as specified as Architect.
10. Provide and install all unistrut and unistrut mounting equipment required for a complete, code compliant installation.
11. Provide lengths and quantities as per Drawings and/or Lighting Fixture Schedule.

2.10 MOUNTING SYSTEMS

A. The following requirements refer to canopies, mounting plates, mounting arms, stems, chains, cables, and associated hardware required to support the fixtures.

B. Manufacturer shall provide all required mounting system components as part of the work of this Section, including fasteners, safety cables, anchors, etc.

C. Mounting system components and associated hardware shall be designed and fabricated to support entire weight of fixture and components.

D. Suspension mechanisms shall be designed and engineered by the Manufacturer to assure that the fixture remains level and in balance.

E. If indicated in the Drawings, Manufacturer shall coordinate suspension mechanism with the specified winch system.

F. Safety cables shall be concealed within fixture stems.

G. Chains shall be designed to prevent spinning of fixture and maintain fixture orientation.

H. Suspension and safety cables shall be selected using a minimum safety factor of 3:1.

I. Suspension chains shall be welded link and shall be selected using a minimum safety factor of 3:1.

J. Wherever possible, Manufacturer shall minimize the appearance of exposed fasteners.

K. Finish(es) per Architect.

2.11 ENCLOSURES

A. Enclosures shall be categorized as follows:

1. Fixture Enclosures. Enclosures shall be designed and fabricated to house and protect fixtures that are rated for dry or damp location use.

2. Ballast / Driver / Transformer Enclosures. Enclosures shall be designed and fabricated to house and protect ballasts/drivers/transformers that are rated for dry or damp location use.

B. Enclosures shall be completely sealed and rated for outdoor use.

C. Enclosures shall be rated NEMA Type 3 or higher.

D. Enclosure finish(es) shall be as specified in the Lighting Fixture Schedule.

E. Enclosure locations and mounting orientations shall be as specified in the Drawings.

F. Electrical feed locations shall be properly sealed to prevent moisture from entering the enclosures.

G. Enclosures and hardware shall be made of UV-stabilized materials that are resistant to corrosion.

H. Enclosures and hardware shall be designed for long-term, permanent exterior installations.

I. Fixture Enclosures.

1. Enclosures shall be designed for use with the specified lighting fixture. Enclosures shall be approved by fixture Manufacturer for use with the specified lighting fixture.

2. Enclosures shall be designed to allow sufficient air circulation around fixture for heat dissipation. Enclosure shall include integral fan, if required, to maintain fixture's recommended maximum operating temperature.

3. Enclosures shall allow for easy access to the fixture for re-lamping and maintenance without disturbing the aim and focus of the fixture.

4. Enclosures shall not obstruct the lighting distribution of the specified lighting fixture.
5. Enclosures shall be designed to prevent light leaks.
6. Enclosures shall be capable of accommodating accessories specified in the Lighting Fixture Schedule.
7. Adjustable enclosures shall have reliable heavy-duty locking devices for tilt and rotation.

J. Ballast / Driver / Transformer Enclosures.

1. Enclosures shall be designed for use with the specified ballast / driver / transformer. Enclosures shall be approved by ballast /driver / transformer Manufacturer for use with the specified product.
2. Enclosures shall be designed to allow for proper heat dissipation from ballast /driver / transformer.
3. Enclosures shall allow for easy access to the ballast / driver / transformer for maintenance.

PART 3 - EXECUTION

3.01 FABRICATION

A. Operating elements shall be mechanically safe and electrically "dead."

B. Internal wiring shall be factory completed. All wiring shall be in harnesses and bound. No loose or randomly routed wires shall be permitted.

C. Wire sizes and insulations shall comply with NEC, UL, and local codes and meet or exceed electronics industry standards.

3.02 PACKING AND SHIPPING

A. Equipment shall be wrapped, sealed, and substantially crated for shipment. Crates shall clearly indicate equipment contained.

B. Deliver and store materials in Manufacturer’s original packaging labeled to show project name, project fixture type, Manufacturer name, and model number.

C. Store materials in protected, dry, elevated location and in accordance with Manufacturer’s instructions. Do not open packaging or remove labels until time for installation.

3.03 INSTALLATION

A. Install items in conformity with standard trade practices and Manufacturer's recommendations. Position all items accurately as indicated in the Drawings, and true to plumb line and level. Maintain maximum headroom and clearance at all points.

B. Consult and coordinate work with trades doing adjoining work.

C. Mount all fixtures so as to maintain the fixtures' full range of motion.

D. Where noted on the drawings, the exact location of fixtures shall be confirmed in the field with the consultation of the Lighting Designer and the Architect prior to installation.

E. Many fixture locations are determined to provide maximum performance and accessibility for maintenance. When field conditions require fixtures to be relocated, it is the Contractor’s responsibility to notify the Architect and Theatre Consultant prior to installation.

F. Align continuous linear fixtures with one another to ensure precise alignment and consistent appearance.

G. Support surface-mounted fixtures directly from the building structure.

H. Ballasted fixtures shall not be energized prior to installing the lamps.

I. Install the specified lamps prior to the focusing sessions and project completion, and in accordance with the specific lamp requirements stated below.

1. Tubular tungsten (quartz) halogen and T-6/T-4 single or double ended metal halide lamps shall be handled and installed using gloves and/or protective sleeves in order to avoid direct contact with bare skin.

J. Provide temporary lighting, power, and wiring for the performance of all trades, for the entire period of construction, and remove all temporary wiring at the completion of construction. Fixtures that are part of the work of this Section shall not be utilized for job site illumination during construction. All lamps shall be substantially new upon completion.

K. Protect lighting equipment from paint, dirt, and debris during construction.

L. Installation and care of LED fixtures:

1. LED components (such as LED boards, heat sinks, active cooling devices, drivers, etc.) are particularly susceptible to permanent degradation and/or damage from debris and dust.

2. LED components that are not sealed or enclosed by a lens shall be installed only after all dust-generating activities and preliminary cleaning have been completed.

3. Failure to properly protect LED components from construction dust and debris could void the Manufacturer's warranty.

4. Contractor shall replace any LED components and/or fixtures damaged by construction dust and debris at their cost.

M. Upon completion of the Work, fixtures shall be cleaned and be free of fingerprints, dust, or any debris. Refer to Manufacturer's instructions for proper cleaning methods and materials.

3.04 SYSTEMS INTEGRATION

A. Coordinate addressing of DMX-controlled light fixtures provided under this Section with Section 11 61 63 Contractor.

B. Section 11 61 63 Contractor shall provide Division 26 contractor a list of DMX address numbers prior to installation of fixtures.

C. Prior to Lighting Control System commissioning, Section 11 61 63 Contractor shall patch all DMX controlled fixtures and test to ensure proper functionality.

3.05 FIXTURE FOCUSING AND ADJUSTMENT

A. Notify the Architect and Theatre Consultant at least 10 business days in advance of the project completion date in order to schedule the fixture focusing sessions.

B. The final focusing, aiming, and adjustment of fixtures in this Section shall be supervised by the Theatre Consultant.

C. The Contractor shall coordinate with the other trades and the Owner to ensure that fixtures specified by the Theatre Consultant are accessible.

D. The Contractor shall coordinate with the other trades and the Owner to ensure that focusing sessions are scheduled during times when all of the light fixtures can be turned off / on during the entire duration of the sessions. Individual circuits shall have the ability to be turned on / off independently of the other lighting circuits.

E. The Contractor shall provide means of accessing all lighting fixtures such as ladders, lifts, and scaffolding; such means of access shall not obstruct the line of sight between any fixture and its intended aiming point. Provide two (2) means of access for each fixture mounting height in order to have two focusing teams working at the same time.

F. The Contractor shall provide a crew of two (2) persons, including the job supervisor, for up to two (2) evening focusing sessions of six (6) hours each. Exterior focusing sessions cannot take place during inclement weather. Contractor shall plan for rain dates as required.

G. The Contractor shall, at the consultant's current hourly rates, reimburse the Theatre Consultant for all time and expenses incurred for any additional focusing sessions that are required due to:

1. Incomplete or incorrect installation.
2. Insufficient crew.
3. Lack of access to all fixtures.
4. Missing or malfunctioning lifts, ladders, and/or scaffolding for accessing fixtures.
5. Insufficient or incorrect tools to open, adjust, and lock fixtures.
6. Missing, malfunctioning, or incorrect fixtures.
7. Malfunctioning, or incorrect ballasts / drivers / transformers.
8. Missing or incorrect fixture accessories.
9. Missing, malfunctioning, or incorrect lamps. (Note: lamps must be exactly as specified, including characteristics such as color temperature, beam spread, wattage, voltage, etc.).
10. Equipment and/or obstructions between a fixture and its intended aiming point.
11. Lack of spare lamps.
12. Incomplete or unfinished walls, ceilings, or other architectural elements.
13. Missing or incomplete exhibits, artwork, furnishings, room finishes, and/or other objects that are to be illuminated.

H. If any fixtures are moved out of adjustment or position after they have been focused, the Theatre Consultant shall be reimbursed, at their current hourly rates, for all time and expenses incurred for any additional focusing sessions that are required.

END OF SECTION

SECTION 27 05 29
HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other communications work.

1.02 RELATED REQUIREMENTS

A. Section 27 05 33.13 - Conduit for Communications Systems: Additional support and attachment requirements for conduits.

B. Section 27 10 00 - Structured Cabling.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.

D. BICSI ITSIMM - Information Technology Systems Installation Methods Manual (ITSIMM), 8th Edition; 2022.

E. BICSI N1 - Installation Practices for Telecommunications and ICT Cabling and Related Cabling Infrastructure, 1st Edition; 2019.

F. MFMA-4 - Metal Framing Standards Publication; 2004.

G. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. TIA-569 - Telecommunications Pathways and Spaces; 2019e, with Addendum (2022).

J. UL 5B - Strut-Type Channel Raceways and Fittings; Current Edition, Including All Revisions.

K. UL 2043 - Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces; Current Edition, Including All Revisions.

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 Engineer of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cable supports, channel/strut framing systems, nonpenetrating rooftop supports, and post-installed concrete/masonry anchors.

1.06 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. TIA-569.
      b. NFPA 70.
      c. Applicable building code.
      d. Requirements of authorities having jurisdiction.
   2. Provide required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for complete installation of communications work.
   3. Provide products listed, classified, and labeled as suitable for purpose intended, where applicable.
   4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for load to be supported with minimum safety factor of 1.5. Include consideration for vibration, equipment operation, and shock loads where applicable.
   5. Do not use products for applications other than as permitted by NFPA 70 and product listing.
   6. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
   7. Steel Components: Use corrosion-resistant materials suitable for environment where installed.
      a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
      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. Materials for Metal Fabricated Supports: See Section 05 50 00.

C. Conduit Supports: Straps and clamps suitable for conduit to be supported.
   1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
   2. Conduit Clamps: Bolted type unless otherwise indicated.

D. Cable Supports: Suitable for cables to be supported, including but not limited to J-hooks, bridle rings, drive rings, and flexible harnesses/slings.
   1. Applications:
      a. Do not exceed 4 feet between cable supports.
      b. Maximum Number of Cables per Cable Support:
         1) J-Hooks: 50, regardless of capacity.
      c. Allowable Cable Types:
         1) J-Hooks: Category 3, Category 5e, and Category 6.
   2. Comply with TIA-569.
   3. Cable Supports Installed in Spaces Used for Environmental Air: Plenum rated; listed and labeled as complying with UL 2043, suitable for use in air-handling spaces.
   4. J-Hooks: Noncontinuous cabling support with removable top retainer clip.
      a. Material: Use galvanized steel, factory-painted steel, or stainless steel.
      b. Provide support surfaces with smooth, beveled edges and radius not less than minimum allowable bend radius of cables supported.

c. Provide multitiered J-hooks where required to support multiple cabling systems.
d. Color coding to be visible from below after installation.

E. Outlet Box Supports: Hangers and brackets suitable for boxes to be supported.

F. 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/Strut Used as Raceway, Where Indicated: Listed and labeled as complying with UL 5B.
4. 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.
5. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch.
6. Minimum Channel Dimensions: 1-5/8 inch wide by 13/16 inch high.

G. Hanger Rods: Threaded, zinc-plated steel unless otherwise indicated.
1. Minimum Size, Unless Otherwise Indicated or Required:
a. Equipment Supports: 1/2-inch diameter.
b. Single Conduit up to 1-inch (27 mm) Trade Size: 1/4-inch diameter.
c. Single Conduit Larger than 1-inch (27 mm) Trade Size: 3/8-inch diameter.
d. Trapeze Support for Multiple Conduits: 3/8-inch diameter.
e. Outlet Boxes: 1/4-inch diameter.

H. Anchors and Fasteners:
1. Unless otherwise indicated and where not otherwise restricted, use anchor and fastener types indicated for specified applications.
2. Concrete: Use expansion anchors or screw anchors.
3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
4. Hollow Masonry: Use toggle bolts.
5. Hollow Stud Walls: Use toggle bolts.
6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
7. Sheet Metal: Use sheet metal screws.
8. Wood: Use wood screws.
9. Plastic and lead anchors are not permitted.
10. Powder-actuated fasteners are not permitted.
11. Hammer-driven anchors and fasteners are not permitted.
12. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.

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, BICSI ITSIMM, and BICSI N1.

C. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

D. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

E. Unless specifically indicated or approved by Architect Engineer, do not provide support from suspended ceiling support system or ceiling grid.

F. Unless specifically indicated or approved by Architect Engineer, do not provide support from roof deck.

G. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

H. Provide required seismic controls.

I. 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.

J. Secure fasteners in accordance with manufacturer's recommended torque settings.

K. Remove temporary supports.

L. Identify independent communications component support wires above accessible ceilings, where permitted, with color distinguishable from other support wires in accordance with NFPA 70.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - 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

SECTION 27 05 33.13
CONDUIT FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).

B. Flexible metal conduit (FMC).

C. Liquidtight flexible metal conduit (LFMC).

D. Galvanized steel electrical metallic tubing (EMT).

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2025.

B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S); 2020.

C. BICSI ITSIMM - Information Technology Systems Installation Methods Manual (ITSIMM), 8th Edition; 2022.

D. BICSI N1 - Installation Practices for Telecommunications and ICT Cabling and Related Cabling Infrastructure, 1st Edition; 2019.

E. BICSI TDMM - Telecommunications Distribution Methods Manual, 15th Edition; 2024.

F. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

G. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2020.

H. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.

I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

J. TIA-568.0 - Generic Telecommunications Cabling for Customer Premises; 2020e.

K. TIA-569 - Telecommunications Pathways and Spaces; 2019e, with Addendum (2022).

L. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.

M. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.

N. UL 360 - Liquid-Tight Flexible Metal Conduit; Current Edition, Including All Revisions.

O. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

P. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

Q. UL 2419 - Outline of Investigation for Electrically Conductive Corrosion Resistant Compounds; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate minimum sizes of conduits with actual type and quantity of cables to be installed.
   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 Engineer of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not begin installation of communications cables until installation of conduit between termination points is complete.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.

1.06 QUALITY ASSURANCE

A. 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. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70, TIA-569, BICSI ITSIMM, BICSI TDMM, manufacturers' instructions, and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use conduit types indicated for specified applications. Where more than one listed application applies, comply with most restrictive requirements. Where conduit type for particular application is not specified, use galvanized steel rigid metal conduit. PVC conduit shall only be used where it both complies with all codes/criteria and is specifically called out to be permitted.

C. Underground:
   1. Under Slab on Grade: Use galvanized steel rigid metal conduit (RMC).
   2. Exterior, Direct-Buried: Use galvanized steel rigid metal conduit (RMC) or PVC-coated galvanized steel rigid metal conduit (RMC).
   3. Exterior, Embedded Within Concrete: Use galvanized steel rigid metal conduit (RMC).

D. Embedded Within Concrete:
   1. Within Slab on Grade: Not permitted.
   2. Within Slab Above Ground: Not permitted.

E. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit (RMC) or galvanized steel electrical metallic tubing (EMT).

F. Concealed Within Hollow Stud Walls: Use galvanized steel rigid metal conduit (RMC) or galvanized steel electrical metallic tubing (EMT).

G. Concealed Above Accessible Ceilings: Use galvanized steel rigid metal conduit (RMC) or galvanized steel electrical metallic tubing (EMT).

H. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit (RMC) or galvanized steel electrical metallic tubing (EMT).

I. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit (RMC) or galvanized steel electrical metallic tubing (EMT).

J. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit (RMC).
   1. Locations subject to physical damage include, but are not limited to:
      a. Where exposed below 8 feet, except within electrical and communication rooms or closets.
      b. Where exposed below 20 feet in warehouse areas.

K. Exposed, Interior, Subject to Severe Physical Damage: Use galvanized steel rigid metal conduit (RMC) or stainless steel rigid metal conduit (RMC).
   1. Locations subject to severe physical damage include, but are not limited to:
      a. High traffic industrial and warehouse areas where exposed below 8 feet, except within electrical and communication rooms or closets.
      b. Where exposed below 20 feet in industrial manufacturing areas.

L. Exposed, Exterior, Not Subject to Severe Physical Damage: Use galvanized steel rigid metal conduit (RMC).

M. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit (RMC).

N. Flexible Connections to Vibrating Equipment:
   1. Dry Locations: Use flexible metal conduit.
   2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
   3. Maximum Length: 6 feet unless otherwise indicated.
   4. Vibrating equipment includes, but is not limited to:
      a. Motorized equipment.

O. Fished in Existing Walls, Where Necessary: Use flexible metal conduit (FMC) or galvanized steel electrical metallic tubing (EMT).

2.02 CONDUIT - GENERAL REQUIREMENTS

A. Comply with NFPA 70 and TIA-569.

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. Provide conduit, fittings, supports, and accessories required for complete communications pathway.

D. Provide products listed, classified, and labeled as suitable for purpose intended.

E. Maximum Number of Communications Outlet Boxes per Continuous Conduit Homerun: Two.

F. Minimum Conduit Size, Unless Otherwise Indicated:
   1. Communications Outlet Box: 1-inch trade size.
   2. Continuous Conduit Homerun Serving One Communications Outlet Box: 1-inch trade size.
   3. Continuous Conduit Homerun Serving Two Communications Outlet Boxes: 1-inch trade size.

G. Where conduit size is not indicated, size to comply with NFPA 70, TIA-569, and BICSI TDMM, but not less than applicable minimum size requirements specified. Where specified standards differ, comply with most stringent.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Manufacturers:
   1. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.us/#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 01 60 00 - 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. ABB; T&B: www.electrification.us.abb.com/#sle.
b. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.us/#sle.
c. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
d. Emerson Electric Co; O-Z/Gedney: www.emerson.com/#sle.
e. Substitutions: See Section 01 60 00 - 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. Material: Use steel or malleable iron.
   a. Where not subject to severe corrosive influence, stainless steel or aluminum fittings may be used.
   b. Do not use die cast zinc fittings.
4. Connectors and Couplings: Use threaded fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.
5. Conduit Bodies: Use only conduit bodies specifically designed for communications cabling. Standard conduit bodies designed for electrical raceways are not permitted.
   a. Comply with TIA-568.0 minimum bend radius requirements for fiber optic cables.

2.04 FLEXIBLE METAL CONDUIT (FMC)

A. Manufacturers:
1. AFC Cable Systems, a division of Atkore International: www.afcweb.com/#sle.
2. Electri-Flex Company: www.electriflex.com/#sle.
3. International Metal Hose: www.metalhose.com/#sle.
4. Substitutions: See Section 01 60 00 - 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. ABB; T&B: www.electrification.us.abb.com/#sle.
   b. Bridgeport Fittings, LLC: www.bptfittings.com/#sle.
   c. Emerson Electric Co; O-Z/Gedney: www.emerson.com/#sle.
   d. Substitutions: See Section 01 60 00 - 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. Conduit Bodies: Standard conduit bodies designed for electrical raceways are not permitted.

