

Project Manual

General, Mechanical and Electrical Construction

Project Title Story County Attorney Office
Remodeling 2024

Owner Story County Board of Supervisors
900 Sixth Street
Nevada, Iowa 50201

Architect Roseland Mackey Harris Architects PC
1615 Golden Aspen Drive, Suite 110
Ames, Iowa 50010
Phone: (515) 292-6075

*Mechanical &
Electrical Engineer* Brewer Engineering Consultants, PLC
905 Washington Ave SE
Bondurant, IA 50035
Phone: (515) 957-8806
Fax: (515) 957-8816

Project Manual Issue date: September 11, 2024

Pre-bid date: Thursday September 19 at 5:00 PM
Story County Justice Center
1315 South B Avenue
Nevada, Iowa 50201

Bid date **Tuesday October 1, 2024 at 9:00 am**

TABLE OF CONTENTS

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

00 1113	ADVERTISEMENT TO BID	3
00 2113	INSTRUCTIONS TO BIDDERS	5
00 4100	BID FORM	2
00 4323	ALTERNATES FORM	1
00 5200	AGREEMENT FORM	1
00 7200	GENERAL CONDITIONS	1
00 7300	SUPPLEMENTARY CONDITIONS	1

DIVISION 01 - GENERAL REQUIREMENTS

01 2000	PRICE AND PAYMENT PROCEDURES	3
01 2300	ALTERNATES	1
01 3000	ADMINISTRATIVE REQUIREMENTS	6
01 3216	CONSTRUCTION PROGRESS SCHEDULE	2
01 4000	QUALITY REQUIREMENTS	3
01 5000	TEMPORARY FACILITIES AND CONTROLS	2
01 6000	PRODUCT REQUIREMENTS	2
01 6116	VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS	3
01 7000	EXECUTION AND CLOSEOUT REQUIREMENTS	6
01 7800	CLOSEOUT SUBMITTALS	4
01 7900	DEMONSTRATION AND TRAINING	2

DIVISION 02 - EXISTING CONDITIONS

02 4100	DEMOLITION	2
---------	------------	---

DIVISION 03 - CONCRETE

03 3000	CAST-IN-PLACE CONCRETE	5
---------	------------------------	---

DIVISION 04 - MASONRY

04 2613	MASONRY VENEER	4
---------	----------------	---

DIVISION 05 - METALS

05 5000	METAL FABRICATIONS	2
05 5213	PIPE AND TUBE RAILINGS	3

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

06 1000	ROUGH CARPENTRY	3
06 4100	ARCHITECTURAL WOOD CASEWORK	4

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

07 9200	JOINT SEALANTS	4
---------	----------------	---

DIVISION 08 - OPENINGS

08 1113	HOLLOW METAL DOORS AND FRAMES	4
08 1416	FLUSH WOOD DOORS	3
08 4313	ALUMINUM-FRAMED STOREFRONTS	4
08 4413	GLAZED ALUMINUM CURTAIN WALLS	3

08 7100	DOOR HARDWARE	5
08 8000	GLAZING	5
DIVISION 09 - FINISHES		
09 0561	COMMON WORK RESULTS FOR FLOORING PREPARATION	4
09 2116	GYPSUM BOARD ASSEMBLIES	4
09 5100	ACOUSTICAL CEILINGS	2
09 6500	RESILIENT FLOORING	3
09 6813	TILE CARPETING	2
09 9113	EXTERIOR PAINTING	4
09 9123	INTERIOR PAINTING	5
DIVISION 10 - SPECIALTIES		
10 2800	TOILET, BATH, AND LAUNDRY ACCESSORIES	2
DIVISION 31 - EARTHWORK		
31 2316	EXCAVATION	1
31 2323	FILL	3
DIVISION 32 - EXTERIOR IMPROVEMENTS		
32 1313	CONCRETE PAVING	3
32 1723	PAVEMENT MARKINGS	2

TABLE OF CONTENTS

DIVISION 21 - FIRE SUPPRESSION

21 0500 COMMON WORK RESULTS FOR FIRE SUPPRESSION

21 1300 FIRE-SUPPRESSION SPRINKLER SYSTEMS

DIVISION 22 - PLUMBING

22 0500 COMMON PLUMBING REQUIREMENTS

**22 0529 HANGERS AND SUPPORTS FOR PLUMBING PIPING AND
EQUIPMENT**

22 0553 MECHANICAL IDENTIFICATION

22 0719 PLUMBING PIPING INSULATION

22 1005 PLUMBING PIPING

22 1006 PLUMBING PIPING SPECIALTIES

22 3000 PLUMBING EQUIPMENT

22 4000 PLUMBING FIXTURES

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

23 0500 COMMON HVAC REQUIREMENTS

23 0529 HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

23 0553 IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

23 0593 TESTING, ADJUSTING, AND BALANCING FOR HVAC

23 0713 DUCT INSULATION

23 0719 HVAC PIPING INSULATION

23 0923 DIGITAL CONTROL EQUIPMENT - HVAC

23 2113 HYDRONIC PIPING

23 3100 HVAC DUCTS AND CASINGS

23 3300 AIR DUCT ACCESSORIES

23 3700 AIR OUTLETS AND INLETS

23 4000 HVAC AIR CLEANING DEVICES

23 8149 GROUND-SOURCE UNITARY HEAT PUMPS

DIVISION 26 - ELECTRICAL

26 0500 BASIC ELECTRICAL REQUIREMENTS

**26 0519 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND
CABLES**

26 0526 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

26 0529 HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

26 0533.13 CONDUIT FOR ELECTRICAL SYSTEMS

26 0533.16 BOXES FOR ELECTRICAL SYSTEMS

26 0553 IDENTIFICATION FOR ELECTRICAL SYSTEMS

26 0583 WIRING CONNECTIONS

26 0923	LIGHTING CONTROL DEVICES
26 2726	WIRING DEVICES
26 2816.16	ENCLOSED SWITCHES
26 5100	INTERIOR LIGHTING
26 5600	EXTERIOR LIGHTING
DIVISION 27 - COMMUNICATIONS	
27 1000	STRUCTURED CABLING
DIVISION 28 - ELECTRONIC SAFETY AND SECURITY	
28 4600	FIRE DETECTION AND ALARM