2.05 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Manufacturers:
1. AFC Cable Systems, a division of Atkore International: www.afcweb.com/#sle.
2. Electri-Flex Company: www.electriflex.com/#sle.
3. International Metal Hose: www.metalhose.com/#sle.
4. Substitutions: See Section 01 60 00 - 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. ABB; T&B: www.electrification.us.abb.com/#sle.
   b. Bridgeport Fittings, LLC: www.bptfittings.com/#sle.
   c. Emerson Electric Co; O-Z/Gedney: www.emerson.com/#sle.

d. Substitutions: See Section 01 60 00 - 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. Conduit Bodies: Use only conduit bodies specifically designed for communications cabling. Standard conduit bodies designed for electrical raceways are not permitted.
   a. Comply with TIA-568.0 minimum bend radius requirements for fiber optic cables.

2.06 GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers:
   1. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.us/#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 01 60 00 - 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. ABB; T&B: www.electrification.us.abb.com/#sle.
      b. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.us/#sle.
      c. Bridgeport Fittings, LLC: www.bptfittings.com/#sle.
      d. Emerson Electric Co; O-Z/Gedney: www.emerson.com/#sle.
      e. Substitutions: See Section 01 60 00 - 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.
   5. Damp or Wet Locations, Where Permitted: Use fittings listed for use in wet locations.
   6. Conduit Bodies: Use only conduit bodies specifically designed for communications cabling. Standard conduit bodies designed for electrical raceways are not permitted.
      a. Comply with TIA-568.0 minimum bend radius requirements for fiber optic cables.

2.07 ACCESSORIES

A. Conduit Joint Compound: Corrosion-resistant, electrically conductive compound listed as complying with UL 2419; suitable for use with conduit to be installed.

B. Pull Strings: Use nylon or polyester tape with average breaking strength of not less than 1,250 lbf.

C. Foam Conduit Sealant:
   1. Removable, two-part, closed-cell foam, specifically designed for sealing conduit openings against water, moisture, gases, and dust.
   2. Suitable for use with conductors/cables and associated insulation/jackets to be installed.
   3. Rated to hold minimum of 10 ft water head pressure.

D. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.

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.

3.02 INSTALLATION

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

B. Install conduit in accordance with NECA 1, BICSI ITSIMM, and BICSI N1.

C. Galvanized Steel Rigid Metal Conduit (RMC): Install in accordance with NECA 101.

D. Galvanized Steel Electrical Metallic Tubing (EMT): Install in accordance with NECA 101.

E. 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. Communications rooms.
      c. Mechanical equipment rooms.
   5. Unless otherwise approved, do not route exposed conduits:
      a. Across floors.
      b. Across roofs.
      c. Across top of parapet walls.
      d. Across building exterior surfaces.
   6. Arrange conduit to maintain adequate headroom, clearances, and access.
   7. Arrange conduit to provide no more than equivalent of two 90-degree bend(s) between pull points.
      a. The equivalent of three 90-degree bends between pull points is permitted only under conditions described in BICSI TDMM.
   8. Arrange conduit to provide no more than 100 feet between pull points.
   9. Arrange conduit to provide minimum bend radii in accordance with BICSI TDMM.
   10. Route conduits above water and drain piping where possible.
   11. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
   12. Maintain recommended separation from sources of EMI greater than 5 kVA in accordance with BICSI ITSIMM and BICSI TDMM.
   13. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
   14. 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.
   15. Group parallel conduits in same area on common rack.

F. Conduit Support:
   1. Secure and support conduits in accordance with NFPA 70 using suitable supports and methods approved by authorities having jurisdiction.
   2. Provide required seismic controls.

3. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
4. 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.
5. 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.
6. Use metal channel/strut with accessory conduit clamps to support multiple, parallel, surface-mounted conduits.
7. Use conduit clamp to support single conduit from beam clamp or threaded rod.
8. Use trapeze hangers assembled from threaded rods and metal channel/strut with accessory conduit clamps to support multiple, parallel, suspended conduits.
9. Use nonpenetrating rooftop supports to support conduits routed across rooftops, where approved.
10. Use of spring steel conduit clips for support of conduits is not permitted.
11. Use of wire for support of conduits is not permitted.
12. Where conduit support intervals specified in NFPA 70 and NECA standards differ, comply with most stringent requirements.

G. 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. Terminate outside-plant entrance conduits at 4 inches above finished floor unless otherwise indicated.
7. 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.
8. Provide insulating bushings, insulated throats, or listed metal fittings with smooth, rounded edges at conduit terminations to protect cables.
9. Secure joints and connections to provide mechanical strength and electrical continuity.

H. 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 unless otherwise indicated.
3. Provide sleeves and/or slots for penetrations as indicated or as required to facilitate installation.
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 as required to maintain integrity of membrane.
7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty.
8. Install firestopping to preserve fire resistance rating of partitions and other elements.

I. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed cables or connected equipment. This includes, but is not limited to:
   1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
   2. Where conduits are subject to earth movement by settlement or frost.

J. 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.
   3. Where conduits cross boundaries of hazardous/classified locations, provide identified/listed sealing fittings as approved by authorities having jurisdiction; locate as indicated or in accordance with NFPA 70.

K. Provide pull string in each empty conduit and innerduct/cell, and in each conduit where cables are to be installed by others. Leave minimum slack of 12 inches at each end.

L. Provide grounding and bonding.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - 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. 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 cables.

END OF SECTION

SECTION 27 10 00
STRUCTURED CABLING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Communications system design requirements.

B. Communications pathways.

C. Copper cable and terminations.

D. Communications equipment room fittings.

E. Communications outlets.

F. Communications grounding and bonding.

G. Communications identification.

1.03 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
   1. Includes intersystem bonding termination.
   2. Includes bonding jumpers for bonding of communications systems and electrical system grounding.

B. Section 26 05 33.16 - Boxes for Electrical Systems.

C. Section 26 05 53 - Identification for Electrical Systems: Identification products.

D. Section 26 27 26 - Wiring Devices.

E. Section 27 05 29 - Hangers and Supports for Communications Systems.

1.04 REFERENCE STANDARDS

A. BICSI N1 - Installation Practices for Telecommunications and ICT Cabling and Related Cabling Infrastructure, 1st Edition; 2019.

B. EIA/ECA-310 - Cabinets, Racks, Panels, and Associated Equipment; 2005e.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. TIA-526-7 - Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant, Adoption of IEC 61280-4-2 Edition 2: Fibre-Optic Communications Subsystem Test Procedures – Part 4-2: Installed Cable Plant – Single-Mode Attenuation and Optical Return Loss Measurement; 2015a (Reaffirmed 2022).

E. TIA-526-14 - Optical Power Loss Measurement of Installed Multimode Fiber Cable Plant; IEC 61280-4.1 Edition 3.1, Fiber Optic Communications Subsystem Test Procedures- Part 4-1: Installed Cable Plant- Multimode Attenuation Measurement; 2023d.

F. TIA-568 (SET) - Commercial Building Telecommunications Cabling Standard Set; 2024.

G. TIA-568.2 - Balanced Twisted-Pair Telecommunications Cabling and Components Standards; 2024e.

H. TIA-569 - Telecommunications Pathways and Spaces; 2019e, with Addendum (2022).

I. TIA-606 - Administration Standard for Telecommunications Infrastructure; 2021d.

J. TIA-607 - Telecommunications Bonding and Grounding (Earthing) for Customer Premises; 2024e.

K. UL 444 - Communications Cables; Current Edition, Including All Revisions.

L. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers; Current Edition, Including All Revisions.

M. UL 1863 - Communications-Circuit Accessories; Current Edition, Including All Revisions.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate requirements for service entrance and entrance facilities with Communications Service Provider.
   2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for communications equipment.
   3. Coordinate arrangement of communications equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   4. Notify Architect Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Arrange for Communications Service Provider to provide service.

C. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Communications Service Provider representative.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

C. Shop Drawings: Show compliance with requirements on isometric schematic diagram of network layout, showing cable routings, telecommunication closets, rack and enclosure layouts and locations, service entrance, and grounding, prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).

D. Evidence of qualifications for installer.

E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and operation of product.

F. Test Plan: Complete and detailed plan, with list of test equipment, procedures for inspection and testing, and intended test date; submit at least 60 days prior to intended test date.

G. Field Test Reports.

H. Project Record Documents: Prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
   1. Record actual locations of outlet boxes and distribution frames.
   2. Show as-installed color coding, pair assignment, polarization, and cross-connect layout.
   3. Identify distribution frames and equipment rooms by room number on drawings.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: At least 3 years experience manufacturing products of the type specified.

B. Installer Qualifications: A company having at least 3 years experience in the installation and testing of the type of system specified, and:
   1. Employing a BICSI Registered Communications Distribution Designer (RCDD).
   2. Supervisors and installers factory certified by manufacturers of products to be installed.
   3. Employing BICSI Registered Cabling Installation Technicians (RCIT) for supervision of all work.

C. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Keep stored products clean and dry.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a 2 year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 SYSTEM DESIGN

A. Provide a complete permanent system of cabling and pathways for voice and data communications, including cables, conduits and wireways, pull wires, support structures, enclosures and cabinets, and outlets.
   1. Comply with TIA-568 (SET) (cabling) and TIA-569 (pathways) (commercial standards).
   2. Comply with Communications Service Provider requirements.
   3. Provide fixed cables and pathways that comply with NFPA 70 and TIA-607 and are UL listed or third party independent testing laboratory certified.
   4. Provide connection devices that are rated for operation under conditions of 32 to 140 degrees F at relative humidity of 0 to 95 percent, noncondensing.
   5. In this project, the term plenum is defined as return air spaces above ceilings, inside ducts, under raised floors, and other air-handling spaces.

B. Intermediate Distribution Frames (IDF): Support structures for terminating horizontal cables that extend to telecommunications outlets.
   1. Locate intermediate distribution frames as indicated on the drawings.

C. Backbone Cabling: Cabling, pathways, and terminal hardware connecting intermediate distribution frames (IDF's) with main distribution frame (MDF), wired in star topology with main distribution frame at center hub of star.

D. Cabling to Outlets: Specified horizontal cabling, wired in star topology to distribution frame located at center hub of star; also referred to as "links".

2.02 PATHWAYS

A. Conduit: See section 27 05 33.13.

B. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.
   1. Products:
      a. HoldRite, a brand of Reliance Worldwide Corporation; HydroFlame Pro Series/HydroFlame Custom Built: www.holdrite.com/#sle.

2.03 COPPER CABLE AND TERMINATIONS

A. Manufacturers:
   1. CommScope: www.commscope.com/#sle.
   2. General Cable Technologies Corporation: www.generalcable.com/#sle.
   3. Siemon Company: www.siemon.com/#sle.

B. Copper Horizontal Cable:
   1. Description: 100 ohm, balanced twisted pair cable complying with TIA-568.2 and listed and labeled as complying with UL 444.
   2. Cable Type - Voice and Data: TIA-568.2 Category 6 UTP (unshielded twisted pair); 23 AWG.
   3. Cable Capacity: 4-pair.
   4. Cable Applications: Use listed NFPA 70 Type CMP plenum cable unless otherwise indicated.

5. Cable Jacket Color - Voice and Data Cable: Blue.

C. Copper Cable Terminations: Insulation displacement connection (IDC) type using appropriate tool; use screw connections only where specifically indicated.

D. Jacks and Connectors: Modular RJ-45, non-keyed, terminated with 110-style insulation displacement connectors (IDC); high impact thermoplastic housing; suitable for and complying with same standard as specified horizontal cable; UL 1863 listed.
1. Performance: 500 mating cycles.
2. Voice and Data Jacks: 8-position modular jack, color-coded for both T568A and T568B wiring configurations.

E. Copper Patch Cords:
1. Description: Factory-fabricated 4-pair cable assemblies with 8-position modular connectors terminated at each end.
2. Patch Cords for Patch Panels:
a. Quantity: One for each pair of patch panel ports.

2.04 COMMUNICATIONS EQUIPMENT ROOM FITTINGS

A. Copper Cross-Connection Equipment:
1. Connector Blocks for Category 5e and Up Cabling: Type 110 insulation displacement connectors; capacity sufficient for cables to be terminated plus 25 percent spare.
2. Patch Panels for Copper Cabling: Sized to fit EIA/ECA-310 standard 19 inch wide equipment racks; 0.09 inch thick aluminum; cabling terminated on Type 110 insulation displacement connectors; printed circuit board interface.
a. Jacks: Non-keyed RJ-45, suitable for and complying with same standard as cable to be terminated; maximum 48 ports per standard width panel.
b. Capacity: Provide ports sufficient for cables to be terminated plus 25 percent spare.
c. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with TIA-606.
d. Provide incoming cable strain relief and routing guides on back of panel.

B. Backboards: Interior grade plywood without voids, 3/4 inch thick; UL-labeled fire-retardant.
1. Size: As indicated on drawings.
2. Do not paint.

C. Equipment Frames, Racks and Cabinets:
1. Component Racks: EIA/ECA-310 standard 19 inch wide.
2. Floor Mounted Racks: Aluminum or steel construction with corrosion resistant finish; vertical and horizontal cable management channels, top and bottom cable troughs, and grounding lug.

2.05 COMMUNICATIONS OUTLETS

A. Outlet Boxes: Comply with Section 26 05 33.16.
1. Provide depth as required to accommodate cable manufacturer's recommended minimum conductor bend radius.
2. Minimum Size, Unless Otherwise Indicated:
a. Data or Combination Voice/Data Outlets: 4 inch square by 2-1/8 inch deep (100 by 54 mm) trade size.

B. Wall Plates:
1. Comply with system design standards and UL 514C.
2. Accepts modular jacks/inserts.
3. Capacity:
a. Data or Combination Voice/Data Outlets: 2 ports.
4. Wall Plate Material/Finish - Flush-Mounted Outlets: Match wiring device and wall plate finishes specified in Section 26 27 26.

2.06 GROUNDING AND BONDING COMPONENTS

A. Comply with TIA-607.

B. Comply with Section 26 05 26.

2.07 IDENTIFICATION PRODUCTS

A. Comply with TIA-606.

B. Comply with Section 26 05 53.

2.08 SOURCE QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Factory test cables according to TIA-568 (SET).

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Comply with latest editions and addenda of TIA-568 (SET) (cabling), TIA-569 (pathways), TIA-607 (grounding and bonding), BICSI N1, NFPA 70, and SYSTEM DESIGN as specified in PART 2.

B. Comply with Communication Service Provider requirements.

C. Grounding and Bonding: Perform in accordance with TIA-607 and NFPA 70.

D. Install firestopping to preserve fire resistance rating of partitions and other elements.

3.02 INSTALLATION OF PATHWAYS

A. Install pathways with the following minimum clearances:
   1. 48 inches from motors, generators, frequency converters, transformers, x-ray equipment, and uninterruptible power systems.
   2. 12 inches from power conduits and cables and panelboards.
   3. 5 inches from fluorescent and high frequency lighting fixtures.
   4. 6 inches from flues, hot water pipes, and steam pipes.

B. Outlet Boxes:
   1. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of telecommunications outlets provided under this section.
      a. Mounting Heights: Unless otherwise indicated, as follows:
         1) Telephone and Data Outlets: 18 inches above finished floor.
      b. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
      c. Provide minimum of 24 inches horizontal separation between flush mounted outlet boxes installed on opposite sides of fire rated walls.
      d. Unless otherwise indicated, provide separate outlet boxes for line voltage and low voltage devices.
      e. Locate outlet boxes so that wall plate does not span different building finishes.
      f. Locate outlet boxes so that wall plate does not cross masonry joints.

3.03 INSTALLATION OF EQUIPMENT AND CABLING

A. Cabling:
   1. Do not bend cable at radius less than manufacturer's recommended bend radius; for unshielded twisted pair use bend radius of not less than 4 times cable diameter.
   2. Do not over-cinch or crush cables.
   3. Do not exceed manufacturer's recommended cable pull tension.
   4. When installing in conduit, use only lubricants approved by cable manufacturer and do not chafe or damage outer jacket.

B. Service Loops (Slack or Excess Length): Provide the following minimum extra length of cable, looped neatly:
   1. At Distribution Frames: 120 inches.
   2. At Outlets - Copper: 12 inches.

C. Copper Cabling:
   1. Category 5e and Above: Maintain cable geometry; do not untwist more than 1/2 inch from point of termination.
   2. For 4-pair cables in conduit, do not exceed 25 pounds pull tension.
   3. Use T568B wiring configuration.

D. Floor-Mounted Racks and Enclosures: Permanently anchor to floor in accordance with manufacturer's recommendations.

E. Floor-Mounted Enclosures: Connect adjacent cabinets together and remove interior side panels.

F. Identification:
   1. Use wire and cable markers to identify cables at each end.
   2. Use manufacturer-furnished label inserts, identification labels, or engraved wallplate to identify each jack at communications outlets with unique identifier.
   3. Use identification nameplate to identify cross-connection equipment, equipment racks, and cabinets.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Comply with inspection and testing requirements of specified installation standards.

C. Visual Inspection:
   1. Inspect cable jackets for certification markings.
   2. Inspect cable terminations for color coded labels of proper type.
   3. Inspect outlet plates and patch panels for complete labels.
   4. Inspect patch cords for complete labels.

D. Testing - Copper Cabling and Associated Equipment:
   1. Test backbone cables after termination but before cross-connection.
   2. Test backbone cables for DC loop resistance, shorts, opens, intermittent faults, and polarity between connectors and between conductors and shield, if cable has overall shield.
   3. Test operation of shorting bars in connection blocks.
   4. Category 3 Backbone: Perform attenuation test.
   5. Category 3 Links: Test each pair for short circuit continuity, short to ground, crosses, reversed polarity, operational and ring-back, and dial tone.
   6. Category 5e and Above Backbone: Perform near end cross talk (NEXT) and attenuation tests.
   7. Category 5e and Above Links: Perform tests for wire map, length, attenuation, NEXT, and propagation delay.

E. Testing - Fiber Optic Cabling:
   1. Backbone: Perform optical fiber end-to-end attenuation test using an optical time domain reflectometer (OTDR) and manufacturer's recommended test procedures; perform verification acceptance tests and factory reel tests.
   2. Multimode Backbone: Perform tests in accordance with TIA-526-14.
   3. Single Mode Backbone: Perform tests in accordance with TIA-526-7.
   4. Links: Perform optical fiber end-to-end attenuation tests and field reel tests.

F. Final Testing: After all work is complete, including installation of telecommunications outlets, and telephone dial tone service is active, test each voice jack for dial tone.

END OF SECTION

This page was intentionally left blank for duplex printing.

SECTION 27 41 00
PERFORMANCE AUDIO/VIDEO SYSTEMS

PART 1 - GENERAL

1.1 GENERAL CONDITIONS

A. For the sake of brevity these specifications shall omit phrases such as "(Sub)Contractor shall furnish and install", "unless otherwise indicated or specified", etc., but these phrases are nevertheless implied. Mention of materials and operations requires the (Sub) Contractor to furnish and install such materials and perform such operations complete to the satisfaction of the Systems Designer. Exceptions are noted herein or shown on the drawings.

B. No representative of the Owner shall have power to waive the obligations of this Contract for the furnishing of good materials or of performing good work, as herein described, in full accordance with the Contract Documents. The failure of any representative of the Owner to condemn any defective work or materials shall not release the obligation to at once tear out, remove, and properly replace the same at any time prior to final acceptance and upon discovery of said defective work or material. However, when requested, the Owner's representative shall observe and accept or reject any material furnished; and in the event the material has been once accepted by the Owner's representative, such acceptance shall be binding on the Owner unless it can be clearly shown that such material does not meet the specifications for this work.