**SECTION 00 1113
ADVERTISEMENT TO BID**

STORY COUNTY IOWA

STORY COUNTY ATTORNEY OFFICE REMODEL 2024

1.01 NOTICE

- A. Sealed proposals for remodeling of the Story County Attorney Office, 1315 South B Avenue, Nevada, IA 50201, will be received by the Story County Board of Supervisors, at the office of the Story County Auditor, until 9:00 A.M., on the 1st day of October, 2024. Said proposals will be publicly opened and tabulated at the Board of Supervisors regularly scheduled meeting at 10:00 A.M. on said date. Immediately following the conclusion of said bid opening, or at such later time as the Board of Supervisors may determine, said proposals will be considered and acted upon by the Board.
- B. Work under this contract includes selective interior demolition, concrete sidewalk and paving removal and replacement, exterior masonry patching, rough carpentry, exterior doors, interior doors, windows and finish hardware, gypsum board assemblies, acoustical ceilings, acoustical wall and ceiling treatments, painting, toilet room accessories, plumbing updates, HVAC equipment, power and lighting updates, site improvements and other related work.
- C. Each proposal shall be made on the official bid proposal form prepared for this purpose, which may be obtained from the Architect. Any alteration in the official bid proposal form will entitle the Board of Supervisors at its option to reject the proposal involved from consideration. Each proposal shall be accompanied by a bid bond or a certified check or cashier's check, drawn on a solvent state or national bank, or a certified share draft drawn on a credit union in Iowa, and filed in a sealed envelope separate from the one containing the proposal. The bidder's certified check or bid bond shall be in an amount equal to five percent (5%) of the amount of the proposal, made payable to the Story County Iowa. The check may be cashed by the Board of Supervisors or the bid bond forfeited to the Board of Supervisors as liquidated damages in the event the successful bidder fails to enter into a contract and file acceptable bonds satisfactory to the Board of Supervisors assuring the faithful fulfillment of the contract and maintenance of said improvements as required by law within 10 days after the acceptance of the successful bidder's proposal.
- D. The Board of Supervisors reserves the right to reject any or all proposals, or to defer action on the proposals for a period of not to exceed 30 days from and after the date and time specified in this notice for receiving proposals.
- E. The successful bidder will be required to furnish a Performance Bond and a Payment Bond, each in an amount equal to 100 percent of the contract price. Said bonds are to be issued by a responsible Surety approved by the Board of Supervisors and shall guarantee that the Principal will promptly make payment to all persons, firms, subcontractors and corporations furnishing materials for or performing labor in the prosecution of the work stated and the faithful performance of the contract and the terms and conditions therein contained and the guarantee that all work performed and materials furnished shall be free from defects for a period of one (1) year from the time of acceptance of said improvements by the Board of Supervisors.
- F. Payment to the Contractor for said improvements will be made in monthly increments based on the estimated progress of the Contractor in performing the contract. Payment will be made from cash on hand and from such other funds as are available to the Board of Supervisors that may be legally used for such purpose.
- G. At least 10 days before each progress payment falls due (but not more often than once a month), the Contractor will submit to the Architect a partial payment estimate filled out and signed by the Contractor covering the work performed during the period covered by the partial payment estimate and supported by such data as the Architect may reasonably require. If payment is required on the basis of materials and equipment not incorporated in the work but delivered and suitably stored at or near the site, the partial payment estimate shall also be accompanied by such supporting data, satisfactory to the Board of Supervisors, as will

Story County Attorney Office Remodel 2024	00 1113 - 1	ADVERTISEMENT TO BID
--	-------------	----------------------

establish the Board of Supervisors' title to the material and equipment and protect the Board of Supervisors' interest therein, including applicable insurance. The Architect will, within 10 days after receipt of each partial payment estimate, either indicate in writing approval of payment and present the partial payment estimate to the Board of Supervisors, or return the partial payment estimate to the Contractor indicating in writing the reasons for refusing to approve payment. In the latter case, the Contractor may make the necessary corrections and resubmit the partial payment estimate. The Board of Supervisors will, within 10 days of presentation to the Board of Supervisors of an approved partial payment estimate, pay the Contractor a progress payment on the basis of the approved partial payment estimate.

- H. The Board of Supervisors shall retain from each monthly payment five percent (5.0%) of that amount which is determined to be due according to the estimate of the Architect. The retainage shall constitute a fund for the payment of claims for materials furnished and labor performed on said improvement and will be held and disposed of by the Board of Supervisors as hereinafter provided. Such monthly payment shall in no way be construed as an act of acceptance for any part of the work partially or totally completed. Final payment of the retainage due the Contractor will be made not earlier than 31 days after the final acceptance of said work by the Board of Supervisors subject to the conditions and in accordance with the provisions of Chapter 573 of the Code of Iowa.
- I. Work covered by partial payment shall not be construed as relieving the Contractor of the sole responsibility for the care and protection of the work upon which payments have been made or the restoration of any damaged work, or as a waiver of the rights of the Board of Supervisors to require the fulfillment of all terms of the contract documents. No such partial or final payment will be due until the Contractor has certified to the Board of Supervisors that the materials, labor and services involved in each estimate have been paid for in accordance with the requirements stated in the specifications.
- J. The Contractor shall indemnify and save the Board of Supervisors or the Board of Supervisors' agents harmless from all claims growing out of the lawful demands of subcontractors, laborers, workers, material suppliers and furnishers of machinery, equipment, tools and all supplies incurred in the furtherance of the performance of the work on said improvements. The Contractor shall, at the Board of Supervisors' request, furnish satisfactory evidence that all obligations of the nature designated above have been paid, discharged or waived.
- K. If the Contractor fails to do so, the Board of Supervisors may, after having notified the Contractor, either pay unpaid bills or withhold from the Contractor's unpaid compensation, a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the Contractor shall be resumed in accordance with the terms of the contract documents, but in no event shall the provisions of this sentence be construed to impose any obligations upon the Board of Supervisors to either the Contractor, his Surety or any third party. In paying any unpaid bills of the Contractor, any payment so made by the Board of Supervisors shall be considered as a payment made under the contract documents by the Board of Supervisors to the Contractor and the Board of Supervisors shall not be liable to the Contractor for any such payments made in good faith.
- L. By virtue of statutory authority, preference will be given to products and provisions grown and coal produced within the State of Iowa, and to Iowa domestic labor, to the extent lawfully required under Iowa statutes provided that the award of contract will be made to the lowest responsible bidder submitting the lowest responsive bid, which shall be determined without regard to state or local laws giving preference to factors other than the amount of the bid.
- M. Work under the proposed contract shall be commenced immediately after the award of the contract and shall be completed and ready for operation not later than 90 calendar days after the notice to proceed, subject to any extension of time which may be granted by the Board of Supervisors.
- N. Before final payment will be made, the Contractor shall file in duplicate with the Board of Supervisors an itemized statement showing the amount of Iowa sales tax and to whom paid on all materials which have become part of the finished work.

- O. Plans and specifications governing the construction of the proposed improvements have been prepared by Roseland Mackey Harris Architects, P.C., which plans and specifications and the official proceedings of the Board of Supervisors referring to and defining said proposed improvements are hereby made a part of this Notice and the proposed contract by this reference, and shall be executed in compliance therewith.
- P. A bidders conference has been scheduled for 5:00 p.m. on the 19th day of September, 2024 at the Project Site. All general contract and subcontract bidders and suppliers are invited. Representatives of the Architect will be in attendance. Information relevant to the Bid Documents will be recorded in an Addendum, issued to Bid Document recipients.
- Q. Plans, specifications and proposed contract documents are on file with the Architect, for examination by bidders. Copies of said plans, specifications, Form of Proposal blanks and Form of Contract may be obtained from Roseland Mackey Harris Architects, P.C., 1615 Golden Aspen Drive, Suite 110, Ames, Iowa 50010, (515) 292-6075, upon written request and deposit of \$100.00 per set after May 9, 2018. A refund of \$100.00 per document set returned in good and usable condition within 10 days after the date of receiving bids will be returned to the requesting firm.
- R. Bidding Documents may be examined at the following places:
 - 1. Roseland Mackey Harris Architects, P.C.
 - 2. Master Builders of Iowa Plan Room
 - 3. Dodge Data & Analytics
 - 4. Omaha Builders Exchange
 - 5. Lincoln Builders Bureau
 - 6. Sioux Falls Builders Exchange
 - 7. Siouxland Builders - Digital Plan Room

END OF NOTICE

This page intentionally left blank

**SECTION 00 2113
INSTRUCTIONS TO BIDDERS**

SUMMARY

1.01 DOCUMENT INCLUDES

- A. Invitation
 - 1. Intent
 - 2. Contract Time
- B. Bid Documents and Contract Documents
 - 1. Definitions
 - 2. Contract Documents Identification
 - 3. Availability
 - 4. Examination
 - 5. Inquiries/Addenda
 - 6. Product/Assembly/System Substitutions
- C. Site Assessment
 - 1. Site Examination
 - 2. Prebid Conference
- D. Qualifications
 - 1. Qualifications
 - 2. Subcontractors/Suppliers/Others
- E. Bid Submission
 - 1. Submission Procedure
 - 2. Bid Ineligibility
- F. Bid Enclosures/Requirements
 - 1. Security Deposit
 - 2. Performance Assurance
 - 3. Bid Form Requirements
 - 4. Sales and Use Taxes
 - 5. Bid Form Signature
 - 6. Additional Bid Information
 - 7. Selection and Award of Alternates
- G. Offer Acceptance/Rejection
 - 1. Duration of Offer
 - 2. Acceptance of Offer

1.02 RELATED DOCUMENTS

- A. Document 00 1113 - ADVERTISEMENT TO BID.
- B. Document 00 4100 - Bid Form.
- C. Document 00 4323 - Alternates Form.
- D. Document 00 7300 - Supplementary Conditions:

INVITATION

2.01 INTENT

- A. The intent of this Bid request is to obtain an offer to perform work to complete interior and exterior remodeling, mechanical and electrical updates and site improvements located at the Story County Justice Center, 1315 South B Avenue, Nevada, Iowa for a Stipulated Sum contract, in accordance with the Contract Documents.

2.02 CONTRACT TIME

- A. Identify Contract Time in the Bid Form. The completion date in the Agreement shall be the Contract Time added to the commencement date.

BID DOCUMENTS AND CONTRACT DOCUMENTS

3.01 DEFINITIONS

- A. Bid Documents: Contract Documents supplemented with Invitation To Bid, Instructions to Bidders, Information Available to Bidders, Bid Form Supplements To Bid Forms and Appendices identified.
- B. Contract Documents: Defined in AIA A201 Article 1 including issued Addenda.
- C. Bid, Offer, or Bidding: Act of submitting an offer under seal.
- D. Bid Amount: Monetary sum identified by the Bidder in the Bid Form.

3.02 CONTRACT DOCUMENTS IDENTIFICATION

- A. The Contract Documents are identified as Project Number 23039, as prepared by Architect, and with contents as identified in the Project Manual.

3.03 AVAILABILITY

- A. Interested parties may obtain one set of Bid Documents upon receipt of a refundable deposit, by check, in the amount of \$100, or completed current MBI/ABC card, from the office of Architect .
- B. Bid Documents will be delivered directly from the printer after receipt of bid deposit.
- C. Deposit will be refunded if Bid Documents are returned complete, undamaged, unmarked and reusable, within 7 days of bid submission. Failure to comply will result in forfeiture of deposit.
- D. Bid Documents are made available only for the purpose of obtaining offers for this project. Their use does not grant a license for other purposes.
- E. **All Bid Documents are copyright protected and their use for any purpose other than obtaining offers for this project as designed is prohibited.**

3.04 EXAMINATION

- A. Bid Documents may be viewed at the office of Architect.
- B. Upon receipt of Bid Documents verify that documents are complete. Notify Architect should the documents be incomplete.
- C. Immediately notify Architect upon finding discrepancies or omissions in the Bid Documents.

3.05 INQUIRIES/ADDENDA

- A. Direct questions to Jeff Harris, email; jharris@rmharchitects.com.
- B. Addenda may be issued during the bidding period. All Addenda become part of the Contract Documents. Include resultant costs in the Bid Amount.
- C. Verbal answers are not binding on any party.
- D. Clarifications requested by bidders must be in writing not less than 7 days before date set for receipt of bids. The reply will be in the form of an Addendum, a copy of which will be forwarded to known recipients.

3.06 PRODUCT/ASSEMBLY/SYSTEM SUBSTITUTIONS

- A. Where the Bid Documents stipulate a particular product, substitutions will be considered up to 7 days before receipt of bids.
- B. When a request to substitute a product is made, Architect may approve the substitution and will issue an Addendum to known bidders.
- C. The submission shall provide sufficient information to determine acceptability of such products.

- D. Provide complete information on required revisions to other work to accommodate each proposed substitution.
- E. Provide products as specified unless substitutions are submitted in this manner and accepted.
- F. See Section 01 6000 - Product Requirements for additional requirements.

SITE ASSESSMENT

4.01 SITE EXAMINATION

- A. Examine the project site before submitting a bid.

4.02 PREBID CONFERENCE

- A. A bidders conference has been scheduled for 5:00 p.m. on the 19th day of September, 2024 at the Project Site.
- B. All general contract and subcontract bidders and suppliers are invited.
- C. Representatives of Architect will be in attendance.
- D. Information relevant to the Bid Documents will be recorded in an Addendum, issued to Bid Document recipients.

QUALIFICATIONS

5.01 EVIDENCE OF QUALIFICATIONS

- A. To demonstrate qualification for performing the Work of this Contract, bidders may be requested to submit written evidence of financial position, previous experience, and current commitments, license to perform work in the State.

5.02 SUBCONTRACTORS/SUPPLIERS/OTHERS

- A. Story County reserves the right to reject a proposed subcontractor for reasonable cause.
- B. Refer to General Conditions.

BID SUBMISSION

6.01 SUBMISSION PROCEDURE

- A. Bidders shall be solely responsible for the delivery of their bids in the manner and time prescribed.
- B. Submit one copy of the executed offer on the Bid Forms provided, signed and sealed with the required security in a closed opaque envelope, clearly identified with bidder's name, project name and Story County's name on the outside.
- C. Double Envelope: Insert the closed and sealed Bid Form envelope plus requested security deposit, in a large opaque envelope and label this envelope as noted above.
- D. Improperly completed information, irregularities in security deposit, may be cause not to open the Bid Form envelope and declare the bid invalid or informal.
- E. Improperly completed information may be cause not to open the Bid Form envelope and declare the bid invalid or informal.
- F. An abstract summary of submitted bids will be made available to all bidders following bid opening.

6.02 BID INELIGIBILITY

- A. Bids that are unsigned, improperly signed or sealed, conditional, illegible, obscure, contain arithmetical errors, erasures, alterations, or irregularities of any kind, may at the discretion of the Story County, be declared unacceptable.
- B. Bid Forms, Appendices, and enclosures that are improperly prepared may, at the discretion of Story County, be declared unacceptable.

BID ENCLOSURES/REQUIREMENTS

7.01 SECURITY DEPOSIT

- A. Bids shall be accompanied by a security deposit as follows:
 - 1. Bid Bond of a sum no less than 5 percent of the Bid Amount on AIA A310 Bid Bond Form.
- B. Endorse the Bid Bond in the name of the Story County as obligee, signed and sealed by the principal (Contractor) and surety.
- C. The security deposit will be returned after delivery to the Story County of the required Performance and Payment Bond(s) by the accepted bidder.
- D. Include the cost of bid security in the Bid Amount.
- E. After a bid has been accepted, all securities will be returned to the respective bidders and other requested enclosures.
- F. If no contract is awarded, all security deposits will be returned.

7.02 PERFORMANCE ASSURANCE

- A. Accepted Bidder: Provide a Performance bond as described in 00 7300 - Supplementary Conditions.
- B. Include the cost of performance assurance bonds in the Bid Amount.

7.03 BID FORM REQUIREMENTS

- A. Complete all requested information in the Bid Form and Appendices.

7.04 SALES AND USE TAXES

- A. Iowa Construction Sales Tax Exemption Certificates and authorization letters will be provided by the Owner to the Contractor and Subcontractors for use on this project in accordance with the regulations of the Iowa Department of Revenue and Finance. This exemption certificate will authorize suppliers to sell construction materials that will be incorporated into and made part of the Work exempt from Iowa sales tax and any applicable local option sales tax and school infrastructure local option sales tax. Complete information on qualifying materials can be found on the Iowa Department of Revenue and Finance web site at www.state.ia.us/tax. It is the responsibility of the Contractor and Subcontractors to maintain records identifying the materials purchased and verifying they were used on this project. Any materials purchased tax-free and not used on the project are subject to sales and local option taxes and these taxes must be paid directly to the Iowa Department of Revenue and Finance.