C. Definitions of terms in this specification section are as follows:
   1. “Owner” or “End User” is Philander Smith University
   2. “Architect” is the architect of record for this project, Cromwell Architects
   3. “Systems Designer” is the designer of the systems in this specification section, Schuler Shook.
   4. “Electrical Engineer” is the engineer and designer of the associated electrical systems.
   5. “General Contractor” or “Contractor” is the Construction Manager or General Contractor, or other entity contractually responsible for the construction of the project and the full and proper completion of this specification section.
   6. “Systems Contractor” is the Sub-Contractor, responsible to the General Contractor, who is responsible for performing the scope of work described in this specification section, and in the related contract drawings (see 1.2.B).
   7. “Systems” are the audio, video, control, and network systems described in this specification section and in the related contract drawings (see 1.2.B).

D. The written specification and the large format audio video drawings are collectively referred to as the contract documents. System components and criteria may be indicated in one location, or possibly in several locations in the contract documents. It is the Contractor’s responsibility to obtain clarification from the Systems Designer, prior to submitting bid documents, if the Contractor believes that there is conflict within the documentation, or if clarification of any kind is

required. If the Contractor fails to obtain said clarification(s), the Contractor agrees to abide by the interpretation of the Systems Designer, without remedy for additional compensation.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, other General Requirement Sections, apply to work of this section.

B. All work shown on Contract Drawings AV series is provided under this section.

C. Switches, switchboards, contactors, panel boards, transformers, conduit, wire, outlets, connectors and other electrical devices specified herein or on accompanying drawings shall conform to provisions of other sections of Division 26 of the Contract Documents unless otherwise noted. Refer to 1.11 Division of Responsibility Table for additional detailed division of scope.

1.3 SCOPE OF WORK

A. Work under this section shall include the furnishing of all labor, materials, tools, transportation services, and supervision necessary to complete the installation of the systems and other items as herein listed, all as described in these specifications, as illustrated on the drawings, and as directed by the Systems Designer. Work is comprised of, but not limited to, the following principal systems:
1. Performance Audio Systems
2. Performance Video Systems
3. Audio Recording Systems
4. Video Recording Systems
5. Production Video Monitoring Systems
6. Production Communications Systems
7. ADA Assistive Listening Systems
8. Video Wall Systems – Add Alternate 1B
9. AV Infrastructure
10. AV Control Systems
11. Portable AV Loose Equipment
12. Digital Signage Systems
13. Livestream AV Systems

B. The contract documents show design intent and signal flow and are not meant to be fully detailed installation drawings. It is the responsibility of the Systems Contractor to provide fully detailed installation drawings for review and approval by the Systems Designer (see submittal requirements below). It is understood and agreed to by the Contractor that the work described in the contract documents shall be fully and properly installed and must be a complete and working system per the requirements indicated in these contract documents.

C. Consistent with the detailed information contained in this specification, it is the responsibility of the Contractor to supply complete and functional overall systems. Verify complete parts lists, the accuracy of the type numbers and the overall suitability of the equipment to provide functional systems coordinated and interfaced with related work. Provide repeaters, additional switches, and similar

equipment as needed for cable length limitations. Other items that are included in the scope of work but may not be fully detailed in the contract documents include, but are not limited to, hardware, rigging devices and supplies, transformers, distribution amplifiers, signal format converters, connectors, patch cords, jumpers, network, or other device SFP modules, and other devices necessary for device interfacing, isolation, installation, or gain structure.

D. Minor items of equipment needed to meet the requirements stated above, even if not specifically mentioned herein or on the drawings, shall be provided in quality equivalent to other conditions on the project with no claim for additional payment.

E. Furnish Shop Drawings (see details in Submittals sections below) to the Systems Designer and Architect for review. All purchase of equipment, and/or fabrication or installation work performed without fully approved shop drawings is done so at the Contractor's risk. Any at risk work as described above may be rejected and if so, all cost associated with the removal of unapproved work, and replacement with approved work is not eligible for reimbursement or additional charge. This includes Division 26 electrical systems and conduit that is required to be provided to support the work described in this section. Conduit drawings related to this scope of work are required to be submitted by the Division 26 sub-contractor, with input and coordination from the Systems Contractor and Contractor, and approved by the Systems Designer and Electrical Engineer, prior to any of the work described above being performed. Any work done prior to approval of the conduit drawings submittal is at risk and any remedial work or replacement work required by the Systems Contractor and/or Electrical Engineer to correct deficiencies in unapproved work must be performed at the Contractor's cost and is not eligible for reimbursement or additional charge.

F. Furnish and install complete Systems with all necessary apparatus and equipment, wiring, etc., required to ensure complete systems in excellent working order as specified herein and on the attached diagrams.

G. Furnish all back boxes and enclosures for audio video systems panels and control devices, to be installed by Division 26 sub-contractor. Coordinate with Division 26 sub-contractor to verify proper location, orientation, and installation conditions of all back boxes and enclosures to meet project requirements. Refer to 1.11 Division of Responsibility Table and to project documentation for details.

H. Furnish, install, and terminate all low voltage wire and cable included in this specification section. This does not include AC power system distribution and terminations, except as expressly called out in these specifications or in the audio video drawings.

I. Systems Contractor is responsible for frequency scanning and coordination of any existing audio video systems devices, or audio video systems devices provided by Owner, with any new wireless transmitters and receivers. Coordinate with Contractor and Owner as necessary accounting for local frequencies already in use by other entities, and accounting for available spectrum. Provide Owner with a complete listing of all wireless equipment referenced above, and the frequencies assigned to the devices, as well as providing a list of available open frequencies for all devices that are tunable.

J. Systems Contractor must provide Control System and Digital Signal Processing (DSP) system programming and graphical user interface designs, along with any other specialized programming requirements listed or indicated in the drawings, and/or specifications, including specification appendices. Systems Contractor will provide a full set of said programming, fully tested, installed, functioning and ready for inspection prior to Systems Commissioning and Testing. Systems Contractor will then provide a full set of changes, adjustments, and additions to address any deficiencies, or changes requested by the Systems Designer during Systems Commissioning and Testing prior to turnover to the Owner. Systems Contractor will also provide one additional full set of changes and adjustments to meet requests and notes from the Owner during the last third of the initial warranty period. All of this work is part of the base scope of work covered by these contract documents. Changes required to support additional equipment added to the systems during warranty period, that is not part of the work in these contract documents is not included in the work described above. Any such work should be proposed to the Owner with the costs for that work for the Owner to approve prior to work being performed.

K. Perform all initial systems settings and required Systems Contractor testing (see paragraphs 3.10, 3.11, and 3.12 below) and submit all required test reports, and a Declaration of Audio Video Systems Completion.

L. Provide any required manufacturer training or commissioning (see paragraphs 3.14 below)

M. Participate, along with manufacturer's representatives (if required), in Systems Designer Commissioning, Testing, and Systems Adjustments.

N. Remedy all outstanding punch list items prior to Owner training.

O. Provide training sessions, as required in paragraph 3.14 below, to the Owner's Designated Staff.

P. Provide systems documentation, as required in paragraph 3.15 below, to the Systems Designer for review and approval.

Q. Provide systems documentation to the Owner, as required in paragraph 3.15 below, corrected per any notes from the Systems Designer.

R. Warranty all equipment, components, and workmanship per the warranty requirements in paragraph(s) 1.7 below.

S. Contract documents for work in this section includes references to supporting work to be provided by other divisions and specification sections. That work is NOT included in this scope of work and is only referenced to show related work to assist in coordination. Refer to the Division of Responsibility Table in paragraph 1.11 for detailed information on division of related labor between sub-contractors. The Contractor is ultimately responsible for completion of all this scope of work and any related supporting scopes of work.

1.4 JOB CONDITIONS

A. Verify all conditions on jobsite applicable to this work. Coordinate with scheduled work of other trades. Notify Systems Designer in writing of discrepancies, conflicts,

or omissions prior to commencement of work or correct same at Contractor's expense.

B. The drawings show diagrammatically the cables, conduit, wiring, and so far as possible, the arrangement of equipment, which fit into the spaces available without interference. If conditions exist at the jobsite which make it impossible to install work as shown, prepare and submit drawings to the Systems Designer for approval showing how the work may be installed and, on approval, install the work without additional cost to the Owner.

C. Contractor and their sub-contractors shall take care not to damage any equipment or to disconnect any wiring other than as required to interface new system. Any contractor-damaged equipment shall be repaired or replaced by the Contractor at no cost to the Owner.

D. The Systems Contractor must keep the job adequately staffed at all times.

E. For no reason other than illness, loss of personnel, or other circumstances completely outside the control of the Systems Contractor, the Project Engineer, Project DSP and Control Systems Programmers, and the Lead Installer shall remain with the project from beginning through completion. In cases where a change must occur, the same pre-bid requirements for CTS-D and CTS-I certification apply to the new staff members, and in anything other than a catastrophic and immediate loss, there must be a minimum of a one week overlap between personnel on the project. The Systems Contractor MUST provide the Systems Designer, notice of any change, including a general reason for the change, and a detailed plan as to how the continuity of information will be achieved. This requirement does not apply to staff other than those directly named above.

F. The Contractor is responsible to perform all cutting, patching, and painting or other work necessary to match finish treatments during installation of the systems and to repair any damage done as a result of installation of the systems. The Contractor is responsible for all cleanup and trash removal from all systems work areas.

G. The Systems Contractor will cooperate with the Contractor and any or all sub-contractors and the Owner, Owner’s Representative, and all other appropriate parties to coordinate progress with the overall construction schedule. Watch for conflicts with work by other contractors on the job. Without claim for additional payment, make moderate moves or changes as are necessary to accommodate other equipment or to maintain aesthetic appearance.

H. The Contractor will provide and maintain fully finished, dust free and conditioned spaces for all control rooms and rack locations prior to any installation of systems racks or electronics. In addition the Contractor must provide adequate protection to installed loudspeakers, displays, projectors, cameras, and other systems equipment to protect them from damage and from dust or exposure to other contaminants, such as water or paint overspray.

1.5 SUBMITTALS

A. Pre-Bid Submittals

1. All Systems Contractors providing bid responses for the systems specified in this section must provide the following documentation for review no later than ten (10) days prior to the bid due date, and must be deemed qualified, in writing, by the Systems Designer.
   a. A list of projects performed within the last four years of comparable size, and scope (minimum four projects). For each project provide the project name and address, dates of construction start and completion, and a name and phone number for a contact representing the Owner or User.
   b. A description of the Systems Contractor's facilities used for, and capabilities in the following areas:
      i. Shop fabrication
      ii. Rack assembly and wiring
      iii. Equipment repair
      iv. Systems servicing
      v. Creation of CAD, REVIT, or other graphics documentation for shop drawings and as-built drawings
   c. Resume listing education and experience of the staff member (or members) who will be the project engineer.
   d. Current CTS-D certificate(s) for the staff member(s) in item c. above.
   e. Resume listing education and experience of the staff member (or members) who will be the lead installer on-site. The lead installer must be present on-site at all times when installation work is being performed.
   f. Current CTS-I certificate(s) for the staff member(s) in item e. above.
2. The following Systems Contractors have submitted the required documentation and have been approved to bid:
   a. CTI-Little Rock
      6700 Allied Way
      Little Rock, AR 72209
      501-375-2800
      info@cti.com
   b. Stagemasters Sound & Lighting
      9851 Brockington Rd., Suite 8
      Sherwood, AR 72120
      Jim Metcalf
      501-835-3777
      jim@stagemasterssound.com
   c. LD Systems
      407 Garden Oaks Blvd.
      Houston, TX 77018
      Rob Slaughter
      713-695-9400
      rslaughter@ldsystems.com
   d. Ford AV
      4800 West Interstate 40
      Oklahoma City, OK 73128
      Bid Center
      405-946-9966
      sales@fordav.com
   e. Diversified
      5525 Granite Parkway Ste 675
      Plano, TX 75024
      Aaron Beck
      720-840-7651
      abeck@onediversified.com

B. Bid Submittals
   1. Contractors must carefully examine all drawings and specifications for this project. No allowances will be made for failure to read and understand all of the project documentation.
   2. Requests for clarification during the bid process must be submitted in writing, directed to the proper contact. Do not contact the Systems

Designer directly. All requests for clarifications must be made no later than seven (7) working days prior to the bid submission date.

3. Bid proposals must include all of the systems equipment as specified, and all work effort required to engineer and install the systems to meet the specification and drawing requirements. They must also include any other materials, equipment, and labor that may not be shown that is required to deliver a fully functioning and operable systems per the intent of the specifications and drawings.
4. Substitutions of equipment in the design are not allowed during the bid process. The Systems Contractor may provide alternative equipment as options in their submittal, but they must provide a complete bid response based on the systems as designed, with the options shown separately (See 1.5.B.6.e below).
5. The scope of work indicated in this specification and the AV drawings must be performed by the Systems Contractor and may not be sub-contracted or assigned to others unless the following requirements are satisfied:
    a. Any and all sub-contractors must be bound by the terms of this specification including bidding and qualification requirements and must agree to this in writing as part of the bid response package.
    b. The names of all proposed sub-contractors and a statement of their qualifications (see 1.5.A.1 in its entirety above) must be included in the bid response package.
6. All bid response packages must include the following information, in its entirety, or they will be rejected, in whole, as unresponsive:
    a. An itemized list of all equipment and materials to be used in the installation of the systems in this scope of work. This list must include a short item description, item name, and manufacturer's name, quantity of items included, and a unit price for that item. Lot prices may be used instead of unit prices only for miscellaneous items not included in the list of specified equipment. Any manufacturer quotes referenced in the equipment list in this specification section must be broken out into unit descriptions as described above.
    b. A labor breakdown as follows:
        i. Pre-installation engineering (includes shop drawings and other documentation as well as submittals)
        ii. Coordination meetings, site coordination, and supervision
        iii. Shop engineering and assembly
        iv. Shop programming time
        v. Site installation work
        vi. Site programming time
        vii. Systems Contractor verification of systems
        viii. Systems Designer commissioning and tuning
    c. Total contract price for the base project as designed
    d. Total contract price for each add alternate as designed
    e. For each of any proposed options provide the following:
        i. Itemized list of equipment from the design that will be replaced by the option with the same information required in 1.5.B.6.a above.

ii. Lump sum labor cost attached to the list of equipment from the design that will be replaced by the option.
iii. Itemized list of equipment that will replace the equipment listed above in item I, with the same information required in 1.5.B.6.a above.
iv. Lump sum labor cost attached to the list of equipment from the option.
v. Total Add or Deduct amount from the Base Bid if this option is selected.

C. Pre-Installation Submittals
1. The following guidelines must be adhered to for all submittals to be reviewed:
a. All shop drawings must be sized such that the paper size matches that of all other project construction drawings. All drawings must be legible when printed at ½ actual size.
b. Drawings should be done in black and white. Color may only be used to indicate specific signal types in single-line drawings, but in that case, they must still be legible with all information clearly seen if printed in black and white.
c. Drawings and all other submittal documentation should be provided in PDF format. DWG files and Revit models must be provided upon request. All drawings shall be produced in AutoCAD or Revit or in a compatible software that can produce accurate files that are compatible with AutoCAD or Revit.
d. Submittal of contract drawings, or copied portions of contract drawings as shop drawings is not allowed and they will be rejected. Use of electronic files generated by other parties (Systems Designer drawings or architectural backgrounds, for example) does not release the Systems Contractor from the responsibility to provide accurate, fully engineered, coordinated, and functional systems and complete solutions. The Contractor and Systems Contractor must provide systems that meet or exceed all contract document requirements.
e. All revised submittals must include a revision number and date. All changed drawings or documents must clearly indicate the revision number and date, and all changed items must be clouded and tagged with the revision number. All subsequent revisions must have prior revisions clouds and tags removed for clarity. Drawings or documents included in a revised submittal that have NOT changed must not be marked as revised. Revisions that are not properly tagged may not get reviewed. This does not release the Systems Contractor from the responsibility to provide all revisions as are indicated in submittal responses.
f. All submittals must reflect the project awarded, as a whole, including all Owner accepted add/deduct alternates, all Systems Designer approved, Owner accepted Systems Contractor options proposed at bid, and all Systems Designer approved, Owner accepted post-bid, pre-installation, Systems Contractor proposed substitutions.

2. Every Submittal must include, as the first sheet, a table of contents of what all is provided within that particular submittal.
3. Submittal submissions must follow the following schedule:
    a. Within 30 days of award the Systems Contractor must provide work effort documentation that includes:
        i. List of activities that require coordination with the Owner
        ii. List of activities that require coordination with the Architect
        iii. List of activities that require coordination with the Systems Designer
        iv. List of activities that require coordination with the Contractor and other trades.
        v. List of all key procurement items and drop-dead dates for procurement and delivery to maintain schedule.
        vi. Schedule indicating all of the items listed in items a. through e. above and indicating critical path.
        vii. All activities related to coordination listed in a. through d. above must be examined and agreed upon by all other parties prior to submittal.
    b. Within 30 days of award the Systems Contractor must submit all post-bid, pre-installation period substitution requests per the following requirements:
        i. Substitutions may only be incorporated into the design upon acquiring written consent and stamped approved substitution submittal documents from the Systems Designer.
        ii. Substitution products/systems must be equivalent or better than specified products/systems in quality, performance, function, warranty, and conformance to system requirements.
        iii. After the 30 day period mentioned above, the only Systems Contractor proposed substitutions that will be reviewed for approval are those required to replace discontinued products or products that cannot be procured in time to avoid project delays.
        iv. No substitution may be approved without providing the following information for review:
            a) List of any advantages to the Owner
            b) List of any disadvantages to the Owner or lost functionality, whether that functionality is required by the systems design or not.
            c) Printed specifications and/or laboratory test data for the substitution product AND the original product.
            d) Description of previous field use and successes and failures.
            e) Global cost savings reflecting total cost of equipment and labor and other costs incurred by changes in other Contractor’s scope of work to support the substitution.

f) Unit price of each proposed item, and of the item being replaced.

g) In rare instances, the Systems Designer may request a sample of a proposed substitution for evaluation to determine acceptability as a substitute. In this situation, the Systems Contractor will procure and ship the sample to the Systems Designer, at the Systems Contractor's cost. The Systems Designer will evaluate the sample and then return it to the Systems Contractor. If the Systems Designer agrees, the sample may be provided by the manufacturer directly, at their cost, for evaluation.

v. The Systems Designer is the only party that may determine if a proposed substitution is acceptable. If the Systems Designer determines that the substitution is not acceptable, the Systems Contractor must provide the specified product from the contract documents.

vi. Where a substitute material or method is approved, the Contractor must make all changes to accommodate the substitution with no claim for additional payment beyond that included in item iv. e) above.

vii. The Systems Designer reserves the right to substitute new products for products specified in the contract documents provided there is no material cost increase to the Contractor and the Contractor has not purchased the originally specified equipment.

c. Within 45 days of award the Electrical Contractor and Systems Contractor must provide the conduit riser diagrams submittal. This submittal is the responsibility of the Electrical Contractor to create and submit, with input from the Systems Contractor. Any conduit installed prior to receiving a stamped approval of the riser submitted is at risk, and if it is found to be deficient, it must be removed and properly installed per specifications and per the approved riser, at the sole cost of the Contractor.

d. Within 60 days of award the Systems Contractor must provide the following in a single PDF format document:

i. Itemized list of all equipment and materials to be used in assembling the system.

ii. Catalog cut sheets or data sheets for each listed item.