7.05 BID FORM SIGNATURE

- A. The Bid Form shall be signed by the bidder, as follows:
 - 1. Sole Proprietorship: Signature of sole proprietor in the presence of a witness who will also sign. Insert the words "Sole Proprietor" under the signature. Affix seal.
 - 2. Partnership: Signature of all partners in the presence of a witness who will also sign. Insert the word "Partner" under each signature. Affix seal to each signature.
 - 3. Corporation: Signature of a duly authorized signing officer(s) in their normal signatures. Insert the officer's capacity in which the signing officer acts, under each signature. Affix the corporate seal. If the bid is signed by officials other than the president and secretary of the company, or the president/secretary/treasurer of the company, a copy of the by-law resolution of their board of directors authorizing them to do so, must also be submitted with the Bid Form in the bid envelope.
 - 4. Joint Venture: Each party of the joint venture shall execute the Bid Form under their respective seals in a manner appropriate to such party as described above, similar to the requirements of a Partnership.

7.06 ADDITIONAL BID INFORMATION

- A. Submit the following Supplements concurrent with bid submission:

1. Document 00 4323 - Alternates Form: Include the cost variation to the Bid Amount applicable to the Work described in Section 01 2300.

7.07 SELECTION AND AWARD OF ALTERNATES

- A. Indicate variation of bid price for Alternates listed on the Bid Form. Unless otherwise indicated, indicate Alternatives as a difference in bid price by adding to or deducting from the base bid price.
- B. Bids will be evaluated on the total of the base bid price and the selected alternatives.

OFFER ACCEPTANCE/REJECTION

8.01 DURATION OF OFFER

- A. Bids shall remain open to acceptance and shall be irrevocable for a period of thirty (30) days after the bid closing date.

8.02 ACCEPTANCE OF OFFER

- A. Story County reserves the right to accept or reject any or all offers.
- B. After acceptance by Story County, Architect on behalf of Story County, will issue to the successful bidder, a written Notice To Proceed.

END OF SECTION

This page intentionally left blank

**SECTION 00 4100
BID FORM**

THE PROJECT AND THE PARTIES

1.01 TO:

- A. Story County
900 Sixth Street
Nevada Iowa 50201

1.02 FOR:

- A. Project: Story County Attorney Office Remodel 2024

1.03 DATE: _____ (BIDDER TO ENTER DATE)

1.04 SUBMITTED BY: (BIDDER TO ENTER NAME AND ADDRESS)

- A. Bidder's Full Name _____

1. Address _____

2. City, State, Zip _____

1.05 OFFER

- A. Having examined the Place of The Work and all matters referred to in the Instructions to Bidders and the Contract Documents prepared by Roseland Mackey Harris Architects P.C. for the above mentioned project, we, the undersigned, hereby offer to enter into a Contract to perform the Work for the Sum of:

- B. _____
_____ dollars

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

- C. We have included the required security deposit as required by the Instruction to Bidders.
D. We have included the required performance assurance bonds in the Bid Amount as required by the Instructions to Bidders.
E. All applicable federal taxes are excluded and State of Iowa taxes are excluded from the Bid Sum.

1.06 ACCEPTANCE

- A. This offer shall be open to acceptance and is irrevocable for thirty days from the bid closing date.
B. If this bid is accepted by Story County within the time period stated above, we will:
1. Execute the Agreement within seven days of receipt of Notice of Award.
2. Furnish the required bonds within seven days of receipt of Notice of Award.
3. Commence work within 15 days after written Notice to Proceed of this bid.
C. If this bid is accepted within the time stated, and we fail to commence the Work or we fail to provide the required Bond(s), the security deposit shall be forfeited as damages to Story County by reason of our failure, limited in amount to the lesser of the face value of the security deposit or the difference between this bid and the bid upon which a Contract is signed.

1.07 CONTRACT TIME

- A. If this Bid is accepted, we will:
- B. Complete the Work in _____ calendar weeks from the commencement date. (Bidder to enter number of weeks.)

1.08 ADDENDA

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

1.09 BID FORM SUPPLEMENTS

- A. The following Supplements are attached to this Bid Form and are considered an integral part of this Bid Form:
 - 1. Document 00 4323 - Alternates Form: Include the cost variations to the Bid Sum applicable to the Work as described in Section 01 2300.

1.10 BID FORM SIGNATURE(S)

- A. _____
- B. (Bidder - print the full name of your firm)
- C. _____
- D. (Authorized signing officer, Title)

END OF BID FORM

**SECTION 00 4323
ALTERNATES FORM**

PARTICULARS

1.01 THE FOLLOWING IS THE LIST OF ALTERNATES REFERENCED IN THE BID SUBMITTED BY:

1.02 (BIDDER) _____

1.03 TO (STORY COUNTY): _____

1.04 DATED _____ AND WHICH IS AN INTEGRAL PART OF THE BID FORM.

ALTERNATES LIST

2.01 THE FOLLOWING AMOUNTS SHALL BE ADDED TO OR DEDUCTED FROM THE BID AMOUNT. REFER TO SECTION 01 2300 - ALTERNATES.

2.02 ALTERNATIVE # 1 - REPLACE FIRE ALARM SYSTEM THROUGHOUT BUILDING:

(ADD) \$ _____

END OF ALTERNATES FORM

This page intentionally left blank

**SECTION 00 5200
AGREEMENT FORM**

PART 1 GENERAL

1.01 FORM OF AGREEMENT

1.02 AIA DOCUMENT A101, OWNER-CONTRACTOR AGREEMENT FORM - STIPULATED SUM 2017 EDITION, FORMS THE BASIS OF CONTRACT BETWEEN THE OWNER AND CONTRACTOR.

1.03 RELATED REQUIREMENTS

- A. Section 00 7200 - General Conditions.
- B. Section 00 7300 - Supplementary Conditions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF AGREEMENT FORM

This page intentionally left blank

**SECTION 00 7200
GENERAL CONDITIONS**

FORM OF GENERAL CONDITIONS

1.01 AIA DOCUMENT A201, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, 2017 EDITION, IS THE GENERAL CONDITIONS BETWEEN THE OWNER AND CONTRACTOR.

RELATED REQUIREMENTS

2.01 SECTION 00 7300 - SUPPLEMENTARY CONDITIONS.

SUPPLEMENTARY CONDITIONS

3.01 REFER TO DOCUMENT 00 7300 - SUPPLEMENTARY CONDITIONS FOR AMENDMENTS TO THESE GENERAL CONDITIONS.

END OF SECTION

This page intentionally left blank

**SECTION 00 7300
SUPPLEMENTARY CONDITIONS**

PART 1 GENERAL

1.01 SUMMARY

- A. These Supplementary Conditions amend and supplement the General Conditions defined in Document 00 7200 - General Conditions and other provisions of the Contract Documents as indicated below. Provisions that are not so amended or supplemented remain in full force and effect.
- B. The terms used in these Supplementary Conditions that are defined in the General Conditions have the meanings assigned to them in the General Conditions.

1.02 MODIFICATIONS TO AIA A201

- A. ARTICLE 11.5 - PERFORMANCE BOND AND PAYMENT BOND
 - 1. Add the following subparagraph:
 - a. 11.5.3: The bond value requirements are as follows:
 - 1) Provide bonds on AIA A312.
 - 2) Provide a 100 percent Performance Bond.
 - 3) Provide a 100 percent Payment Bond.
 - 4) Deliver bonds within 7 days after execution of the Contract.
- B. ARTICLE 17: INSURANCE
 - 1. Insurance coverage shall not be less than the following:
 - a. Worker's Compensation:
 - 1) Statutory limits
 - b. Contractor's General Liability on an occurrence basis, limit applies per this project:
 - 1) Each occurrence: \$1,000,000
 - 2) Fire damage: \$100,000
 - 3) Medical expense per person: \$5,000
 - 4) Personal & Adv. Injury: \$1,000,000
 - 5) General aggregate: \$2,000,000
 - 6) Products-Comp/Op Aggregate: \$2,000,000
 - c. All Automobile Public Liability:
 - 1) Personal injury: \$1,000,000/\$1,000,000
 - 2) Property damage: \$100,000 each occurrence
 - d. Contractor's Excess Liability:
 - 1) Combined bodily injury and property damage: \$5,000,000 over primary
 - e. Builder's Risk insurance: All risk contract value to be provided by the Owner.
 - 2. All Contractor's insurance policies shall name the Architect and the Owner as additional insured's for b., c., and d. above.