a) Product data sheets must not be web page captures of specifications, unless there is no other recourse.

b) Product data sheets with multiple options or part numbers must clearly be marked with the selection to be used for this project. All options must be called out. Anything the Contractor is not supplying that is shown on the sheet must be called out as an exclusion.

e. Within 60 days of award the Systems Contractor must provide the following in a single PDF format document:

i. Plan and RCP drawings indicating the location of equipment and termination panels.
ii. A complete list of all cabling, wire by wire. Each entry in the list must include the unique wire number for that cable, and the termination locations of each end
iii. Detailed 3-wire schematic diagrams for any custom circuitry
iv. Detailed 3-wire schematic diagrams for typical connections between audio lines, patch bays, and rack mounted equipment.
v. Drawings of any custom items in a scale suitable for fabrication. The drawings must detail materials, colors, finishes, and any lettering or other markings. All lettering must be shown in the size and typeface to be used. These drawings include custom plates, rack panels, termination plates and any other custom manufactured equipment.
vi. All custom panels in the direct view of the general public may require a custom finish. Provide a list of all panels in the direct view of the general public and their location so that the architect may respond with any custom finish requirements. The Architect may request samples of each custom finish required. The Contractor must provide these samples to the Architect upon request, for approval. Costs for the samples and shipping the samples to the Architect shall be the sole responsibility of the Contractor. Submitted samples will not be returned.
vii. Rack elevation drawings indicating equipment locations within the rack, power distribution and any cabling routing information. Elevate the front and rear of all racks. Notate any equipment in the rack that must have a security cover, per the rack specifications below.
viii. Patchbay layout drawings at 1:1 scale showing labeling and indicating any normal connections and the type of normal connection.
ix. Mechanical drawings showing mounting and/or rigging of all permanently installed AV Systems equipment, including but not limited to projectors, projection screens, displays, loudspeakers, cameras, and other AV devices that mount to architecture or structure. Additionally provide drawings for any permanently installed mounting plates designed to support portable AV systems equipment. Any mounting systems that are not provided as a single manufactured product from a single approved rigging and mounting manufacturer must be a fully engineered solution, must be approved in concept by the Systems Designer, and each drawing sheet must be stamped by a licensed structural engineer selected by the Contractor. Each custom solution must be shown separately and verified and stamped independently.

f. Within 75 days of award the Systems Contractor must provide the following in a single PDF format document:
   i. In coordination with the Owner's IT department, provide a networking plan for the AV systems networks. This plan must include:
      a) Narrative description of the network design and function including but not limited to information describing all LAN's, VLAN's, and QOS plan.
      b) Physical network diagram
      c) Logical network diagram
      d) IP Address table and addressing protocol, including fixed IP addresses for all AV systems devices. This document must be updated for the as-built submittals to indicate the corresponding MAC address for each device.
   ii. Provide a written plan for EDID and HDCP management for all video signals and interconnection between devices.

g. Within 90 days of award the Systems Contractor must provide the following in a single PDF format document:
   i. A mockup of all graphical user interface screens for touchpanels, computer displays, portable devices and any other display format, including but not limited to all loudspeaker control software, Digital Signal Processing software, Video routing and switching software, and control systems software.
   ii. Source code and configuration files for any and all devices, as required for proper systems operation.

h. Every two weeks after award, the Systems Contractor must provide to the Contractor and Owner a progress report that includes:
   i. Overall status of the project and work completed by percentage
   ii. Schedule changes
   iii. Detailed Three week work plan
   iv. Procurement updates:
      a) Procurement problems
      b) Concerns needed to be addressed by others
      c) Value of materials procured and stored on site, or if allowed, in the Systems Contractor facility as a dollar value and a percentage of total project materials cost.
   v. List of outstanding submittals indicating document number and date of submittal, in order from most recent to first submittal.
   vi. List of outstanding RFI's indicating document number and date of submittal, in order from most recent to first submittal.
   vii. Indicate any items in v. and vi. above that are overdue and whether or not they are affecting schedule. If they are affecting schedule provide information as to why and how they are affecting schedule.

i. 30 days prior to any equipment purchase the Systems Contractor must request line item authorization from the Systems Designer to purchase equipment. This is to avoid procurement of equipment that may already be outdated by the time of procurement. The Systems Designer shall respond to the Systems Contractor within 15 days of receipt of the procurement request with approvals and/or replacement products. There will be no allowance for schedule extension based on this requirement.

j. At completion of installation and Systems Contractor testing (see 3.10, 3.11, and 3.12 for testing requirements), the Systems Contractor must provide the following in a single PDF format document:
   i. Written Statement of Completion that verifies the installation is 100% complete and has been tested as required, and is ready for the Systems Designer to perform testing and commissioning of the systems.
   ii. A Testing Report that includes:
      a) ALL test data from all tests, including failed tests and subsequent passing tests after rectifying the problem that caused failure
      b) Usage of any spare cabling to replace cabling that was damaged during installation. Include the wire numbers of the failed cable and the spare used to replace it.
      c) A listing of any and all portable equipment, cabling, racks, etc. that is not located on site, a reason for that, and a date as to when it is expected on site.

k. Within 30 days of completion of Systems Designer testing and commissioning, Owner training, delivery of any missing equipment, and resolution of any and all punch items including software programming changes, the Systems Contractor must provide the following on five separate USB storage devices (three to the Owner, and two to the Systems Designer):
   i. Systems Documentation:
      a) Table of contents
      b) Written Guarantee and service policy
      c) Copies of all shop drawings which have been updated to include any changes made during the installation process.
      d) Single-line signal diagrams identifying all cable runs and patchbay points with the associated cable number
      e) Complete Systems Contractor Testing report
      f) Complete and updated conduit riser diagram to match installed conduit.
      g) Final system settings for all settings adjusted during Systems Designer testing and commissioning
      h) Updated network documentation as listed above

i) All updated and current system software files, source code, GUI designs, and any other software files for all of the AV Systems

j) All available manufacturers' operation and service literature for each major system and system component.

k) Systems operational procedures including power on sequences, power off sequences, recovery from power failure sequences, emergency procedures, and any other procedures needed to operate the systems properly in any and all states.

l) In addition to the above, provide to the Owner, two printed copies of items j) and k) above.

m) In addition to the above, provide to the Owner one laminated copy of each sheet of each Single-Line signal diagram for each venue as per item d) above.

1.6 QUALITY ASSURANCE

A. All parts shall be provided complete per manufacturer's specifications and with all necessary accessories required to meet the intent of the design and provide fully functional systems, including but not limited to any mounting devices, software licenses, SFP modules, etc.

B. All materials shall be new and shall meet or exceed all applicable requirements and standards of Underwriters Laboratories and the American Standards Association.

C. Systems Contractor is responsible for obtaining and paying for all permits, licenses and inspections, for meeting any requirements of permits and licenses, and for remediating any work called out as incorrect or not meeting code or other standards during inspections.

D. Systems Contractor must act in accordance with applicable federal, state, local, and union labor regulations.

E. Installation shall conform to latest federal, state and local electrical and safety codes or those of other authorities having jurisdiction (AHJ). Where conflicts exist, the most stringent code or regulation shall apply.

F. If additional work by the Systems Designer is required as a direct result of deviations from approved drawings and specifications during construction, the Contractor will be liable for those additional costs that the Owner may incur.

G. Government Standards: The Systems Contractor is to comply with all government regulations, standards, and laws that apply to the installation and use of the AV equipment and/or other scope of work specified in this section. The following agencies have laws and rules that apply:

1. Federal Communications Commission (FCC): FCC rules are located in Title 47 of the Code of Federal Regulations. The following is a partial list of the FCC regulations that apply to equipment specified in this section of work:

a. Part 15: Radio frequency devices

b. Part 22: Public mobile services.
c. Part 24: Personal communications services.
d. Part 25: Satellite communications.
e. Part 27: Wireless communications service.
f. Part 51: Interconnection.
g. Part 74: Experimental radio, special broadcast, and other program distribution services.
h. Part 95: Personal radio services.

2. Occupational Safety and Health Administration (OSHA) – Follow all applicable standards for health and safety particularly sound pressure level exposure.
3. ANSI Standards: American National Standards Institute (ANSI) standards cover safety, fabrication, assembly, installation, rigging, equipment handling, and testing.
4. Contributing Organizations – The Organizations listed below have published standards used to establish the technical references to be followed under this scope of work.
   a. Acoustical Society of America (ASA) (ASC S1)
   b. Alliance for Telecommunications Industry (ATIS) (ASC T1)
   c. American Society of Safety Engineers (ASSE) (ASC A1264)
   d. Audio Engineering Society (AES) (ASC S4)
   e. Electronics Industry Alliance (EIA) (CEMA)
   f. Entertainment Services and Technology Association (ESTA) (ASC E1)
   g. Institute of Electrical and Electronics Engineers (IEEE) (ASC C136) (802.1)
   h. International Cable Engineers Association (ICEA) Formerly IPCEA
   i. International Standards Organization (ISO)
   j. National Electrical Manufacturer's Association (NEMA) (ASC C119)
   k. National Fire Protection Associations (NFPA)
   l. National Safety Council (NSC) (ASC A10)
   m. Photographic and Imaging Manufacturer's Association (PIMA)
   n. Society of Motion Picture and Television Engineers (SMPTE)
   o. Telecommunications Industry Association (TIA)
   p. Underwriters Laboratories (UL) (ASC C101) (CE)
   q. NTSC
   r. BICSI
   s. National Association of Broadcasters (NAB) – System technical standards for video and RF compliance are listed in the most recent edition of the NAB Handbook
5. Safety Standards – Contractor will adhere to the following Safety Standards for all work identified in Division 27 41 00 and as part of the General and Supplementary sections of the Division-1 Specifications.
   a. ANSI A14.2-2000: Safety Requirements for Portable Metal Ladders
   b. ANSI A14.7-2000: Safety Requirements for Mobile Ladder Stands and Mobile Work Platforms.
   c. ANSI C2-2002: National Electrical Safety Code
   d. ANSI Z136.1-2000: Safe Use of Lasers and laser systems

e. ANSI Z136.2-1997: Safe Use of Optical Fiber
f. ANSI Z359.1-1992 (R1999): Safety Requirements for Personal Fall Arrest Systems, Subsystems, and Components.
g. ANSI/PIMA IT7.101-1999: Recommended Practice for the Safe Handling and Operating of Audiovisual Equipment.
h. IEEE 142-1991: Grounding of Industrial and Commercial Power Systems
i. UL 514A: Scrub Water exclusion from AV Floor Boxes
j. UL 1419-1995: Standard for Safety for Professional Video and Audio Equipment
k. in accordance with the National Electrical Code, ANSI/NFPA 70
l. UL 1492-1994: Standard for Safety for Audio-Video Products and Accessories
m. UL 1651-1997: Standard for Safety for single and multiple Optical Fiber Cable
n. UL 1667-1996: Audiovisual Systems Safety Standard for Tall AV Institutional Carts for use with Audio, Video, etc.
o. ANSI E1.1-1999: Construction and Use of Wire Rope Ladders to prevent most injuries
p. ANSI A10.8-2001: Safety Requirements for Scaffolding
q. ANSI A10.42-2000: Rigging Qualifications and Responsibilities

6. Applicable Performance Standards – Execute all Division work in accordance with the following standards:
   a. ANSI S4.48-1992 (R1998): Recommended Practice for the Application of Connectors, Part 1, XLR-Type polarity, and gender
   b. ANSI S4.55-1997: Recommended Practice for conservation of the Polarity of Audio Signals
   c. ANSI S4.56-1997: Recommended Practice for the subjective evaluation of Loudspeakers
   d. ANSI S12.2-1995 (R1999): Criteria for Evaluating Room Noise
   e. ANSI T1.217-1991 (R1998): Integrated Services Digital Network (ISDN)
   f. Management –Primary Rate Physical Layer
   g. ANSI T1.522-2000: Quality of Service (QOS) for Business Multimedia Conferencing. Specifies classes of Service for conferencing on IP Networks
   h. AES15: ANSI S4.49: AES Recommended practice for Sound Reinforcement Systems –Communications Interface PA-422.
   i. AES-R1-1997 AES project report for professional audio: Specifications for audio on high capacity media
   j. AES14-1992 (r1998) AES standard for professional audio equipment -- Application of connectors, part 1, XLR-type polarity and gender
   k. AES24-1-1999, (Revision of AES24-1-1995) AES standard for sound system control - Application protocol for controlling and monitoring audio devices via digital data networks
   l. AES26-2001 (Revision of AES26-1995) AES recommended practice for professional audio -- Conservation of the polarity of audio signals

m. ANSI/TIA/EIA 606-1993: Standard for the Telecommunications Infrastructure of Commercial Buildings
n. ANSI/TIA/EIA 607-1994: Commercial Building Grounding and Bonding Requirements for Telecommunications
o. IEEE 149-1979 (R1990): Test Procedure for Antennas
p. IEEE 1100-1999: Powering and Grounding Sensitive Electronic Equipment
q. NEMA 250-2001: Enclosures for Electrical Equipment
r. SMPTE 292M: SMPTE 292M defines the base 1.485Gbps HD-SDI. Note: This standard can handle all HD formats except 1920*1080 @ 50P and 60P.
s. SMPTE 372M: Uncompressed Dual-Link HD-SDI for 50P & 60P
t. SMPTE 424M: 2.97 Gbps HD-SDI for 50P & 60P
u. TIA/EIA-568-B: Digital audio over Cat5 audio cable
v. UL 1047-1999: Isolated Power Systems Equipment
w. UL 1581-1998: Reference Standard for Electrical Wires, Cables, and Flexible Cords
x. UL 1682-1998: Standard for Safety for Plugs, Receptacles, and Cable Connectors, of the Pin and Sleeve Type up to 800 Amperes and up to 600 volts ac or dc.
y. UL 467-1998: Grounding and Bonding Equipment
z. UL 813-1999: Commercial Audio Equipment and accessories for use in commercial enterprises
aa. ANSI/TIA/EIA-568-A: Commercial Building Telecommunications Cabling
bb. ANSI/TIA/EIA-569-A: Commercial Building Standard for Telecommunications Pathways and Spaces
cc. ANSI/TIA/EIA-607: Commercial Building Grounding and Bonding Requirements for Telecommunications
dd. ANSI/TIA/EIA TSB-72: Centralized Optical Fiber Cabling Guidelines
ee. ANSI/TIA/EIA-526-14A: Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
ff. ANSI/TIA/EIA-526-7 Measurement of Optical Power Loss of Installed Single mode Fiber Cable Plant
gg. ANSI/IEEE C-2 National Electrical Safety Code how to install cabling in accordance with the most recent edition of BICSI® publications:
    i. BICSI Telecommunications Distribution Methods Manual
    ii. BICSI Cabling Installation Manual

1.7 WARRANTY AND WARRANTY SERVICE REQUIREMENTS

A. All systems devices shall be guaranteed free of defects in materials and workmanship for a minimum period of one year and for a maximum period not to exceed the length of the manufacturer’s warranty. All workmanship will be guaranteed free of defects for a period of one year. These warranty times begin on the date the Systems Designer accepts the systems as complete.

B. The Systems Contractor will provide the Owner with an emergency service request phone number that will be answered twenty-four hours a day, 365 days a year. See response times below.

C. In a non-emergency situation, defective devices shall be repaired or replaced within forty-eight hours following the report of such defects by the owner, and telephone calls must be responded to within one business day.

D. Many of the systems installed as part of this scope of work are critical to the operation of the facility. As such it is mandatory that the following replacement and response times be strictly adhered to in a Qualifying Emergency Event. Qualifying emergency events are defined as events that may cause severe hardship or cause the systems to be inoperable or unusable for a scheduled class or event. In an emergency event:
   1. The Systems Contractor must respond to telephone calls within one hour. The personnel answering this call must be fully qualified to troubleshoot problems and propose solutions.
   2. If the situation requires a site visit, The Systems Contractor must have personnel on-site within eight hours of the phone call determining the need.
   3. If corrective measures on-site are required, they will be performed within twelve hours of the determination of a need for a site visit.

E. If, during the warranty period, any component is out of service for more than seven days due to unavailability of parts or service, Contractor shall supply and install an identical new component. If an identical component is not available, Contractor will substitute equivalent equipment, with the approval of the Owner.

F. Repeated device failures, defined as the failure of a device or a single type of device three or more times over three contiguous months, will be considered as a failure of a manufactured system and all items of this type shall be replaced at no charge to the Owner.

G. During the course of the warranty period, the Contractor shall provide a minimum of three (3) service visits to the site for inspection and adjustment of equipment. Contractor shall submit proposed schedule for these visits and shall notify Owner and Systems Designer in writing at least one month in advance of each visit.

H. During the warranty period, the Systems Contractor will supply the Owner with any published updates of manufacturer provided operating software and firmware for any and all software-controlled equipment that are issued to correct “bugs”. During the warranty period, the Owner will rely on the Systems Contractor to determine when to update the software and/or firmware, unless it is needed to correct a situation that renders the systems unstable, non-functional, or otherwise affects operations.

I. At least one representative of the Systems Contractor, well versed in the installation and the operation of the systems, shall be on site in support of the Owner for the first significant public event in each venue (as determined by the Owner) where the system will be used. The Contractor representative(s) for this event shall also be competent in show operations.

J. The Contractor is to coordinate ongoing remote access to AV Systems Networks for support and troubleshooting. Owner to provide the access at their discretion.

1.8 PERMIT

A. Obtain all permits necessary for the execution of any work pertaining to the installation, and conform in all trades with all applicable codes/regulations. Obtain all permits necessary for operation of any equipment by the Owner, including but not limited to laser projectors and radio systems.

1.9 INSURANCE

A. All equipment and materials shall be fully insured, by the Systems Contractor, against loss or damage up until acceptance of the system by the Owner or until Owner relieves the Contractor in writing of this responsibility, whichever is earlier, regardless of the location of the equipment. All equipment is deemed to be under the control of the Systems Contractor until acceptance of the system by the Owner or until Owner relieves the Contractor in writing of this responsibility, whichever is earlier.

1.10 EXISTING CONDITIONS

A. For projects including renovation work on existing facilities, visit the site prior to making a bid. No subsequent allowance will be made due to failure to thus observe and verify conditions which may affect the work. Report to the Architect and Systems Designer any discrepancies among this specification and existing conditions and similarly report obvious omissions.

1.11 DIVISION OF RESPONSIBILITY TABLE

ITEMS PROVIDED AND INSTALLED	Electrical Contractor Provide	Electrical Contractor Install	Systems Contractor Provide	Systems Contractor Install
Main Power Panel Boards and Circuit Breakers	X	X		
Audio Video Isolated Ground Power (AVIGP)Transformers	X	X		
AVIGP Isolated Ground Conduit, and Conductors	X	X[1]		
AVIGP panel boards and circuit breakers	X	X		
AVIGP standard load centers and circuit breakers	X	X		
AVIGP Company Switches	X	X		
Audio Video Systems Equipment Racks, Termination Panels, and Audio Video Devices				
- Racks			X	X
- Termination Panels			X	X
- Termination Panel Back Boxes		X[1]	X	
- Termination Panel Floor Boxes		X[1]	X	
- All conduit, J-Boxes, Cable Sleeves, Ladder Tray, Mounting Hardware for Audio Video Systems Signal and Control Cabling	X	X[1]		
- Conduit Isolation Bushings at Racks	X	X		
- Audio Video Cabling			X	X
- Audio Video Cabling Termination			X	X
AVIGP Branch Circuits for Systems Equipment Racks going to:				
- In Wall Outlets	X	X		
- Ladder Tray Mounted Outlets	X	X		
- Ceiling Mounted Outlets	X	X		
- In Rack Power Distribution Devices		X[2]	X[2]	
Audio Video Systems Conduit Riser Diagram Submittal	X[3]			

Note 1: Installation criteria and coordination provided by Systems Contractor
Note 2: Rack Power Raceways are provided and installed by the Systems Contractor. The branch circuits are installed and terminated to the raceway by the Electrical Contractor. Care must be taken to maintain the isolation of the rack and its contents from building ground.
Note 3: The Conduit Riser Diagram is developed by the Electrical Contractor with criteria provided by the Systems Contractor. This is a critical submittal. Any conduit installed prior to approval is at risk and any replacement, remediation, or repairs required to meet specifications will be performed at the Contractor’s cost.

PART 2 - EQUIPMENT

2.1 GENERAL EQUIPMENT

A. All equipment specified by manufacturer and model number is done so for the purposes of establishing a standard of quality, performance, construction and function.

B. All materials and equipment shall be of the latest design or model offered for sale by the manufacturer.

C. All equipment will be new and be supplied with a full manufacturer's warranty.

D. The equipment provided shall operate at the required AC line voltage and frequency for the available power supply.

E. Contractor shall provide quantities as indicated in the specifications, specification appendices, and in the large format AV drawings. Where quantities appear to differ, the Contractor must request clarification from the Systems Designer.

F. Audio & Video Wire and Cable
1. All wire numbers listed in the drawings are Windy City unless otherwise noted.
2. THHN wire is not an allowable substitute for twisted pair stranded loudspeaker wiring.
3. Approved manufacturers: Belden, Canare, Gepco, West Penn, Whirlwind, Windy City.
4. Where conflict exists with any codes or ordinances, such codes and ordinances shall take precedence.
5. Where conflict exists with electrical specifications, the higher standard or more stringent requirement shall apply, at the discretion of the Systems Designer or AHJ.

G. AV System Plates and Panels:
1. Rack Mount Panels shall be constructed of 11 gauge steel or 1/8" Aluminum, minimum thickness. Finish shall be black or match adjacent equipment. The panels shall be 19" wide with standard EIA mounting hole spacing. Height as specified.
2. Back Box Enclosures shall be code grade steel. Black, Galvanized, or Stainless Steel (for NEMA4 or 4X). Size as specified.
3. Plug Box and Termination Panels shall be constructed of 11 gauge steel or 1/8" Aluminum, minimum thickness. Finish shall be black (unless instructed otherwise by Architect – see 1.5.C.3.e.iv. Size as specified. Approved Manufacturers: Steel City, Raco, Hoffman, Whirlwind, Pro Co, Wireworks
4. Engraved lettering is white paint filled engraving on black anodized panel unless it is a custom color panel in which case, confirm lettering color with Systems Designer. Lettering is to be upper case, 14 point, Arial. Where spacing is critical, reduction to 12 point is allowed.

2.2 MAJOR EQUIPMENT

A. Equipment provided shall be that specified herein or approved substitute (see Paragraph 1.5.C.3.b).

B. Detailed performance specifications shall be those published by the manufacturer effective on the date of this document for all equipment listed.

C. See Major Equipment List in Appendix B.

2.3 DETAIL DRAWINGS

A. The drawings herein may detail custom built equipment and system details.

B. Furnish all materials and labor to provide complete and finished work even though not specifically shown on the drawings.

C. Detail drawings are located in large format AV drawings.

PART 3 - EXECUTION

3.1 AUDIO VIDEO SYSTEM REQUIREMENTS

A. Requirements herein refer to materials and work which are related to or part of the Systems. Where conflict exists with other specifications concerning such work or materials, this specification takes precedence unless otherwise approved in writing by the Architect.

3.2 AUDIO VIDEO SYSTEMS INSTALLATION

A. All equipment must be installed in such a manner and in locations that allow for access for maintenance and repair. Equipment racks must be placed in the rack rooms to permit full access for operation and service.

B. Furnish and install all necessary brackets, braces and supports. All mounting hardware shall be included. AV devices may require additional support and/or backing in stud walls or ceilings to support the weight of the device. Contractor must furnish and install all support and backing as necessary for proper and safe installation.

C. All bolts and fasteners must be Grade 5 or better.

D. All bolted attachments to have lock washers or other self-locking fasteners.

E. Provide all required mounting brackets and framing, hardware and components, safety systems and rigging systems using the following minimum design factors (given as ratio of working load limit (WWL) : rated breaking load):
   1. 5:1 – Minimum design factor for all mounting components regardless of mounting condition.
   2. 8:1 – Minimum design factor for all hardware and connecting assemblies between manufacturer rated assemblies when equipment is not hung above the general public.
   3. 10:1 – For all hardware and connecting assemblies between manufacturer rated assemblies and supporting structure when equipment is hung above the general public and for all single point rigging suspension.

4. Design factor calculations to be provided with all equipment mounting details.
5. Systems Contractor shall coordinate required additional blocking, supplemental steel or channel strut supports with Main Contractor & specific trade contractors.
6. All mounting systems not provided as a complete package from a single manufacturer must be engineered, approved, and have drawings stamped by a professional rigging engineer or licensed structural engineer, as approved by the Main Contractor. The engineer shall verify that the design meets or exceeds design criteria for this particular use case. Each mounting system solution must be separately engineered, verified, and stamped.

F. All supporting structures and enclosures supplied by the Contractor not having a standard factory paint finish shall be painted. Paint specifications will be supplied by the Architect or indicated herein.

G. Provide custom color or finish for any equipment, panels, or materials supplied which are in public view. This does not exclude equipment or materials where standard colors and finishes may be specified herein. Request information on color and finish from the Architect.

H. Finish of blank panels and custom assembly panels shall match adjacent equipment panels. All color choices should be clearly indicated on panel drawing submittals, and on the panel schedule submittals

I. Switches, connectors, jacks, receptacles, outlets, cables and cable terminations shall be logically and permanently marked. Custom panel nomenclature shall be engraved, etched or screened. Markings for these items are detailed in the drawings to ensure consistency and clarity. Verify any changes in working type size and/or placement with the Systems Designer prior to marking.

J. Protect equipment and related wiring where construction conditions may cause damage or environmental conditions exceed manufacturer’s specifications.

3.3 CONDUIT

A. Review and coordinate Systems conduit installation with the electrical contractor to ensure proper operation of the Systems. Provide input to the electrical contractor so that they may complete the AV conduit riser submittal.

B. All wiring shall be in conduit unless authorized by the Architect, approved by the Systems Designer, and permitted by code. Exceptions are short runs at rack terminations where there is no means of connecting conduit to the equipment.

C. Where installed exposed, conduits shall be parallel with or at right angles to walls or ceilings and shall be supported from walls or ceilings by means of approved galvanized iron clamps or hangers. Conduit connections to equipment racks shall be insulated in order to maintain ground isolation.

D. Minimum size conduit shall be 3/4 inch. All conduit shall be sized for a maximum 40% fill, unless applicable codes require a lower maximum fill

E. No conduit run between pull boxes/termination boxes may exceed 100 feet in length, and no single turn may exceed 90 degrees.

F. No conduit run shall have more than 180 degrees of combined turns between pull boxes.

G. Conduit containing STP, UTP, and COAX wire types must be installed so that the final length of the cable runs does not exceed maximum cable lengths as stated in 3.7.N and 3.7.O.

H. Systems wiring is divided into wiring groups according to their nominal voltage levels. Cabling may be combined in a single conduit, and/or junction box(es) as long as all cables are of the same wiring group. Refer to the Major AV Drawings General Information sheet for information on conduit separations by cable type. Refer to major AV drawings Terminations Schedule for cabling, grouping, and destination details, by termination):

I. All conduits, within 6” of termination box, junction box, gutter or rack/ ladder tray, must be labeled with conduit group and destination of the opposite end of that conduit, as follows: “AV -<Group>- <opposite end>”. For example “AV – III – STGA-01”. Permanent marker on the conduit where it can be seen from the ground or nearest access point is acceptable.

J. Each termination does not require individual home run conduits. Conduits of like groups may be combined at junction boxes so that a smaller number of larger conduit sizes may be used instead of a larger quantity of smaller individual conduits.

K. Contractor must have written authorization from the Systems Designer for any conduit installation which does not conform to these requirements. The conduit separations above are based on the use of EMT conduit for all AV and other signals. Separations where Rigid conduit is utilized for AV systems and/or other adjacent systems may be halved. Separations where PVC conduit is utilized for AV systems and/or other adjacent systems must be doubled. Flex conduit is not allowed without written authorization for each separate instance. The Contractor must request information on separation adjustments for each instance where a different type of conduit than what is listed above is used.

3.4 ELECTRICAL POWER

A. Review and coordinate electrical power system installation including grounding with the electrical contractor to ensure proper operation of the Systems.

B. Verify that all AC power circuits designated for Systems equipment are wired with correct polarity and isolated ground. Report in writing any discrepancies found to the Architect for corrective action.

C. Provide distribution of electrical power within the equipment racks with a minimum of one spare AC receptacle for each four in use per branch circuit.

D. All AV systems electrical power distribution and outlets are provided and installed per the Division of Responsibility Table (see 1.11)

E. DIV. 26 contractor is to provide engraved cover plates for all power receptacles used in the Audio Video Systems, both isolated ground, and standard circuits that

are shown as provided by Electrical Contractor. The engraving must call out the panel number and the circuit number(s) for the circuit(s) connected to that particular receptacle. Refer to

3.5 STEEL SUPPORTS

A. Fabricate and install any supports so that the installation does not weaken or overload the building structure. Do not impose the weight of equipment or fixtures on supports provided for other trades or systems. No drilling or cutting of concrete beams, joists, or structural steel, nor welding to structural steel, will be permitted except as authorized, in writing, by the Architect.

3.6 BOXES

A. With the exception of portable equipment, all boxes, conduits, cabinets, equipment and related wiring shall be held in place and the mounting shall be plumb and square.

B. All boxes shall be securely mounted to building structure. All boxes shall be installed so that wiring contained in them is accessible. Install blanking devices or threaded plugs in all unused holes.

C. Wiring groups and circuits shall be isolated as indicated herein. Common pull or junction boxes are not permitted except as authorized, in writing, by the Systems Designer.

D. Clean all box interiors before installing plates, panels or covers.

E. Using permanent marker on the box or on wire tags, indicate the lengths of installed cable for all COAX and Category wiring inside the box.

F. Using permanent marker, inside the box, indicate the box name, for example “STGA”.

3.7 WIRING METHODS AND PRACTICES

A. Provide installation of all Systems wire and cable, ensuring proper:
   1. Pulling Tensions
   2. Quantities
   3. Types
   4. Lengths
   5. Routing
   6. Wire Group Separation
   7. Identification

B. The interconnection of equipment in a rack shall use the same wire by type as specified for runs external to racks unless otherwise indicated on AV single line drawings. All wiring within racks shall be direct between devices without splices.

C. Interconnection wire between amplifiers and loudspeaker transition panels will be type SP12 (refer to wire types on AV011)

D. Connector polarity shall be maintained except for terminations at equipment manufactured to other standards. In the event that manufactured equipment can

be ordered with, or internally set to, various standards, the equipment shall be configured as follows:

1. Polarity for XLR style connector shall be: pin 2-high, pin 3-low, and pin 1-shield.
2. Polarity for TRS style connector shall be: tip-high, ring-low, and sleeve-shield.

E. Spare wire runs of each group and type shall be pulled to each termination location. The number of spares shall be ten percent of those in actual use or one, whichever is greater.

F. Splicing of cables is not permitted between terminations of specified equipment.

G. Do not pull wire or cable through any box fitting or enclosure where change of raceway alignment or direction occurs without written approval from the Systems Designer; do not bend conductors to less than recommended radius. Employ temporary guides, sheaves, and rollers to protect cables from excess tension, abrasion or damaging bending during installation.

H. Provide wire pulling lubricants and pulling tensions in accordance with the wire and cable manufacturer's recommendations.

I. All wires shall be permanently identified at each wire end by marking with self-laminating adhesive labels fully covered with clear heat shrink tubing, and a chart kept of each wire's function. This applies to wire within a rack assembly as well as wire running in conduit.

J. Wire ends should be wrapped with heat shrink tubing. Each shield or drain wire should be covered with heat shrink to avoid unintentional connections.

K. Use Wago or Entrelec DIN rail mounted terminal blocks for all terminal block wiring connections. Do not exceed one wire per terminal connection point. Do not cut strands from conductors to fit lugs or terminals. Spare terminal blocks, equivalent to 10% of those in actual use, shall be provided.

L. Form, in an orderly manner, all conductors in enclosures and boxes, wire ways and wiring troughs, providing circuit and conductor identification. Tie using wraps of appropriate size and type. Limit spacing between ties to six (6) inches and provide circuit and conductor identification at least once in each enclosure.

M. Provide service loops, minimum 6’, at each termination so that plates, panels, patch bays, and equipment can be dismounted and placed on an adjacent horizontal work surface allowing for safe service and inspection without disconnection.

N. Maximum installed length of Category cables is 200’

O. Maximum installed length of Coaxial cable for HD-SDI, 3G-SDI, 6G-SDI, and 12G-SDI is 200’

3.8 GROUNDING

A. Audio system wiring shall conform to the following procedures:
   1. Audio equipment AC ground pins shall connect to AC isolated ground.

2. Audio equipment chassis shall connect to AC isolated ground or rack frames.
3. Audio rack frames shall connect to AC isolated ground bus in panelboard by means of #2 gauge (minimum) conductor.
4. Audio shields between AC powered pieces of equipment, where signal shield is tied to chassis ground, shall be directly connected to ground at the initiating end only. Capacitively terminate the receiving end with a 0.1µF capacitor.
5. Audio signal paths between AC powered pieces of equipment shall be connected using balanced lines and/or transformer isolation as required. No unbalanced signal paths may be connected to the patch bay.
6. Isolate all Systems wiring from racks, back boxes and conduit.
7. Isolate all Systems racks from conduit and other conductive surfaces. Use insulated bushings for conduit connections and a dielectric plinth between racks and conductive flooring materials.
8. AC isolated ground system shall be isolated from all other facility grounds except at the single point of connection at the AV isolation Transformer.
9. All metallic conduit, boxes and enclosures shall be grounded in accordance with the current National Electrical Code.

B. Metallic enclosures containing active equipment shall be grounded with due regard for the minimization of electrical noise. This may include the provision of grounding conductors separate from the AC ground.

3.9 EQUIPMENT RACKS

A. The equipment racks shall be considered as custom assemblies and shall be assembled, wired and tested in the Contractor's shop. Assembly of racks on-site will not be permitted, without written approval from the Systems Designer (except for system wiring which must terminate directly to the patch bays via soldering, punch-down or other non-connectorized termination process).

B. Placement of equipment in equipment racks, as shown in the drawings, is for maximum operator convenience. Verify any changes in placement of the equipment with the Systems Designer before assembly.

C. Racks shall be installed plumb and square without twists in the frames or variations in level between adjacent racks.

D. All wire, cable, terminal blocks, rack mounted equipment, and active slots of card frame systems shall be clearly and logically labeled as to their function, circuit, or system. Labeling on manufactured equipment shall be by engraved plastic laminate or by thermal printer on adhesive tape, with white lettering on black background or dark background that is similar to panel finish.

E. Provide stiffeners to custom panels to prevent panel deformation during normal plugging or switching operations.

F. All wires and cables used in assembling custom panels and equipment racks shall be formed into harnesses which are tied and supported in accordance with accepted engineering practice.

G. Harnessed cables shall be combed straight, wrapped every six (6) to ten (10) inches, and attached to the structure as necessary. Each cable that breaks out from a harness for termination shall be provided with an ample service loop so that panels, patch bays, and equipment can be dismounted and placed on an adjacent horizontal work surface allowing for safe service and inspection without disconnecting.

H. Harnessed cables shall be formed in either a vertical or a horizontal relationship to equipment, controls, components or terminations.

I. All system components and related wiring shall be located with due regard for the minimization of induced electro-magnetic and electrostatic noise, for the minimization of wiring length, for proper ventilation, and to provide reasonable safety and convenience for the operator.

J. All rack mounted equipment, with front panel controls, shall be provided with security covers to avoid tampering with preset levels. If specific security covers are not included in the equipment list, the Contractor will provide the manufacturer's security cover for each specified device or a suitable alternate.

K. Every device shall be installed with regard for proper polarity. Absolute polarity shall be maintained through the entire Systems signal chain.

L. Any permanently mounted electronic device must be balanced. Contractor will provide balancing transformers for unbalanced equipment connections where necessary.

3.10 SYSTEMS CONTRACTOR TESTS

A. The Systems Contractor must test all the systems and systems components, as described below, prior to Systems Designer Testing and Commissioning. At the conclusion of the Systems Contractor Testing, the Systems Contractor will submit a Written Statement of Completion and test reports indicating test results, including failed tests and re-tests to clear the failures.

B. Test each point to point wire segment individually, and test any linkage of multiple point to point cables that form an end to end link.

C. Contractor must document all test requirements and results for submission (see 3.12 below).

D. Confirm that each individual wire and cable run (whether in a rack or in conduit) is identified with a unique number. These numbers are affixed to both ends of each cable and are clearly visible. Provide a complete list of these numbers along with the termination location of each end of the wire run.

E. Verify all circuits and extensions for correct connection, continuity and polarity. Absolute polarity must be maintained between all points in the system.

F. Identify installed length of all copper and fiber cabling.

G. Confirm that all system outputs are free of spurious signals including oscillations and radio frequency signals. A wide band oscilloscope shall be used to verify this condition.

H. Confirm that the system is free of audible clicks, pops, and other noises when any operating control is activated, with or without input signal.

I. For MIC, LINE, ACOM, SP48(signal pair), CTRL, AND MIDI cable types, confirm:
   1. Proper circuits appearing at each termination location
   2. Proper circuits appearing at each jack bay position
   3. Continuity of all conductors
   4. Proper polarity is maintained
   5. Absence of shorts between conductors within each circuit
   6. Absence of shorts between circuit conductors and conduit
   7. Perform a sweep test to 0.5MHz

J. For ANTS, and ANTL cabling confirm:
   1. Verify that TDR impedance is 50 +/-3 ohms
   2. Frequency sweep test from 5MHz to 1000MHz.

K. For VIDSDI cabling confirm:
   1. Verify that the installed cable meets, at a minimum, the requirements set forth in SMPTE ST 2081 for 6G-SDI single-link and 12G-SDI dual-link.
   2. Verify that TDR impedance is 75 +/-3 ohms
   3. Frequency sweep test from 5MHz to 6GHz.

L. For STP and UTP cabling:
   1. Use Category 6A cable pair tester to verify compliance with TIA/EIA standards referenced above (including all current addendums)
   2. Test each cable using the permanent link procedure for opens, shorts, reversals, cross twists and mis-wiring. Check NEXT, ELFEXT, Delay Skew, Return Loss, and Alien Crosstalk.
   3. Report all mis-wiring or failures found and report retests as needed.
   4. If any conductors report open or short, replace the entire wire and re-test.

M. For OS2 and OM4 Fiber cabling:
   1. Using appropriate test devices and proper factory terminated jumpers, measure all fiber optic line attenuations, end to end, as required by TIA/EIA-526-14A.
   2. Optical budget may not exceed the cable performance by length plus splice and connector losses (0.03 dB for each fusion splice, 0.3dB for each mechanical splice, and/or 0.4 dB for each connector).
   3. Overall attenuation must meet TIA/EIA-568B standards. Perform attenuation tests at 850nm and 1300nm as appropriate.

N. Confirm that loudspeakers and mountings are free of buzzes and rattles when the loudspeaker is swept with sine wave tones over its rated bandwidth at one-half (1/2) its maximum rated power.