1.03 ADDITIONAL ARTICLE - DEFINITIONS

- A. PRODUCTS: Means new material, machinery, components, equipment, fixtures, and systems forming the work, but does not include machinery and equipment used for preparation, fabrication, conveying and erection of the work. Products may also include existing materials or components required for re-use.
- B. FURNISH OR SUPPLY: To supply and deliver, unload, inspect for damage.
- C. INSTALL: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, and ready for use.
- D. PROVIDE: To furnish or supply, plus install.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF DOCUMENT

Story County Attorney Office Remodel 2024	00 7300 - 1	Supplementary Conditions
--	-------------	--------------------------

This page intentionally left blank

**SECTION 01 2000
PRICE AND PAYMENT PROCEDURES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Change procedures.

1.02 RELATED REQUIREMENTS

- A. Section 00 5200 - Agreement Form: Contract Sum, retainages, payment period, monetary values of unit prices.
- B. Section 00 7200 - General Conditions: Additional requirements for progress payments, final payment, changes in the Work.

1.03 SCHEDULE OF VALUES

- A. Use Schedule of Values Form: AIA G703, edition stipulated in the Agreement.
- B. Submit a printed schedule on AIA Form G703 - Application and Certificate for Payment
- C. Continuation Sheet.
- D. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect for approval.
- E. Forms filled out by hand will not be accepted.
- F. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.
- G. Revise schedule to list approved Change Orders, with each Application For Payment.

1.04 APPLICATIONS FOR PROGRESS PAYMENTS

- A. Payment Period: Submit at intervals stipulated in the Agreement.
- B. Use Form AIA G702 and Form AIA G703, edition stipulated in the Agreement.
- C. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect 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. List contingency allowance as a separate line item and show itemized draws against the allowance in the month the amounts are approved or the work is completed.

- J. Submit one electronic and three hard-copies of each Application for Payment.
- K. When Architect 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 the Contract Documents.
- B. For minor changes not involving an adjustment to the Contract Price or Contract Time, Architect will issue instructions directly to Contractor.
- C. For other required changes, Architect will issue a document signed by Story County 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. For changes for which advance pricing is desired, Architect will issue a document that 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 fixed price quotation within ____ days.
- E. Contractor may propose a change by submitting a request for change to Architect, 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. Document any requested substitutions in accordance with Section 01 6000.
- F. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
 - 1. For change requested by Architect 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.
 - 3. For change ordered by Architect without a quotation from Contractor, the amount will be determined by Architect based on the Contractor's substantiation of costs as specified for Time and Material work.
- G. Substantiation of Costs: Provide full information required for evaluation.
 - 1. On request, provide the 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. 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 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 Price.
- J. 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 7000.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

This page intentionally left blank

**SECTION 01 2300
ALTERNATES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Description of Alternates.

1.02 RELATED REQUIREMENTS

- A. Document 00 2113 - Instructions to Bidders: Instructions for preparation of pricing for Alternates.
- B. Document 00 4323 - Alternates Form: List of Alternates as supplement to Bid Form.
- C. Document 00 5200 - Agreement Form: Incorporating monetary value of accepted Alternates.

1.03 ACCEPTANCE OF ALTERNATES

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Story County's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.
- B. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

1.04 SCHEDULE OF ALTERNATES

- A. Alternate No. 1 - Replace Fire Alarm System throughout entire Justice Center facility:
 - 1. Provide alternative pricing for replacing the existing building-wide fire alarm system with new equipment in accordance with Electrical drawings.
 - 2. Base bid shall exclude all work related to the new fire alarm system.
 - 3. Base bid shall include modifications to existing fire alarm system to accomodate remodeling of County Attorney offices.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

This page intentionally left blank

**SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preconstruction meeting.
- B. Progress meetings.
- C. Progress photographs.
- D. Submittals for review, information, and project closeout.
- E. Number of copies of submittals.
- F. Requests for Interpretation (RFI) procedures.
- G. Submittal procedures.

1.02 RELATED REQUIREMENTS

- A. Section 01 3216 - Construction Progress Schedule: Form, content, and administration of schedules.
- B. Section 01 6000 - Product Requirements: General product requirements.
- C. Section 01 7000 - Execution and Closeout Requirements: Additional coordination requirements.
- D. Section 01 7800 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

- A. Architect will schedule a meeting after Notice of Award.
- B. Attendance Required:
 - 1. Story County.
 - 2. Architect.
 - 3. Contractor.
- C. Agenda:
 - 1. Execution of Story County-Contractor Agreement.
 - 2. Submission of executed bonds and insurance certificates.
 - 3. Distribution of Contract Documents.
 - 4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
 - 5. Designation of personnel representing the parties to Contract, Owner, Contractor and Architect.
 - 6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 - 7. Scheduling.
- D. Contractor shall record minutes and distribute copies within seven days after meeting to participants, with copies to Contractor, Story County, participants, and those affected by decisions made.

3.02 PROGRESS MEETINGS

- A. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- B. Attendance Required:
 - 1. Contractor.

2. Story County.
 3. Architect.
 4. Contractor's superintendent.
 5. Major subcontractors.
- C. Agenda:
1. Review minutes of previous meetings.
 2. Review of work progress.
 3. Field observations, problems, and decisions.
 4. Identification of problems that impede, or will impede, planned progress.
 5. Review of submittals schedule and status of submittals.
 6. 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. Maintenance of quality and work standards.
 11. Effect of proposed changes on progress schedule and coordination.
 12. Other business relating to work.
- D. Contractor shall record minutes and distribute copies within seven days after meeting to participants, with copies to Contractor, Story County, participants, and those affected by decisions made.

3.03 PROGRESS PHOTOGRAPHS

- A. Submit new photographs at least once a month, within 3 days after being taken.
- B. Photography Type: Digital; electronic files.
- C. Provide photographs of construction throughout progress of work produced by an experienced photographer, acceptable to Architect.
- D. Views:
 1. Provide factual presentation.
 2. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.
- E. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
 1. Delivery Medium: Via email.
 2. File Naming: Include project identification, date and time of view, and view identification.
 3. PDF File: Assemble all photos into printable pages in PDF format, with 2 to 3 photos per page, each photo labeled with file name; one PDF file per submittal.

3.04 REQUESTS FOR INFORMATION (RFI)

- A. Definition: A request seeking one of the following:
 1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in the Contract Documents.
 2. A resolution to an issue which has arisen due to field conditions and affects design intent.
- B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.
- C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of the Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
 1. Prepare a separate RFI for each specific item.

- a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
 - b. Do not forward requests which solely require internal coordination between subcontractors.
- 2. Prepare in a format and with content acceptable to Story County.
- D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
 - 1. Include in each request Contractor's signature attesting to good faith effort to determine from the Contract Documents information requiring interpretation.
 - 2. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
 - a. Approval of submittals (use procedures specified elsewhere in this section).
 - b. Approval of substitutions (see Section - 01 6000 - Product Requirements)
 - c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
 - d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
 - 3. Improper RFIs: Requests not prepared in conformance to requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
- E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
 - 1. Official Project name and number, and any additional required identifiers established in Contract Documents.
 - 2. Story County's, Architect's, and Contractor's names.
 - 3. Discrete and consecutive RFI number, and descriptive subject/title.
 - 4. Issue date, and requested reply date.
 - 5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
 - 6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
 - 7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.
- F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.
- G. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
 - 1. Indicate current status of every RFI. Update log promptly and on a regular basis.
 - 2. Note dates of when each request is made, and when a response is received.
 - 3. Highlight items requiring priority or expedited response.
 - 4. Highlight items for which a timely response has not been received to date.
- H. Review Time: Architect will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
 - 1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.
- I. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and

follow up with an appropriate Change Order request to Story County.

1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
4. Notify Architect within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.05 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
 1. Product data.
 2. Shop drawings.
 3. Samples for selection.
 4. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 7800 - Closeout Submittals.

3.06 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
 1. Design data.
 2. Certificates.
 3. Test reports.
 4. Inspection reports.
 5. Manufacturer's instructions.
 6. Manufacturer's field reports.
 7. Other types indicated.
- B. Submit for Architect's knowledge as contract administrator or for Story County.

3.07 SUBMITTALS FOR PROJECT CLOSEOUT

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual sections, submit them at project closeout in conformance to requirements of Section 01 7800 - Closeout Submittals:
 1. Project record documents.
 2. Operation and maintenance data.
 3. Warranties.
 4. Bonds.
 5. Other types as indicated.
- D. Submit for Story County's benefit during and after project completion.

3.08 NUMBER OF COPIES OF SUBMITTALS

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
- B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.

1. After review, produce duplicates.
2. Retained samples will not be returned to Contractor unless specifically so stated.

3.09 SUBMITTAL PROCEDURES

A. General Requirements:

1. Use a separate transmittal for each item.
2. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
3. Transmit using approved form.
 - a. Use Contractor's form, subject to prior approval by Architect.
4. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
5. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
6. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
 - a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
7. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
 - a. Deliver submittals to Architect at business address.
8. Schedule submittals to expedite the Project, and coordinate submission of related items.
 - a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
 - b. For sequential reviews involving Architect's consultants, Story County, or another affected party, allow an additional 7 days.
9. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
10. Provide space for Contractor and Architect review stamps.
11. When revised for resubmission, identify all changes made since previous submission.
12. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
13. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
14. Submittals not requested will be recognized, and will be returned "Not Reviewed",

B. Product Data Procedures:

1. Submit only information required by individual specification sections.
2. Collect required information into a single submittal.
3. Do not submit (Material) Safety Data Sheets for materials or products.

C. Shop Drawing Procedures:

1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related work.
2. Do not reproduce the Contract Documents to create shop drawings.
3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

D. Samples Procedures:

1. Transmit related items together as single package.
2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.

E. Transmit each submittal with approved form.

3.10 SUBMITTAL REVIEW

- A. Submittals for Review: Architect will review each submittal, and approve, or take other appropriate action.
- B. Submittals for Information: Architect will acknowledge receipt and review. See below for actions to be taken.
- C. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
- D. Architect's and his consultants' actions on items submitted for review:
 - 1. Authorizing purchasing, fabrication, delivery, and installation:
 - a. "Approved", or language with same legal meaning.
 - b. "Approved as Noted, Resubmission not required", or language with same legal meaning.
 - 1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
 - c. "Approved as Noted, Resubmit for Record", or language with same legal meaning.
 - 2. Not Authorizing fabrication, delivery, and installation:
- E. Architect's and his consultants' actions on items submitted for information:
 - 1. Items for which no action was taken:
 - a. "Received" - to notify the Contractor that the submittal has been received for record only.
 - 2. Items for which action was taken:
 - a. "Reviewed" - no further action is required from Contractor.

END OF SECTION

**SECTION 01 3216
CONSTRUCTION PROGRESS SCHEDULE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preliminary schedule.
- B. Construction progress schedule, bar chart type.

1.02 SUBMITTALS

- A. Within 10 days after date of Agreement, submit preliminary schedule.
- B. If preliminary schedule requires revision after review, submit revised schedule within 7 days.
- C. Within 10 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 every 7 days.

1.03 SCHEDULE FORMAT

- A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

- A. Prepare preliminary schedule in the form of a horizontal bar 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 for each stage of Work identified in Section 01 1000 - Summary.
- 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, owner-furnished products, products identified under Allowances, and dates reviewed submittals will be required from Architect. Indicate decision dates for selection of finishes.
- G. Indicate delivery dates for owner-furnished products.
- 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 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. Annotate 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.

3.05 DISTRIBUTION OF SCHEDULE

- A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Architect, Story County, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

END OF SECTION

**SECTION 01 4000
QUALITY REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Submittals.
- B. Quality assurance.
- C. References and standards.
- D. Testing and inspection agencies and services.
- E. Control of installation.
- F. Defect Assessment.

1.02 RELATED REQUIREMENTS

- A. Document 00 7200 - General Conditions: Inspections and approvals required by public authorities.
- B. Section 01 3000 - Administrative Requirements: Submittal procedures.

1.03 REFERENCE STANDARDS

- A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008 (Reapproved 2014).
- B. ASTM C1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation; 2014.
- C. ASTM 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; 2012a.
- D. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection and/or Testing; 2014a.
- E. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2013.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.
 - 1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of inspector.
 - d. Date and time of sampling or inspection.
 - e. Identification of product and specifications section.
 - f. Location in the Project.
 - g. Type of test/inspection.
 - h. Date of test/inspection.
 - i. Results of test/inspection.
 - j. Conformance with Contract Documents.
 - k. When requested by Architect, provide interpretation of results.
 - 2. Test report submittals are for Architect's knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Story County's information.
- C. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.

1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- D. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Story County's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.05 QUALITY ASSURANCE

- A. Testing Agency Qualifications:
 1. 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.

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. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
- C. Obtain copies of standards where required by product specification sections.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
- F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from the 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.
- 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 E 329, ASTM E 543, ASTM C 1021, ASTM C 1077, ASTM C 1093, and ASTM D3740.
 2. Inspection agency: Comply with requirements of ASTM D3740 and ASTM E329.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have Work performed by persons qualified to produce required and specified quality.

- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 TESTING AND INSPECTION

- A. See individual specification sections for testing and inspection required.
- B. Testing Agency Duties:
 - 1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
 - 2. Perform specified sampling and testing of products in accordance with specified standards.
 - 3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 - 4. Promptly notify Architect and Contractor of observed irregularities or non-conformance of Work or products.
 - 5. Perform additional tests and inspections required by Architect.
 - 6. Submit reports of all tests/inspections specified.
- C. Limits on Testing/Inspection Agency Authority:
 - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 - 2. Agency may not approve or accept any portion of the Work.
 - 3. Agency may not assume any duties of Contractor.
 - 4. Agency has no authority to stop the Work.
- D. Contractor Responsibilities:
 - 1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
 - 2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
 - 3. Provide incidental labor and facilities:
 - a. To provide access to Work to be tested/inspected.
 - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
 - c. To facilitate tests/inspections.
 - d. To provide storage and curing of test samples.
 - 4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
 - 5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- E. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect.
- F. Re-testing required because of non-conformance to specified requirements shall be paid for by Contractor.

3.03 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not conforming to specified requirements.

END OF SECTION

This page intentionally left blank

**SECTION 01 5000
TEMPORARY FACILITIES AND CONTROLS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary utilities.
- B. Temporary sanitary facilities.
- C. Temporary Controls: Barriers, enclosures, and fencing.
- D. Security requirements.
- E. Vehicular access and parking.
- F. Waste removal facilities and services.

1.02 TEMPORARY UTILITIES

- A. Story County will provide the following:
 - 1. Electrical power , consisting of connection to existing facilities.
 - 2. Water supply, consisting of connection to existing facilities.
- B. Existing facilities may be used.
- C. New permanent facilities may be used.
- D. Use trigger-operated nozzles for water hoses, to avoid waste of water.

1.03 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
- B. Use of existing facilities is not permitted.
- C. Maintain daily in clean and sanitary condition.

1.04 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 and to protect existing facilities and adjacent properties from damage from construction operations .
- B. Provide protection for plants designated to remain. Replace damaged plants.
- C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.05 FENCING

- A. Construction: Contractor's option.