O. For all permanently mounted loudspeaker terminations, provide impedance measurement of each pair of loudspeaker lines with all loudspeakers connected and all amplifiers disconnected. These measurements shall be documented as editable tabular data listing impedance for each 1/3 octave band from 20 Hz to 20 kHz and shall be accurate to the nearest tenth of an Ohm.

P. For all intercom terminations, confirm proper operation by initiating and receiving audio communication and call light. For single lines connected to a matrix, test

each line with each channel in the matrix. Verify that all channels are quiet and without spurious noise.

Q. For all electronic devices mounted in racks and connected to patch bays, confirm:
1. Every input and output is balanced.
2. Proper polarity is maintained throughout the entire audio path.
3. Tip connection of each TRS jack is connected to the positive terminal of each corresponding input or output.

R. For all devices requiring IP addressing:
1. IP addressing scheme must make use of subnets such that all devices, regardless on which network (Audio, Video, Control, or House) they reside, have a unique IP address to eliminate the possibility of duplicate IP addresses if networks are inadvertently cross-patched.
2. All devices must have static IP addresses.
3. Create a spreadsheet of all devices and their IP addresses, Subnet Masks, MAC Addresses, and other pertinent IP configuration information.
4. Coordinate all IP addressing schemes with the Owner.

S. If the Audio, Video, and Control network switches are dedicated to these systems and the systems do not rely on Owner furnished and configured network switches:
1. Configure network switches to operate properly and provide the proper network configurations to support the network devices and protocols used by those devices.
2. Configure, as needed, VLANS, IGMP, QOS, and other protocols requiring configuration to provide a fully functioning and robust network system.
3. With all networks configured and operating, and all network devices configured and operating, confirm that the networks are behaving as expected and as required.

T. Electrical Contractor, coordinating with the Systems Contractor must confirm that there are no shorts between the Neutral and Isolated Ground conductors, and between the isolated ground conductor and building ground for each AV Technical Power circuit. Electrical Contractor, coordinating with the Systems Contractor must confirm there are no Bootleg Grounds or Neutral-Ground Reversals on each AV Technical Power circuit.

U. The Contractor is responsible for the programming and configuration of all DSP systems and control systems necessary as specified in this project specification and AV large format drawings.
1. Programming and configuration must be complete and ready prior to System Designer’s arrival for verification of functionality and acceptance testing.
2. Programming for the DSP systems must contain control pages to support normal operations, and to support Systems Designer Testing and Commissioning operations, as described in this specification and the large format AV drawings.
3. Programming for the Control Systems must include all master controller code and touch panel code and graphics, working together to provide the function as described in this specification and the large format AV drawings.

V. Test all Audio, Video, and Control system controls, including but not limited to mixing consoles, switchers, routers, touch panels, paging stations, volume controls, and source selectors for proper operation.

W. Test proper operation of any portable controls at each designated control location (Stage Manager's rack, for example).

3.11 SYSTEMS CONTRACTOR INITIAL SETTINGS

A. All initial adjustments must be documented and submitted as part of the Systems Contractor Test Reports (see 1.5.C.3.j.ii and 3.12).

B. Make all adjustments and modifications so that the system is operational and fully functional including but not limited to:
   1. Update all device software and firmware to the latest manufacturer's recommended release that allows for proper operation with ALL OTHER DEVICES in the systems.
   2. Make all adjustments and modifications for system gain structure per recommendations of major component manufacturers.
   3. Properly configure all EDID and HDCP settings to allow for proper function of all video systems.
   4. Install all programming for digital mixing consoles, DSP, Control and any other software based devices in the systems, and verify that audio and video signal passes as designed through these systems. Verify that control systems function as specified. Refer to Section 1.3 for full scope of work description for programming.
   5. Properly balance all 70 Volt loudspeaker zones to be consistent from zone to zone using amplifier settings and loudspeaker taps to adjust for differing loudspeakers or installation height. All 70 Volt loudspeakers within a given zone must not have a broadband SPL variation of greater than +/- 2dB from center of speaker to center of speaker.
   6. Properly adjust delay and equalization for all loudspeaker systems using SIM, SMAART or other similar dual FFT type measurement devices. All testing and adjustment shall be in accordance with all manufacturer recommendations and industry standard practice. Contact the Systems Designer for further system delay and equalization requirements.
   7. Capture traces showing magnitude and phase response for each loudspeaker or loudspeaker cluster before and after equalization and delay adjustments.
   8. Capture traces showing magnitude and phase response for the systems operating as a whole from 3 locations in each major seating area. One of these areas should be the House Mix Position, if applicable.
   9. Equalization and timing of the loudspeaker systems shall be further adjusted as required by the Systems Designer and Owner during Systems Designer Testing and Commissioning.

3.12 SYSTEMS CONTRACTOR TESTING REPORTS

A. Submit written report detailing the results of Initial Adjustments and Systems Contractor Tests. Report to include, at minimum, the following:

1. Copies of all relevant drawings, charts, test instrument data, and photographs.
   a. PDF copies of all available manufacturers' operation and service literature for each major system component.
   b. Copy of all programming files including, but not limited to, Audio DSP programming and Graphic User Interface (GUI) files, Control system Touch Panel GUI files and control system control programming files including un-compiled source codes.
   c. All other documentation and results of testing and initial settings as referenced in 3.10, and 3.11 above.
   d. Written certification that the installation conforms to the requirements stated herein, is complete in all respects, and is ready for inspection, Acceptance Testing, and tuning.
2. Prepare and submit an Avixa standard Commissioning Checklist for each system in this specification.
3. Prepare and submit a training syllabus for Owner training (see section 3.14).

B. This report shall be completed and submitted to the Systems Designer for review a minimum of five (5) days prior to Systems Designer Testing and Commissioning.

3.13 SYSTEMS DESIGNER TESTING AND COMMISSIONING

A. Systems Designer Testing and Commissioning shall be performed by the Systems Designer and Contractor during a period designated by the Architect. Contractor shall furnish a minimum of three (3) technicians or one technician per Systems Designer commissioning team, for the acceptance testing period, and one or more engineers fully capable of programming DSP and Control systems, and making any other engineering adjustments to equipment in the systems. Contact Systems Designer for number of commissioning teams that will be deployed. For Bid purposes assume there will be two (2) commissioning teams.

B. The minimum time required for Systems Designer Testing and Commissioning is five (5) working days, including two (2) days of dedicated quiet time. Coordinate this time period so that free access, work lighting, and electrical power are available on the site.

C. Ensure that Systems areas are in a clean and orderly condition ready for acceptance testing.

D. Provide test equipment (meeting the following minimum specifications) on site, at all times during Systems Designer Testing and Commissioning. Prior to testing, provide the Systems Designer with a listing of the specific equipment to be made available (#).
   1. Oscilloscope: 10MHz Bandwidth, Sensitivity – 1mV/cm
   2. Digital Multi-meter: 1% Accuracy
   3. Function Generator: 1MHz Bandwidth, Distortion < 1%
   4. Real Time Analyzer: 1/3 Octave with microphone
   5. SMAART Analysis package with V.8 software and a minimum of two matching test microphones (Earthworks M30 or better)
   6. Pink Noise Source: 20 Hz – 20 kHz Bandwidth
   7. Test mic tone calibrator

8. Impedance Sweep Meter: 20 Hz – 20 kHz Range, 1 Ohm – 50 kOhm
9. Polarity Checker: Mic, line, or loudspeaker level
10. Video Test Signal Generator(s): must provide all signals, resolutions, and output formats as needed to fully test the systems.

    # Systems Designers may choose to supply some of their own test equipment. Confirm specific requirements prior to commissioning

E. Be prepared to verify the performance of any portion of the system by demonstration, listening tests and instrumented measurements.

F. Be prepared to facilitate the visual inspection of system components and wiring, including removal of termination panels for inspection of wiring termination and wire management practices.

G. Be prepared to demonstrate all software and control systems.

H. Be prepared to go through the commissioning checklist and verify all items as complete.

I. Make additional mechanical and electrical adjustments within the scope of the work and which are deemed necessary by the Systems Designer as a result of the Acceptance Tests. This may include focusing of loudspeaker systems, changes in system gain structures, grounding, filtering or interfaces.

J. Contractor will bear any costs incurred for additional Systems Designer's time and expenses due to failure to have the system functioning in accordance with specification requirements at the times scheduled for Systems Designer Testing and Commissioning.

3.14 USER TRAINING

A. Contractor will provide in-depth training in operation and regular maintenance of all systems and on all equipment included in the scope of work contained in this specification and the AV large format drawings.

B. Training to include (but is not limited to):
1. Required Manufacturer provided training.
2. Detailed operation of mixing consoles, video switchers and routers, computer control systems and other essential system elements as relevant to their installation in this project.
3. Maintenance and repair of system equipment, including replacement procedures for user-replaceable parts.
4. Review of Operation and Maintenance Manual (See 3.15)

C. Contractor will provide a minimum of six (6) training sessions of no more than four hours each with times and dates to be approved by the Owner.

D. The first session shall take place in the presence of the Systems Designer and shall occur directly after the completion of Systems Designer Testing and Commissioning. If the Systems Designer, Owner, and/or Architect judge any work to be deficient and/or not substantially complete at the time scheduled for training, the training will be postponed until the Systems Designer, Owner, and Architect

judge the entire AV system conforms to this specification and the AV large format drawings.

E. Contractor will bear any costs incurred for additional Systems Designer's time and expenses due to failure to have the system functioning in accordance with specification requirements at the times scheduled for User Training.

3.15 SYSTEMS DOCUMENTATION

A. Systems Designer will review the Systems Documentation submittal (see 1.5.C.3.k) Upon approval of the documentation submittal, the Contractor will prepare five electronic copies stored on five separate USB storage devices and submit four to the Owner and the fifth to the Systems Designer.

3.16 FINAL ACCEPTANCE

A. Final acceptance will be contingent upon issuance by the Systems Designer of a letter of acceptance stating that the work has been completed and is in accordance with the contract documents.

APPENDICES TO FOLLOW

END OF SECTION 27 41 00

APPENDIX A - CONTROL NARRATIVE

A. The following is a brief description of AV system control functions that must be present on the project, whether automatic or triggered by a control interface on the project. This list does not preclude the Systems Contractor from making changes as directed by either the consultant or owner.

a. General Notes
    a. Control system buttons should represent real feedback from system, not button press feedback. For operations where the action being initiated is not instantaneous, button feedback should indicate that an action is in progress (a video source switch, as an example).
    b. All control system buttons are to be appropriately sized. All buttons shall be of a relatively similar scale.
    c. Touch panel graphics shall be coordinated with client graphic standards. Client text styles, colors, and logos shall be incorporated into the graphic user interface (GUI) design.
    d. All touch panels and control devices shall run separate GUI files - no interfaces shall run a single file.

b. General system functions
    a. The AV systems must mute when a fire alarm is activated by way of a relay connection provided by the fire alarm installer. All outputs should be muted in processing and should be brought back online after the fire alarm is cancelled.

c. The following sections describe the expected controls and functionality to be incorporated into the control interfaces on the project.
    a. Main Performance Hall - Stage Touch Panel (1)
        i. Welcome Screen with the school's branding
            1. Text shall direct the user to touch anywhere to begin. When the system is off, this shall direct the user to the Start Up Pop Up screen before powering on the system. When the system is on, this action shall direct the user to the Audio Page.
        ii. Startup Pop Up
            1. Allow for the Selection of Engineer or Simple Use mode
        iii. Main Page
            1. The following controls shall be present on all control pages
                a. Power Button to Page Flip to a Power Pop up
                    i. Include a start up and cool down timer upon system power up / power down
                    ii. System power on controls should not include the video presentation system, but power off control should trigger the projector to turn off and screen to retract if the video system is on.
                b. Mode Selection option to allow user to change system operating modes.
                c. Admin button to page flip to an Administrative Page with independent projector and screen controls, as well as any

other specific controls requested by the client or required by the project.

d. Help page with phone and email information for the installing contractor and name of the AV consultant.

iv. Audio Page

1. When in Engineer mode, no audio source level controls shall be available and all audio control shall be via the audio console. In Engineer mode all wireless channels are routed to the console, as are audio feeds from the video system.
2. When in Simple Use mode, audio level faders and mute buttons for any and all automix microphone and line level audio connections, four wireless microphone channels, Bluetooth inputs and an overall fader for all playback audio content should be present.
3. The wireless microphone channels shall include a general recallable EQ
4. curve for either handheld or headset microphones, recallable via a button and/or through automatic transmitter sensing.
5. A warning screen should appear upon the selection of either mode to warn the user that audio may be interrupted by the selection.

v. Video Page

1. Video projector on/off control
    a. Include a single Projector Power button to power on the projector. The screen is a fixed framed screen flown on a stage batten.
    b. Include a start up and cool down timer.
2. Video source selection
    a. Radio buttons shall allow the selection and routing of any video source to either the main projector and/or other video decoders.
3. A Video Mute button shall allow for the equivalent of a shutter control for the main projector, preventing any video from being seen within the house.

vi. Lighting Page

1. Lighting preset page shall allow for recall of 15 user-defined lighting presets from the house and stage lighting systems. Presets are to be created by the lighting contractor for recall by the AV contractor.

vii. Auxiliary Space Page

1. Room Mic/Console Select functions shall allow the user to choose and mix the stereo room microphones and direct feed from the console via a crossfader. Individual level controls shall be available for the video sources, and Bluetooth endpoints as well. This program source shall feed the ALS (Assisted Listening System) and record and livestream feeds.

2. This page shall also allow selection of the source for the equipment rack audio monitor.

b. Main Performance Hall - Portable House Mix Touch Panel (1)
    i. This panel shall function as the above panel with the following additional features:
        1. There will be a page that allows the selection of all encoded video sources. Selecting the source also connects any keyboard and mouse connected to that encoder to the local keyboard and mouse. This is particularly for the control computer which will primarily run the Blackmagic software for the switcher, but also allow for access to various other software on that control PC.

SECTION 274100 APPENDIX B - MAJOR EQUIPMENT LIST

Note: "APD" means As Per Design. It means the contractor must provide enough quantity to make the design functional without limitations beyond those expressed in the design or narrative documents.
Note: “Allow” indicates that the contractor must use the amount indicated as the base bid price for that line item. This is not a set aside allowance, this is a fixed unit price. Subsequent to award of contract, the Systems Designer and Owner shall select the actual equipment and provide a list, and the contractor will then submit back to the Owner and Systems Designer line item pricing for that equipment list. If that pricing is greater than the amount bid, the Owner will then determine if a change order is desired, or if they will reduce the list to meet the dollar amount.

Quantity	Manufacturer	Model	Description
Theater			
Base			
Loudspeakers Systems			
1	Biamp	Quote # DQ013995-1	Installed Loudspeaker Systems
4	QSC	K10.2	Portable Stage FX/Monitors with yokes
4	QSC	K8.2	Portable Stage FX/Monitors with yokes
House and Monitor Mixing Consoles and I/O			
1	Yamaha	RIO1608-D2	Small Stage Box
1	Yamaha	RIO3224-D2	Large Stage Box
1	Yamaha	DM-7	consoles
1	Gator Cases	G-TOUR 10U CAST	Large Stage Box Rack on casters
1	Middle Atlantic	D3	Rack Drawer
1	Middle Atlantic	UPS-S2200R	UPS
DSP Processing, Control, and Paging			
1	QSC	Core 24F	Core Processor with 24 i/o, GPIO, RS232
2	QSC	TSC-70-G3	Touch Panel - Provide TSC-710t-G3 for one of the touch panels
Live Room Mic			
1	Shure	VP88	Stereo Microphone
1	By Contractor	VP88 Rigging and Mounts	As needed to hang below catwalk
Assistive Listening System			
1	Listen Technologies	LA-122	Universal Antenna Kit (72 and 216 MHz)
1	Listen Technologies	LA-304	Assistive Listening Notification Signage Kit
1	Listen Technologies	LA-326	Universal Rack Mounting Kit
2	Listen Technologies	LA-381-01	Intelligent 12-Unit Charging Tray
22	Listen Technologies	LA-401	Universal Ear Speaker
5	Listen Technologies	LA-430	Intelligent Earphone/Neck Loop Lanyard
18	Listen Technologies	LR-4200-XXX	Intelligent DSP RF Receiver (72, 150 or 216 MHZ)
1	Listen Technologies	LT-800-XXX-01-D	Stationary RF Transmitter (72 or 216 MHZ)
Wireless Microphone System			
4	Sennheiser	EW-DX EM 4 DANTE	4 ch RF Receiver
16	Sennheiser	EW-DX SKM + MMD 835-1 BK	Handheld Cardioid Dynamic Wireless Mic Transmitter
16	Sennheiser	EW-DX SK	Belt Pack Wireless Mic Transmitter
1	RF Venue	DISTRO 4	Antenna distribution
1	RF Venue	DIVERSITY FIN ANTENNA	Wireless Mic Antennas
18	Point Source Audio	CO-8WL	Omni Lavalier Microphone
18	Point Source Audio	EO-8WL	Omni Earset Microphone
Wired Microphones, Cables, Mic Stands, DI's and Other Loose Equipment			
TBD	Various	Various	Allow $15,000
Production Communications System			
1	Clearcom	MS-702	Power Supply
2	Clearcom	KB-702	Portable Stations
2	Clearcom	U-BOX	For above
5	Clearcom	RS-701	Single Channel Beltpack

1	Clearcom	RS-702	Two Channel Beltpack
1	Clearcom	FL-7	Flasher
3	Clearcom	CC-300	Single Muff Heavy Duty Headset
4	Clearcom	CC-400	Double Muff Heavy Duty Headset
4	Clearcom	CC-110	Single Muff Lightweight Headset
1	Clearcom	HS-6	Handset

Video Switching and Distribution

1	Marshall	CV625-TB	PTZ Camera with tracking camera
1	Marshall	VS-PTC-300	Camera Controller
5	Visionary Solutions	DuetE-5	Video Encoder
4	Visionary Solutions	DuetD-5	Video Decoder
1	Visionary Solutions	DuetE-5	Portable Video Encoder
1	Visionary Solutions	DuetD-5	Portable Video Decoder
3	Visionary Solutions	DuetE5-WP-C-BT	Wall mount Video-BT encoder with HDMI and USB-C
1	Kiloview	D350	SRT to HDMI
1	Decimator	MD-HX	Cross convert SDI to/from HDMI
1	Blackmagic Design	ATEM Mini Pro ISO	Video Switcher/Recorder/Streamer

Video Projection

1	Barco	I65-V16	Center Projector balcony rail
1	Barco	R9803322	Rigging frame
1	Barco	ILD 0.37:1 UST 90 degree lens	Lens for above
1	Draper	383500CD	Projection Screen

Network

1	Netgear	GSM4248UX	M4250-40G8XF-PoE++ (w/ SFPs as required)
1	Netgear	GSM4212UX	M4250-10G2XF-PoE++ (w/ SFPs as required)

Terminations

APD	By Contractor	Custom	Plates, Panels, Cabling, Connectors, etc. Per specifications and drawings

AMRK Rack Equipment

1	Blackbox	JPM385A	Fiber Patch
2	Blackbox	JPMT700A	Patch Panel Cat 6A 1U 24 Port w/FMT700 modules as required
APD	By Contractor	2' Dual LC to Dual LC MMF	As required plus 20% spares
APD	By Contractor	2' Dual LC to Dual LC SMF	As required plus 20% spares
APD	By Contractor	Shielded CAT6A - 2'	As required plus 20% spares
APD	By Contractor	Shielded CAT6A - 3'	As required plus 20% spares
1	Fostex	RM-3	Audio Monitor
1 per rack	Littlelite	RL-10-D-LED	Rackmount Lamp Double
1	Stealth Computing	SR-1550	Model: SR-1550, Rack Mount Computer (COMPUTER) - 100-240V AC, 400W, FlexATX - Intel® Core™ i5-9500TE, up to 3.60GHz - Intel® UHD Graphics 630 - 32GB DDR4 Memory (2x 16GB) - 480GB Solid State Drive (SSD), 3D NAND, 5400, SATA III (6Gb/s) - 2TB Hard Drive, 2.5”, SATA III (6Gb/s), 5400 RPM, 128MB Cache - Microsoft Windows 11 Pro 64-bit OEM - ST2000SPEXI, StarTech PCIe x4 Dual GB Lan card - 3 Year Warranty
1	Cyberview	F117SB	LCD Console Drawer 1U DVI - USB - 1080P
2	Middle Atlantic	BGR-45SA-32	Rack - Provide power distribution, lacing bars and cable management, blank panels, shelves, fans as needed
1	Middle Atlantic	UPS-S2200R	UPS
1	Middle Atlantic	UPS-OLIPCARD	Network card for above
3	Audio Accessories	WEP-262EO-SH-JSK	Provide as needed plus: 1in x 3out parallel patches, plus 10% spares

8	Audio Accessories	622A	2' patch cable
8	Audio Accessories	623D	3' patch cable
1	Audio Accessories	PCH-X	Patch Cable Holder

Add Alternate 1B

Video Wall

1	Absen	KLCOB1.2 V2	SC_732026322_US_1
1	Brightsign	XT2145	Dual HDMI output
1	Visionary Solutions	DuetD-5	Video Decoder
2	K-Array	KV52	Loudspeaker for Video
1	K-Array	RUMBLE-KU44	Subwoofer for Video
1	K-Array	KOMMANDER-KA04	Amplifier for above

SECTION 28 46 00
FIRE DETECTION AND ALARM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire alarm system and associated components, including control units, related equipment, initiating devices, and notification appliances.