1.06 EXTERIOR ENCLOSURES

- A. Provide temporary weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.07 INTERIOR ENCLOSURES

- A. Provide temporary partitions as necessary to separate work areas from Story County-occupied areas, to prevent penetration of dust and moisture into Story County-occupied areas, and to prevent damage to existing materials and equipment.

1.08 SECURITY

- A. Provide security and facilities to protect Work, existing facilities, and Story County's operations from unauthorized entry, vandalism, or theft.
- B. Coordinate with Story County's security program.

1.09 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. Provide and maintain access to fire hydrants, free of obstructions.

1.10 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 as necessary.

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.
- D. Restore new permanent facilities used during construction to specified condition.

1.12 SMOKING ON STORY COUNTY PREMISES

- A. **Story County facilities and grounds are SMOKE-FREE. Construction personnel are not allowed to smoke in any location within the building or on the property.**

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 01 6000
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. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

- A. Section 01 2500 - Substitution Procedures: Substitutions made during and after the Bidding/Negotiation Phase.
- B. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions: Requirements for VOC-restricted product categories.

1.03 SUBMITTALS

- A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
 - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by the Contract Documents.
- B. Where all other criteria are met, Contractor shall give preference to products that:
 - 1. If used on interior, have lower emissions, as defined in Section 01 6116.
 - 2. If wet-applied, have lower VOC content, as defined in Section 01 6116.
 - 3. Are extracted, harvested, and/or manufactured closer to the location of the project.
 - 4. Have longer documented life span under normal use.
 - 5. Result in less construction waste.
 - 6. Have a published GreenScreen Chemical Hazard Analysis.

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: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.03 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. See Section 01 2500 - Substitution Procedures.

3.02 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.

3.03 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Provide off-site storage and protection when site does not permit on-site storage or protection.
- G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- H. Comply with manufacturer's warranty conditions, if any.
- I. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- J. Prevent contact with material that may cause corrosion, discoloration, or staining.
- K. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- L. 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 6116
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 3000 - Administrative Requirements: Submittal procedures.
- B. Section 01 6000 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.
- C. Section 07 9200 - Joint Sealants: Emissions-compliant sealants.

1.03 DEFINITIONS

- A. Indoor-Emissions-Restricted Products: All products in the following product categories, whether specified or not:
- B. VOC-Content-Restricted Products: All products in the following product categories, whether specified or not:
 - 1. Interior paints and coatings.
 - 2. Interior adhesives and sealants, 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 2013).
- C. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers; California Department of Public Health; v1.1, 2010.
- D. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board; 2007.
- E. CHPS (HPPD) - High Performance Products Database; Current Edition at www.chps.net/.
- F. CRI (GLP) - Green Label Plus Testing Program - Certified Products; www.carpet-rug.org; current edition.
- G. SCAQMD 1113 - South Coast Air Quality Management District Rule No.1113; current edition.
- H. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.

- I. SCS (CPD) - SCS Certified Products; current listings at www.scs-certified.com.
- J. UL (GGG) - GREENGUARD Gold Certified Products; current listings at <http://http://productguide.ulenvironment.com/QuickSearch.aspx>.

1.05 SUBMITTALS

- A. See Section 01 3000 - 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. 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. 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).

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

- A. Story County 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 Story County.

- 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 intentionally left blank

**SECTION 01 7000
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, except removal, disposal, and/or remediation of hazardous materials and toxic substances.
- C. Cutting and patching.
- D. Cleaning and protection.
- E. Starting of systems and equipment.
- F. Demonstration and instruction of Story County personnel.
- G. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

1.02 RELATED REQUIREMENTS

- A. Section 01 3000 - Administrative Requirements: Submittals procedures, Electronic document submittal service.
- B. Section 01 4000 - Quality Requirements: Testing and inspection procedures.
- C. Section 01 5000 - Temporary Facilities and Controls: Temporary interior partitions.
- D. Section 01 7800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties and bonds.
- E. Section 01 7900 - Demonstration and Training: Demonstration of products and systems to be commissioned and where indicated in specific specification sections

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. 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.
- C. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.04 PROJECT CONDITIONS

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- B. 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.
- C. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
 - 1. Outdoors: Limit conduct of especially noisy exterior work to the hours of 8 am to 5 pm.
- D. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.
- E. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.
- F. 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.

1.05 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. Coordinate completion and clean-up of work of separate sections.
- C. After Story County occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Story County'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 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 LAYING OUT THE WORK

- A. Promptly notify Architect of any discrepancies discovered.
- B. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means.
- C. Periodically verify layouts by same means.
- D. Maintain a complete and accurate log of control and survey work as it progresses.

3.04 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. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

- C. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- D. Make neat transitions between different surfaces, maintaining texture and appearance.

3.05 ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 - 1. Verify that construction and utility arrangements are as indicated.
 - 2. Report discrepancies to Architect before disturbing existing installation.
 - 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
 - 1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
 - 2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.
- C. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
 - 2. Remove items indicated on drawings.
 - 3. Relocate items indicated on drawings.
 - 4. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
 - 5. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- D. Services (Including but not limited to HVAC, Plumbing, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
 - 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
 - 2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 - a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
 - b. Provide temporary connections as required to maintain existing systems in service.
 - 3. Verify that abandoned services serve only abandoned facilities.
 - 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; patch holes left by removal using materials specified for new construction.
- E. Protect existing work to remain.
 - 1. Prevent movement of structure; provide shoring and bracing if necessary.
 - 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 - 3. Repair adjacent construction and finishes damaged during removal work.
- F. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
 - 1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.
 - 2. Where a change of plane of 1/4 inch or more occurs in existing work, submit recommendation for providing a smooth transition for Architect review and request instructions.

- G. Clean existing systems and equipment.
- H. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- I. Do not begin new construction in alterations areas before demolition is complete.
- J. Comply with all other applicable requirements of this section.

3.06 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:
 - 1. Complete the work.
 - 2. Fit products together to integrate with other work.
 - 3. Provide openings for penetration of mechanical, electrical, and other services.
 - 4. Match work that has been cut to adjacent work.
 - 5. Repair areas adjacent to cuts to required condition.
 - 6. Repair new work damaged by subsequent work.
 - 7. Remove samples of installed work for testing when requested.
 - 8. Remove and replace defective and non-conforming work.
- D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- G. Restore work with new products in accordance with requirements of Contract Documents.
- H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- I. 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.

3.07 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.

3.08 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.

- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Prohibit traffic from landscaped areas.
- H. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.09 SYSTEM STARTUP

- A. Coordinate schedule for start-up of various equipment and systems.
- B. 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.
- C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- D. Verify that wiring and support components for equipment are complete and tested.
- E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- F. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.10 DEMONSTRATION AND INSTRUCTION

- A. See Section 01 7900 - Demonstration and Training.
- B. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of owner personnel.
- C. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Story County's personnel in detail to explain all aspects of operation and maintenance.

3.11 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.12 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
 - 1. Clean areas to be occupied by Story County prior to final completion before Story County occupancy.
- B. Use cleaning materials that are nonhazardous.
- C. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.
- D. Clean site; sweep paved areas, rake clean landscaped surfaces.
- E. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.13 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
 - 1. Provide copies to Architect and Story County.
- 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 when work is considered ready for Architect'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's Substantial Completion inspection.
- E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.
- F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Story County-occupied areas.
- G. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.
- H. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

END OF SECTION

**SECTION 01 7800
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 7200 - General Conditions: Performance bond and labor and material payment bonds, warranty, and correction of work.
- B. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- C. Section 01 7000 - 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 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 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 Story County, submit completed documents within ten days after acceptance.
 - 3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
 - 4. Submit two sets of revised final documents in final form within 10 days after final inspection.
- C. Warranties and Bonds:
 - 1. For equipment or component parts of equipment put into service during construction with Story County'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. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed shop drawings, product data, and samples.
 - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Story County.