1.02 RELATED REQUIREMENTS

A. Section 08 71 00 - Door Hardware:

B. Section 10 44 00 - Fire Protection Specialties.

C. Section 26 05 33.16 - Boxes for Electrical Systems.

D. Section 27 10 00 - Structured Cabling: Data cables for fire alarm system IP network connections.

1.03 ABBREVIATIONS AND ACRONYMS

A. AHJ: Authorities having jurisdiction.

B. BAS: Building automation system.

C. EoL: End-of-line.

D. FACU: Fire alarm control unit.

E. HVAC: Heating, ventilation, and air conditioning.

F. IDC: Initiating device circuit.

G. LAN: Local area network.

H. MNS: Mass notification system.

I. NAC: Notification appliance circuit.

J. NPLFA: Non-power-limited fire alarm.

K. PLFA: Power-limited fire alarm.

L. SLC: Signaling line circuit.

M. SOO: Sequence of operation.

1.04 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

B. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

C. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. ICC (IFC) - International Fire Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

F. NECA 90 - Standard for Commissioning Building Electrical Systems; 2024.

G. NECA 305 - Standard for Fire Alarm System Job Practices; 2018.

H. NFPA 3 - Standard for Commissioning of Fire Protection and Life Safety Systems; 2024.

I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

J. NFPA 72 - National Fire Alarm and Signaling Code; Most Recent Edition Cited by Referring Code or Reference Standard.

K. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

L. UL 38 - Standard for Manual Signaling Boxes for Fire Alarm Systems; Current Edition, Including All Revisions.

M. UL 268 - Standard for Smoke Detectors for Fire Alarm Systems; Current Edition, Including All Revisions.

N. UL 268A - Standard for Smoke Detectors for Duct Application; Current Edition, Including All Revisions.

O. UL 464 - Standard for Audible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories; Current Edition, Including All Revisions.

P. UL 497B - Standard for Protectors for Data Communications and Fire-Alarm Circuits; Current Edition, Including All Revisions.

Q. UL 521 - Standard for Heat Detectors for Fire Protective Signaling Systems; Current Edition, Including All Revisions.

R. UL 864 - Control Units and Accessories for Fire Alarm Systems; Current Edition, Including All Revisions.

S. UL 1449 - Standard for Surge Protective Devices; Current Edition, Including All Revisions.

T. UL 1971 - Standard for Signaling Devices for the Hearing Impaired; Current Edition, Including All Revisions.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate arrangement of equipment with dimensions and clearance requirements of actual equipment.
   2. Coordinate placement of devices and notification appliances with potential conflicts or view obstructions.
   3. Coordinate work to provide power for equipment at required locations (e.g., smoke dampers, type of actuators, line or local control transformer, zoning, grouping and circuit activations).
   4. Coordinate requirements for branch circuit protection, identification, and shunt trip if applicable.
   5. Coordinate reflected ceiling plans to avoid conflicting placements; maintain minimum diffuser and detector clearances as indicated.
   6. Coordinate submittals to confirm equipment and associated components are capable of indicated settings, and manufacturer documentation identifies required compatible product listings.
   7. Notify Architect Engineer of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Preinstallation Meetings:
   1. Conduct meeting with facility representative to review devices, notification appliances, and equipment locations.
   2. Conduct meeting with facility representative and other related equipment manufacturers to discuss fire alarm system interface requirements.
   3. Conduct meeting to review anticipated installation of code-required smoke control requirements, product solutions, and SOO.
   4. Convene one week before starting work for review of documented SOO for system applications.

C. Sequencing:
   1. Verify exact termination locations required for boxes, enclosures, and equipment.
   2. Do not install devices or notification appliances until final surface finishes, painting, and cleaning are complete, unless otherwise required by AHJ.

3. Do not begin installation of conductors and cables until installation of conduit and pathways between termination points is complete.
4. Sequence work to protect cabling (e.g., overspray painting, physical stress, and insulation damage or covering markings).
5. Verify naming convention for equipment identification, including room names and numbers, prior to creation of final drawings, reports, and labels.

D. Scheduling:
1. Arrange access to facility for data collection with facility representative.
2. Where work involves interruption of existing electrical or fire alarm system service, arrange interruption with Owner.
   a. Arrange test start and end with responsible reporting service. Confirm system normal operating mode and record as-found and as-left settings.
   b. Arrange work to disable individual devices or circuits for minimal disruption if possible.
   c. Arrange in accordance with NFPA 72 fire alarm system impairment requirements.
   d. Where required by AHJ, arrange systems or partial system out of service interruption in accordance with requirements of building, life safety, and fire codes (e.g., approved fire watch plus required notifications, tags at each fire department connection and control valve, and AHJ notification when excess hours).

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Evidence of designer qualifications.

C. Comply with NFPA 72 chapter "Documentation," including noting names of installers, owners, and system classification information.

D. Design Documents: Submit all information required for plan review and permitting by AHJ, including floor plans, riser diagrams, and description of operation.
1. Copy (if any) of list of data required by AHJ.
2. NFPA 72 "Record of Completion", filled out to extent known at time.
3. Clear and concise description of operation, with input/output matrix similar to that shown in NFPA 72 Appendix A, and complete listing of software required.
4. Manufacturer's detailed product data sheet for each component, including wiring diagrams, and circuit length limitations. Catalog pages and product descriptions include ratings, dimensions, finishes, service conditions, and included features.
5. Certification by manufacturer of FACU that system design complies with Contract Documents.
6. Certification by Contractor that system design complies with Contract Documents.

E. Shop Drawings: Submit installation documentation required for plan review and permitting by AHJ, including floor plans showing locations of fire alarm system components, enlarged drawn to identified scale plan view, and riser diagrams.
1. System zone boundaries and interfaces to fire safety systems.
2. Show locations of components, circuits, and raceways; mark components with identifiers used in control unit programming.
3. Include elevations and details of proposed equipment arrangements.
4. Include system interconnection schematic riser diagram showing proposed and approved cable size and type; coordinated with floor plans and describing circuit class, survivability, and application specific information required by NFPA 72.
5. Include typical wiring diagrams for devices, notification appliances, remote indicators, annunciators, remote test stations, and EoL and power supervisory devices.
6. Include requirements and control diagrams for interfacing with other systems.

7. Circuit layouts; number, size, and type of raceways and conductors; conduit fill calculations; standby and spare capacity calculations; notification appliance circuit loop resistance and voltage drop calculations, including spare capacity.
8. List of devices and notification appliances on each SLC, with spare capacity indicated.
9. Manufacturer's detailed data sheet for each component, including wiring diagrams, installation instructions, and circuit length limitations.
10. Description of power supplies; if secondary power is by battery include calculations demonstrating adequate battery power.
11. Detailed drawing of graphic annunciators, displays, and interfaces.
12. Certification by either FACU manufacturer or manufacturer of related equipment.
13. Certification by FACU manufacturer that system design complies with Contract Documents.
14. Certification by Contractor that system design complies with Contract Documents.

F. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

G. Evidence of installer qualifications.

H. Evidence of maintenance contractor qualifications, if different from installer.

I. Inspection and Test Reports:
1. Submit inspection and test plan prior to closeout demonstration.
2. Submit documentation of satisfactory inspections and tests.
3. Submit NFPA 72 "Inspection and Test," filled out.

J. Operating and Maintenance Data: See Section 01 7800 for additional requirements; revise and resubmit until acceptable; have one set available during closeout demonstration:
1. Complete set of specified design documents, as approved by AHJ.
2. Additional printed set of project record documents and closeout documents, bound or filed in same manuals.
3. Contact information for firm that will be providing contract maintenance and trouble call-back service.
4. List of recommended spare parts, tools, and instruments for testing.
5. Replacement parts list with current prices, and source of supply.
6. Detailed troubleshooting guide and large scale input/output matrix.
7. Preventive maintenance, inspection, and testing schedule complying with NFPA 72; provide printed copy and computer format acceptable to Owner.
8. Detailed but easy to read explanation of procedures require recording of system trouble events by qualified personnel, such as when routine testing is being conducted for fire drills and when entering into contracts for building renovations.

K. Project Record Documents: See Section 01 7800 for additional requirements, have one set available during closeout demonstration:
1. Complete set of floor plans showing actual installed locations of components, conduit, and zones.
2. "As installed" wiring and schematic diagrams, with final terminal identifications.
3. "As programmed" operating sequences, including control events by device, and updated input/output chart.

L. Closeout Documents:
1. Certification by manufacturer that system has been installed in compliance with manufacturer's installation requirements, is complete, and is in satisfactory operating condition.
2. NFPA 72 "Record of Completion," filled out completely and signed by installer and authorized representative of AHJ.

3. Maintenance contract.

1.07 QUALITY ASSURANCE

A. Designer Qualifications: NICET Level III (three) or Level IV (four) certified fire alarm technician or registered fire protection engineer, employed by FACU manufacturer, Contractor, or installer, with experience designing fire alarm systems in jurisdictional area of AHJ.

B. Installer Qualifications: Firm with minimum three years documented experience installing fire alarm systems of specified type and providing contract maintenance service as regular part of their business.
   1. Authorized representative of FACU manufacturer; submit manufacturer's certification that installer is authorized; include name and title of manufacturer's representative making certification.
   2. Installer Personnel: At least two years of experience installing fire alarm systems.
   3. Supervisor: Level III (three) or Level IV (four) certified fire alarm technician; furnish name and address.
   4. Contract maintenance office located within 50 miles of project site.

C. Manufacturer Qualifications: Company specialized in manufacturing products specified in this section with at least three years of documented experience.

D. Maintenance Contractor Qualifications: Same entity as installer or different entity with specified qualifications.

1.08 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.

B. Receive, inspect, handle, and store products in accordance with manufacturer's instructions and NECA 305.

C. Handle carefully to avoid damage to internal components, enclosure, and finish.

D. Store products in manufacturer's unopened packaging, keep dry and protect from damage until ready for installation.

1.09 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

B. Do not exceed maximum ambient temperature requirements for batteries at any time, which reduces battery service life. Replace batteries exposed to temperatures in excess of manufacturer's requirements.

C. 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 Engineer and obtain direction before proceeding with work.

D. Existing Conditions:
   1. Existing Fire Alarm System: Remove devices indicated and terminate the remainder of the existing circuit in a manner that allows repair of the existing system.. Comply with NFPA 70.
      a. Maintain existing under warranty as if new; do not take existing portions of system out of service until new portions are fully operational, tested, and connected.
   2. Modifications to Existing System:
      a. Remove inactive or abandoned cables and components from existing fire alarm system.
      b. Remove unused existing components and materials from site and dispose according to local and federal requirements.

1.10 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Fire Alarm Control Units and Accessory Equipment: Provide minimum 3-year manufacturer warranty covering repair or replacement due to defective materials or workmanship.

C. Fire Alarm Manual Pull Stations: Provide minimum 1-year manufacturer warranty covering repair or replacement due to defective materials or workmanship.

D. Fire Alarm System Detectors: Provide minimum 1-year year manufacturer warranty covering repair or replacement due to defective materials or workmanship.

E. Fire Alarm System Notification Appliances: Provide minimum 1-year year manufacturer warranty covering repair or replacement due to defective materials or workmanship.

PART 2 PRODUCTS

2.01 FIRE ALARM SYSTEM

A. General Requirements:
   1. Provide new fire alarm system complying with NFPA 70, NFPA 72, NFPA 90A, and consisting of required equipment, conduit, cabinets, outlet boxes, wiring, connectors, hardware, supports, accessories, components, software, and system programming as necessary for complete operating system that provides functional intent indicated.
   2. Comply with the following; where requirements conflict, order of precedence of requirements is as listed:
      a. 36 CFR 1191 and ADA Standards.
      b. Requirements of AHJ.
      c. Applicable local codes.
      d. Contract Documents.
      e. NFPA 72; "should" is mandatory; where conflicts between requirements require deviation, identify deviations clearly on design documents.
   3. Fire Alarm System Products:
      a. Listed, classified, and labeled as suitable for purpose intended.
      b. Installation Environments: Provide products suitable for their respective indoor and outdoor applications.
   4. Fire Alarm System Design Information:
      a. Building Code: Comply with 2021 AFPC Vol. II.
         1) Principle Occupancy: As indicated on Architect code summary drawings.
         2) Principle Use: As indicated on Architect code summary drawings.
         3) Fire Suppression System: Unsprinkled.
      b. NFPA 72 Fire Alarm System Classification: Remote supervising station.
      c. Notification Appliance Zones:
         1) See fire alarm system floor plans on drawings.
   5. Provide fire alarm circuits in accordance with NFPA 70.
      a. Comply with methods of interconnecting FACUs in accordance with NFPA 72 and NFPA 70.
      b. Power Sources:
         1) Comply with requirements for power supplies of emergency systems in accordance with NFPA 70.
         2) Primary: Dedicated branch circuits from facility power distribution system.
         3) Secondary: Storage batteries with capacity to operate system for period specified by NFPA 72.
      c. Wiring and Wiring Methods:
         1) General Requirements:
            (a) Comply with requirements for wiring and wiring methods in accordance with NFPA 70.

(b) 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.
(c) Special Occupancies: Comply with NFPA 70.
(d) Comply with NFPA 70 for wire and cable plenum, riser, general-purpose, limited-use, undercarpet, and underground applications.

2) Fire Alarm Circuits:
(a) Comply with NFPA 70 for conditions and types required for multiconductor cable systems.
(b) Non-Power-Limited Fire Alarm (NPLFA) Circuits:
(1) Provide dedicated NPLFA non-GFCI branch circuits for fire alarm equipment and marked by red identification in accordance with NFPA 70.
(c) Power-Limited Fire Alarm (PLFA) Circuits:
(1) Provide identification for PLFA circuits in accordance with NFPA 70.

6. Provide pathway class designations and pathway survivability, as defined in NFPA 72.
a. Provide monitoring of conductors and other signaling channels for integrity and circuit performance.
b. Pathway Class Designations:
1) Unless otherwise indicated or required, pathways to meet the following requirements:
(a) SLCs: Class B (star, tee-tap, multi-tap, with no return).
(b) IDCs: Class B (daisy-chain with EoL resistor device installed at end of circuit).
(c) NACs: Class B (daisy-chain with EoL resistor device installed at end of circuit).

7. Spare System Capacity:
a. SLCs: Provide sufficient capacity to protect the entire building, not just the areas within the scope of work. .
b. NACs: Provide sufficient capacity to protect the entire building, not just the areas within the scope of work.

8. Secondary Power Source - Battery Storage Capacity:
a. Provide standby (nonalarm) operation sufficient for 24 hours.
b. Provide additional alarm operation for 5 minutes.
c. Calculate combined of standby load plus alarm load for overall battery storage capacity requirements, per power supply.
d. Provide 25 percent additional overall battery capacity correction factor.

B. Fire Alarm System Interfaces and Control Functions:
1. UL 864 listed unless otherwise indicated.
2. Descriptions below are intended to provide means for interface. See project SOOs, narrative, and input/output matrix for execution requirements.
3. Provide initiating devices, interfaces, and control functions for emergency control function interfaces in accordance with NFPA 72.
4. Provide monitoring of interconnected systems. Coordinate notification appliance alternate markings as indicated on drawings.
5. HVAC Systems:
a. Air Handling Units (AHUs) and Roof Top Units (RTUs):
1) Provide duct smoke detector on supply side of air stream for units over 2,000 cfm.
2) Provide duct smoke detector on return side of air stream for units over 15,000 cfm.

3) Provide remote test station for each duct smoke detector unless explicitly indicated as not required.
4) Provide output signal to shut down units with at least one duct smoke detector via addressable relay module.
5) Where fire/smoke dampers are located downstream of unit, provide monitoring point input to determine that unit is not operational and subsequently provide output signal to close such dampers via addressable relay module and power isolation relay.

2.02 FIRE ALARM CONTROL UNITS AND RELATED EQUIPMENT

A. Manufacturers:
1. Honeywell International, Inc; Honeywell Gamewell-FCI: www.honeywell.com/#sle.
2. Honeywell International, Inc; Honeywell Notifier: www.honeywell.com/#sle.
3. Substitutions: See Section 01 60 00 - Product Requirements.

B. Fire Alarm Control Units and Related Equipment: Listed and labeled as complying with UL 864.

C. Provide cabinets and enclosures as indicated or as required to house system components.

D. Fire Alarm Control Unit (FACU): Addressable.
1. SLCs and IDCs: Configurable for Class B or Class A with additional modules.
2. NACs: Integral and programmable with synchronization modules or cards as required.
3. Power Supply: 120 VAC, 60 Hz, supplying necessary power for FACU.
4. User-Interface: Touchscreen display for system interfacing and service mode settings, include password and user credentials; configurable for custom actions and incorporates historical event log.
5. Support self-testing detector capability.
6. Remote Annunciator Support: Up to 10.

E. Notification Appliance Circuit Expansion:
1. Where notification appliance circuit requirements exceed capacity of FACU, provide accessories and cabinets as required for expansion.

F. Networking:
1. Comply with NFPA 70.
2. FACU capable of communicating over network utilizing peer-to-peer, inherently regenerative communication and format.
3. Provide network repeaters as required.

G. Addressable Interface Modules:
1. General Requirements:
a. Provide addressable modules suitable for connection to FACU SLCs.
b. Unless otherwise indicated, use addressable modules only in clean, dry, indoor, nonhazardous locations.
2. Addressable Monitor Modules: Unless devices are explicitly permitted connected together on one zone; provide separate addressable monitor module for each conventional dry-contact input device in order to be individually identifiable by addressable FACU.
3. Addressable Relay Modules:
a. Provide as indicated or as required to perform necessary functions via dry-contact interface.
b. Where load exceeds module contact rating, provide accessory power isolation relays suitable for load as required.

H. Alarm Communication:
1. Supervising Station Alarm Systems:
a. Provide accessories as required for interface with supervising station as indicated and as required by AHJ.

b. Communication Method: Dual path, internet protocol (IP) primary with cellular backup.
c. Supervise communication paths at interval required by NFPA 72.

I. Remote Annunciators:
1. LED Remote Annunciators:
a. Provide LEDs each with customizable label for displaying alarm, supervisory, and trouble conditions.
b. Mounting: Wall-mounted; Provide flush-mounted annunciator for finished areas and surface-mounted annunciator for non-finished areas unless otherwise indicated.

2.03 FIRE ALARM SYSTEM INITIATING DEVICES

A. Manufacturers:
1. Honeywell International, Inc; Honeywell Gamewell-FCI: www.honeywell.com/#sle.
2. Honeywell International, Inc; Honeywell Notifier: www.honeywell.com/#sle.
3. Substitutions: See Section 01 60 00 - Product Requirements.
4. Source Limitations: Furnish initiating devices produced by same manufacturer as FACUs where possible.

B. General Requirements:
1. Addressable Systems:
a. Addressable Devices: Individually identifiable by addressable FACU; suitable for connection to FACU SLCs.
2. Provide devices and associated accessories suitable for intended application and location to be installed. Unless otherwise indicated, use addressable devices and addressable interface modules only in clean, dry, indoor, nonhazardous locations.
3. Surface-Mounted Devices: Provide manufacturer's accessory surface mount backboxes or suitable outlet/device box.
4. Devices for Outdoor and Damp/Wet Locations: Weatherproof, suitable for outdoor use; provide manufacturer's accessory backboxes or enclosures in accordance with product listing.
5. Devices for Hazardous/Classified Locations: Listed and labeled as suitable for classification of installed location.

C. Manual Fire Alarm Boxes/Pull Stations:
1. Description: Noncoded manual signaling boxes listed and labeled as complying with UL 38.
2. Alarm Initiation: Configured for general alarm initiation unless otherwise indicated; presignal stations (where indicated) require use of key to initiate general alarm.
3. Operation: Dual-action unless otherwise indicated or required.
a. Dual-Action Operation: First requires pushing, pulling, or lifting, then pulling of lever.
4. Color: Red, in accordance with NFPA 72.
5. Station Reset: Requires use of key or tool.

D. Spot-Type Detectors:
1. Utilize plug-in mounting to separate base with tamper-resistant feature; provide bases as indicated or as required.
2. Addressable Detectors:
a. Provide LED indication of normal operation and regular communication with FACU and alarm condition.
3. Smoke Detectors:
a. Listed and labeled as complying with UL 268.
b. Provide sensor type (e.g., photoelectric, ionization) as indicated.
4. Thermal/Heat Detectors:
a. Listed and labeled as complying with UL 521.

b. Provide sensor type (e.g., fixed temperature, rate-of-rise) and rating as indicated.

E. Duct Smoke Detectors:
1. Listed and labeled as complying with UL 268A.
2. Ratings: Compatible with air velocity, temperature, and humidity requirements for installed duct.
3. Housing: Select as required for application.
4. Sampling Tubes: Select as required for installation in duct to be monitored.

F. Beam Smoke Detectors:
1. Listed and labeled as complying with UL 268.
2. Provide reflective type (with transmitter/receiver unit and separate reflector) or end-to-end type (with separate transmitter and receiver units) detectors.
3. Provide minimum of four configurable automatic detection sensitivity levels.
4. Select detectors and associated accessories suitable for coverage range required.
5. Finish Color: Selected by Architect.
6. Coverage Area: As indicated on drawings.

2.04 FIRE ALARM SYSTEM NOTIFICATION APPLIANCES

A. Manufacturers:
1. Honeywell International, Inc; Honeywell System Sensor: www.honeywell.com/#sle.
2. Substitutions: See Section 01 60 00 - Product Requirements.
3. Source Limitations: Furnish notification appliances produced by same manufacturer as FACUs where possible.

B. General Requirements:
1. Provide signaling notification appliances listed for fire-protective service and intended operating mode, public or private; suitable for connection to FACU notification appliance circuits.
2. Provide notification appliances and associated accessories suitable for intended application and location to be installed. Use notification appliances only according to listed mounting (e.g. ceiling, wall).
3. Surface-Mounted Notification Appliances: Provide manufacturer's accessory surface mount backboxes or suitable outlet/device box.
4. Notification Appliance Derating: Include device derating adjustments in accordance with listing where applicable, including the following.
a. Where accessory protective guards or enclosures are utilized.
b. Where required by field conditions (e.g., ambient temperature and sound).
5. Notification Appliance Color:
a. Wall-Mounted: White.
b. Ceiling-Mounted: White.
c. See drawings for mounting configuration indicated by symbols on floor plans, system interconnection diagrams, and details.

C. Visible Notification Appliances:
1. Public Mode Operation: Listed and labeled as complying with UL 1971.
2. Strobes: Clear or nominal white lens with flash rate of 1 Hz unless otherwise indicated or required; xenon or LED light source with maximum pulse duration of 0.02 seconds; candela rating as indicated.

D. Audible Notification Appliances:
1. Listed and labeled as complying with UL 464.
2. Rated Sound Pressure Level: As required to achieve design sound pressure levels, but not less than 75 dBA at 10 feet for public mode operation or 45 dBA at 10 feet for private mode operation in accordance with UL 464.

3. Horns: Selectable tone, including at minimum NFPA 72 temporal 3 pattern and continuous; minimum of two selectable volume levels.

2.05 WIRE AND CABLE

A. General Requirements:
   1. Comply with NFPA 70 listing and marking requirements for cables.
   2. Provide cables as indicated or as required for connections between system components.
      a. Data Cables for IP Network Connections: Unshielded twisted pair (UTP) complying manufacturer's minimum requirements.
      b. See Section 27 10 00.

B. Power-Limited Fire Alarm Cables (PLFA):
   1. Comply with applications of listed cables in accordance with Chapter 7 of NFPA 70.
      a. Fire alarm cable substitutions in accordance with NFPA 70: Permitted.

C. Non-Power-Limited Fire Alarm Cables (NPLFA):
   1. Comply with NPLFA circuit conductor properties in accordance with NFPA 72.
   2. Comply with listing requirements in Chapter 7 of NFPA 70.

2.06 ACCESSORIES

A. Provide components as indicated or as required for connection of fire alarm system to devices and other systems indicated.

B. Provide EoL resistors as required for wiring supervision.

C. Protective Covers for Fire Alarm Devices:
   1. Listed to same standard as device being protected.
   2. Outdoor Covers: Weather resistant, suitable for outdoor use; use only with outdoor-rated devices.
   3. Provide guards to protect devices where subject to mechanical damage; listed for use with detector.
      a. Protective Covers for Detectors:
         1) Use only with specific devices approved under listing.

D. Documentation Cabinets:
   1. Provide cabinets, size as indicated or as required to comply with on-site documentation storage required by NFPA 72.
   2. Cabinet: Steel with red finish; keyed to match fire alarm system equipment unless otherwise required by AHJ.

E. Surge Protection:
   1. Line Voltage Surge Protection:
      a. Provide for each line voltage circuit serving fire alarm system control units and related equipment (e.g., FACU, field booster panels, nodes, and transponders).
      b. Listed and labeled as complying with UL 1449.
   2. Low Voltage Surge Protection:
      a. Provide for each power-limited fire alarm circuit that enters or exits a building.
      b. Listed as complying with UL 497B.
      c. Provide voltage/current ratings suitable for circuit to be protected.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify field measurements, including future system expansion as indicated on Contract Documents.

B. Verify that system capacities listed in manufacturer instructions align with designed system.

C. Verify that mounting surfaces are ready to accept components and equipment, with suitable support frames and anchors installed where required.

D. Verify ratings, configurations, and characteristics of system components.

E. Verify rough-ins for field connections.

F. Verify that work likely to damage fire alarm system has been completed.

G. Verify that interior of building has been protected from weather.

H. Perform preinstallation tests and inspections per manufacturer's instructions and in accordance with NECA 305.

I. Verify that system bonding is in accordance with Section 26 05 26.

J. Do not energize system until deficiencies have been corrected.

K. Verify that branch circuit wiring installation is completed, tested, and ready for connection to fire alarm system. Overcurrent protection ratings are consistent with circuit voltage and manufacturer's recommendations and nameplate data for equipment.

3.02 PREPARATION

A. Prior to installation, confirm environment of installation area is clean, and with ambient temperature, humidity, and ventilation requirements are per manufacturer’s written instructions.
   1. Clean and vacuum in accordance with manufacturer's written instructions. Confirm equipment ventilation holes are absent of obstructions and free for air flow.
   2. Clean pathways thoroughly to remove foreign materials before installing conductors and cables.
   3. Clean dirt, debris, plaster, and other foreign materials from equipment enclosures, cabinets, and outlet boxes.
   4. Clean surfaces to receive adhesive products according to manufacturer's instructions.

B. Follow tool requirements for installation, including torquing adjustments, as listed in manufacturer documentation.

C. Remove detector dust covers prior to system energization.

3.03 INSTALLATION

A. Install field-devices, components, FACU and related equipment, and accessories in accordance with the following:
   1. Manufacturer's instructions, applicable codes, and Contract Documents.
   2. NFPA 72.
   3. NFPA 70; including requirements for mechanical execution of work.

B. Field Locations:
   1. Obtain Owner's approval of locations of devices and notification appliances before installation.
   2. Arrange equipment to provide minimum operational clearances and required maintenance access in accordance with manufacturer's instructions and NFPA 70.
   3. Conceal wiring, conduit, outlet boxes, and supports where installed in finished areas; maintain code-required access.

C. Raceways and Supports:
   1. Coordinate locations of outlet boxes as required for installation. Only install boxes and equipment at locations based on application standards indicated in NFPA 72.
   2. Secure and support raceways at intervals complying with NFPA 70. Provide supports where vertical rise exceeds permissible limits.
   3. Install firestopping to preserve fire resistance rating of partitions and other elements.

D. Wiring and Connections:

1. Maintain separation of Class 1, Class 2, Class 3 remote-control, signaling, fire alarm circuits, and power-limited circuits in accordance with cable insulation class and NFPA 70.
2. Maintain circuit pathway and class designations in accordance with NFPA 72 for configuration, separation, and survivability.
3. Comply with permitted and not permitted installations for wires, cables, cable routing assemblies, communications circuits, and fire alarm circuits in accordance with NFPA 70.
4. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by AHJ. Provide independent support from building structure and suspended ceiling systems. Do not provide support from raceways, piping, ductwork, or other systems.
5. Provide grounding and bonding in accordance with Section 26 05 26.
6. Comply with manufacturer's minimum cable sizes or ratings.
7. Do not exceed manufacturer's recommended maximum power, signal, or network cable lengths between components.
8. Provide network wiring in accordance with NFPA 70.
9. Neatly train and bundle conductors inside boxes, wireways, and cabinets.
10. See manufacturer's instructions for batteries.

E. Fire Alarm System Components:
1. Install field-installed devices, components, relays, notification appliances, accessories, and when applicable EoL resistors.
   a. Install wiring to supervisory devices and associated EoL resistors as required for supervision of hardwired connections
2. Install Wall-Mounted Equipment: Assemble component hardware within (e.g., card bays, sub-bays, expansion bays, signal cards, other card frames, networking, signal transmission, application modules, tamper monitoring devices, interconnecting modules, and auxiliary power supplies), including space for required spare capacity, and configure settings.
3. Install Interconnect Wiring: Connect system cabinets, install processor and cards, cabling, connectors, terminations, and bonding.

F. Branch Power:
1. After installation confirmations, follow manufacturer instructions to connect branch circuit power cables to premises fire alarm system components; comply with NFPA 70.
2. Where accessories require auxiliary power, provide control power source and monitoring as indicated or as required to complete installation.
3. Install auxiliary power supplies, including indicated monitoring, and connections necessary for remote equipment.

G. System Identification:
1. Identify devices, notification appliances, components, cables, and equipment in accordance with approved submittals. See Section 26 05 53.
2. Confirm fire alarm system programming meets requirements of SOO and sub-system SOOs.
3. Mark location of disconnecting means for NPFLA circuits.
4. Coordinate to provide red branch power circuit protective devices or identify them accordingly as required by NFPA 72 and NFPA 70.
5. Mark date of batteries installed on inside cover of panels and formal maintenance logs.

H. Troubleshooting and Installer Checks:
1. Field test connectivity periodically during installation process to avoid unexpected troubleshooting.
2. Check system operation for notification, FACU functions, circuit supervision, alarm initiating devices, supervisory initiating devices, dress panels/doors/covers, and programming before performing field tests.

I. Fire Alarm System Tests:
   1. Perform required tests of NFPA 72. Record measured values during operational checks.
   2. Confirm functional testing of fire alarm system is as indicated in Contract Documents.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Provide services of manufacturer's authorized representation to observe installation and assist in inspection, testing, and adjusting. Include manufacturer's detailed testing procedures and field reports and with submittals.

C. Provide equipment, two-way radios for testing personnel use, tools, and supplies required to accomplish inspection and testing.

D. Notify Owner and Architect Engineer at least two weeks prior to scheduled inspections and tests.

E. Inspect and test in accordance with manufacturer's instructions.

F. Inspect wiring and components for damage and defects.

G. Batteries and Power Supplies: Perform inspections and tests listed in manufacturer installation instructions.

H. Perform additional requirements related to testing and inspection during system startup.

I. Test for interface with other systems.

J. Test shunt trips to verify operation.

K. Correct defective work, adjust for operation, and retest until entire system complies with Contract Documents.

L. Submit detailed reports indicated inspection and testing results, corrective actions taken, and as-found and final adjusted settings.

M. Diagnostic Period: After successful completion of inspections and tests, operate system to normal mode for at least 14 days without system or equipment malfunctions.

3.05 SYSTEM STARTUP

A. Obtain Owner approval prior to performing system startup.

B. Prepare and start equipment and systems in accordance with manufacturer's instructions and recommendations.

3.06 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

B. Adjust initiating device and notification appliance settings to achieve desired operation as indicated in submittals.

C. Measure power supply primary and secondary voltages, log values for records, and make appropriate adjustments.

D. Adjust alignment of equipment covers and doors. Provide keys and spare keys to Owner.

E. Reprint and reinstall damaged or misinstalled labels; maintain neat and square to installed location good workmanship - see NECA 1; maintain consistent placements for identification on products of similar type.

F. Adjust devices or notification appliances and associated bases to be flush and level.

G. Program system parameters according to requirements of Owner.

3.07 CLEANING

A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.

B. See Section 01 74 19 - Construction Waste Management and Disposal for field-generated construction waste requirements.

C. Check tightness of electrical connections. Replace damaged components and provide closure plates for vacant positions. Provide circuit directory updates for related power branch circuits.

D. Clean and repair existing materials and equipment that remain or are indicated for reuse.

E. Clean dirt, debris, plaster, and other foreign materials from outlet boxes and fire alarm system equipment and components.

F. Clean fire alarm system equipment and components according to manufacturer's instructions and NECA 305.

G. Clean surfaces and interiors of boxes and device cover plates in accordance with manufacturer's instructions to remove dirt, fingerprints, debris, plaster, and other foreign materials.

H. Repair scratched or marred exposed surfaces to match original factory finish.

I. Comply with federal (EPA), state, and local regulations for battery handling and disposal. Do not spill battery fluids down plumbing drains. Only use containers safe for transportation marked 'nonspillable.'

3.08 COMMISSIONING

A. See Section 01 91 13 - General Commissioning Requirements for additional requirements.

B. Comply with NFPA 3 for commissioning of fire protection and life safety systems.

C. Comply with NECA 90 for commissioning building electrical systems.

D. Support Commissioning Agent in assembling test data and generating reports.

E. Participate in four hours of seasonal testing, as scheduled by Commissioning Agent, six months from Date of Substantial Completion.

3.09 INSPECTION AND TESTING FOR COMPLETION

A. Notify Owner 7 days prior to beginning completion inspections and tests.

B. Notify AHJ and comply with their requirements for scheduling inspections and tests and for observation by their personnel.

C. Provide services of installer's supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.

D. Prepare for testing by ensuring that work is complete and correct; perform preliminary tests as required.

E. Provide tools, software, and supplies required to accomplish inspection, testing, and document results.

F. Perform inspection and testing in accordance with NFPA 72 and requirements of AHJ; document each inspection and test.

G. Correct defective work, adjust for operation, and retest until entire system complies with Contract Documents.

H. Diagnostic Period: After successful completion of inspections and tests, operate system in normal mode for at least 14 days without system or equipment malfunctions.
   1. Record system operations and malfunctions.
   2. If malfunction occurs, start diagnostic period over after correction of malfunction.
   3. Owner will provide attendant operator personnel during diagnostic period; schedule training to allow Owner personnel to perform normal duties.
   4. At end of successful diagnostic period, fill out and submit NFPA 72 "Inspection and Testing Form."

3.10 OWNER PERSONNEL INSTRUCTION

A. Provide the following instruction to designated Owner personnel:
   1. Hands-On Instruction: On-site, using operational system.
   2. Classroom Instruction: Owner furnished classroom, on-site or at other local facility.

B. Administrative: One-hour session(s) covering issues necessary for nontechnical administrative staff; classroom:
   1. Initial Training: One session precloseout.

C. Basic Operation: One-hour sessions for attendant personnel, security officers, and engineering staff; combination of classroom and hands-on:
   1. Initial Training: One session precloseout.

D. Use operation and maintenance documentation as primary instruction material; have paper copies available for attendees and supplement training material aids.

3.11 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals for additional submittals.

B. See Section 01 79 00 - Demonstration and Training for additional requirements.

C. Closeout Demonstration: Demonstrate operation of all functions to Owner.
   1. Be prepared to conduct any of required tests.
   2. Have minimum one copy of operation and maintenance data, preliminary copy of project record drawings, input/output matrix, and operator instruction chart(s) available during demonstration.
   3. Have authorized technical representative of FACU manufacturer present during demonstration.
   4. Demonstration may be combined with inspection and testing required by AHJ; notify AHJ with enough time to schedule demonstration.
   5. Repeat demonstration until successful.

D. Substantial Completion of project cannot be achieved until inspection and testing is successful and the following:
   1. Specified diagnostic period without malfunction has been completed.
   2. Approved operating and maintenance data has been delivered.
   3. All aspects of operation have been demonstrated to Owner.
   4. Final acceptance of fire alarm system has been given by AHJ.
   5. Specified precloseout instruction is complete.

3.12 PROTECTION

A. Protect installed fire alarm system from subsequent construction operations.

3.13 MAINTENANCE

A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements relating to maintenance service.

B. Provide to Owner, at no extra cost, written maintenance contract for entire manufacturer's warranty period, to include work described below.

C. Perform routine inspection, testing, and preventive maintenance required by NFPA 72, including:
   1. Maintenance of fire safety interface and supervisory devices connected to fire alarm system.
   2. Repairs required, unless due to improper use, accidents, or negligence beyond control of maintenance contractor.
   3. Record keeping required by NFPA 72 and AHJ.

D. Provide trouble call-back service upon notification by Owner:

1. Provide on-site response within two hours of notification.
2. Include allowance for call-back service during normal working hours at no extra cost to Owner.
3. Owner will pay for call-back service outside of normal working hours on hourly basis, based on actual time spent at site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.

E. Provide complete description of preventive maintenance, systematic examination, adjustment, cleaning, inspection, and testing, with detailed schedule.

F. Maintain on-site log listing date and time of each inspection and call-back visit, condition of system, nature of trouble, correction performed, and parts replaced. Submit duplicate of each log entry to Owner's representative upon completion of site visit.

G. Comply with Owner's requirements for access to facility and security.

END OF SECTION

This page was intentionally left blank for duplex printing.