Story County Attorney Office Remodel 2024	01 7800 - 1	Closeout Submittals
--	-------------	---------------------

- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
 - 1. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
 - 1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - 3. Field changes of dimension and detail.
 - 4. 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. 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. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

- E. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- F. Provide servicing and lubrication schedule, and list of lubricants required.
- G. Include manufacturer's printed operation and maintenance instructions.
- H. Include sequence of operation by controls manufacturer.
- I. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- J. Include test and balancing reports.
- K. Additional Requirements: As specified in individual product specification sections.

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

- A. Assemble operation and maintenance data into durable manuals for Story County's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
- B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
- C. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- D. Prepare data in the form of an instructional manual.
- E. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- F. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- G. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
- H. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
- I. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
- J. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.
- K. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- L. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.
- M. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
 - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
 - 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.

- f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
- 3. Part 3: Project documents and certificates, including the following:
 - a. Shop drawings and product data.
 - b. Air and water balance reports.
 - c. Photocopies of warranties and bonds.

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 Story County's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.
- E. Include photocopies of each in operation and maintenance manuals, indexed separately on Table of Contents.

END OF SECTION

**SECTION 01 7900
DEMONSTRATION AND TRAINING**

PART 1 GENERAL

1.01 SUMMARY

- A. Demonstration of products and systems where indicated in specific specification sections.
- B. Training of Story County personnel in operation and maintenance is required for:
 - 1. All software-operated systems.
 - 2. HVAC systems and equipment.
 - 3. Electrical systems and equipment.
 - 4. Items specified in individual product Sections.

1.02 RELATED REQUIREMENTS

- A. Section 01 7800 - Closeout Submittals: Operation and maintenance manuals.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Training Plan: Story County will designate personnel to be trained; tailor training to needs and skill-level of attendees.
 - 1. Submit to Architect for transmittal to Story County.
 - 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 as 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.

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 Story County.
- B. Demonstration may be combined with Story County 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. Story County 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 Story County's personnel to be trained; re-schedule training sessions as required by Story County; once schedule has been approved by Story County failure to conduct sessions according to schedule will be cause for Story County 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

SECTION 02 4100 DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Selective demolition of building elements for alteration purposes.

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary: Description of items to be salvaged or removed for re-use by Contractor.
- B. Section 01 5000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- C. Section 01 6000 - Product Requirements: Handling and storage of items removed for salvage and relocation.
- D. Section 01 7000 - Execution and Closeout Requirements: Project conditions; protection of control points, and existing construction to remain; reinstallation of removed products.

1.03 REFERENCE STANDARDS

- A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.
- B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 SCOPE

- A. Remove paving and curbs as required to accomplish new work.
- B. Remove concrete slabs on grade as indicated on drawings.
- C. Remove other items indicated, for salvage and relocation.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 - 1. Obtain required permits.
 - 2. Provide, erect, and maintain temporary barriers and security devices.
 - 3. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
 - 4. Conduct operations to minimize effects on and interference with adjacent areas and occupants.
 - 5. Do not close or obstruct roadways or sidewalks without permit.
 - 6. 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.
- B. Do not begin removal until receipt of notification to proceed from Story County.
- C. Minimize production of dust due to demolition operations.
- D. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.03 EXISTING UTILITIES

- A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Story County.
- E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Story County.
- F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 - 1. Verify that construction and utility arrangements are as indicated.
 - 2. Report discrepancies to Architect before disturbing existing installation.
 - 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Separate areas in which demolition is being conducted from other areas that are still occupied.
 - 1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 5000 in locations indicated on drawings.
- C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
- D. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
 - 2. Remove items indicated on drawings.
- E. Services (Including but not limited to Electrical): Remove existing systems and equipment as indicated.
 - 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
 - 2. See Section 01 1000 for other limitations on outages and required notifications.
- F. Protect existing work to remain.
 - 1. Prevent movement of structure; provide shoring and bracing if necessary.
 - 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 - 3. Repair adjacent construction and finishes damaged during removal work.
 - 4. Patch as specified for patching new work.

3.05 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 03 3000
CAST-IN-PLACE CONCRETE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete formwork.
- B. Floors and slabs on grade.
- C. Concrete stoops.
- D. Concrete reinforcement.
- E. Concrete curing.

1.02 RELATED REQUIREMENTS

- A. Section 07 9200 - Joint Sealants: Products and installation for sealants for saw cut joints and isolation joints in slabs.
- B. Section 32 1313 - Concrete Paving: Sidewalks, curbs and gutters.

1.03 REFERENCE STANDARDS

- A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; 2010.
- B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).
- C. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).
- D. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000.
- E. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.
- F. ACI 347R - Guide to Formwork for Concrete; 2014.
- G. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.
- H. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2017.
- I. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2016.
- J. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2015a.
- K. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.
- L. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.
- M. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2011.
- N. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2015.
- O. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete; 2013.
- P. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2013).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.

1. For curing compounds, provide data on method of removal in the event of incompatibility with floor covering adhesives.
- C. Mix Design: Submit proposed concrete mix design.
 1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.
 2. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.

1.05 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301 and ACI 318.
- B. Follow recommendations of ACI 306R when concreting during cold weather.

1.06 WARRANTY

- A. Moisture Emission Reducing Curing and Sealing Compound: Provide warranty to cost of flooring delamination failures for 10 years.
 1. Include cost of repair or removal of failed flooring, remediation with a moisture vapor impermeable surface coating, and replacement of flooring with comparable flooring system.

PART 2 PRODUCTS

2.01 FORMWORK

- A. Formwork Design and Construction: Comply with guidelines of ACI 347R to provide formwork that will produce concrete complying with tolerances of ACI 117.
- B. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.

2.02 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
 1. Type: Deformed billet-steel bars.
 2. Finish: Unfinished, unless otherwise indicated.
- B. Steel Welded Wire Reinforcement (WWR): Plain type, ASTM A1064/A1064M.
 1. Form: Coiled Rolls.
 2. WWR Style: W6x6.

2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
- B. Fine and Coarse Aggregates: ASTM C 33.
- C. Fly Ash: ASTM C618, Class C or F.
- D. Water: Clean and not detrimental to concrete.

2.04 ADMIXTURES

- A. Air Entrainment Admixture: ASTM C260/C260M.
- B. Moisture Vapor Reduction Admixture (MVRA): Liquid, inorganic admixture free of volatile organic compounds (VOCs) and formulated to close capillary systems formed during curing to reduce moisture vapor emission and transmission, with no adverse effect on concrete properties.
 1. Provide admixture in slabs to receive adhesively applied flooring.
 2. Manufacturers:
 - a. Barrier One, Inc; Barrier One Moisture Vapor Reduction Admixture: www.barrierone.com/#sle.
 - b. Hycrete, Inc; V1000: www.hycrete.com/#sle.
 - c. Specialty Products Group; Vapor Lock 20/20: www.spggogreen.com/#sle.
 - d. Substitutions: See Section 01 6000 - Product Requirements.

2.05 ACCESSORY MATERIALS

- A. Underslab Vapor Retarder: Multi-layer, fabric-, cord-, grid-, or aluminum-reinforced polyethylene or equivalent, complying with ASTM E1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. The use of single ply polyethylene is prohibited.
 - 1. Installation: Comply with ASTM E1643.
 - 2. Accessory Products: Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations in vapor retarder.
 - 3. Manufacturers:
 - a. Stego Industries, LLC: www.stegoindustries.com/#sle.
 - b. W.R. Meadows, Inc.; PERMINATOR 10 mils: www.wrmeadows.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

2.06 BONDING AND JOINTING PRODUCTS

- A. Latex Bonding Agent: Non-redispersable acrylic latex, complying with ASTM C1059/C1059M, Type II.
 - 1. Manufacturers:
 - a. Euclid Chemical Company; AKKRO-7T: www.euclidchemical.com/#sle.
 - b. SpecChem, LLC; Strong Bond Acrylic Bonder: www.specchemllc.com/#sle.
 - c. W. R. Meadows, Inc; ACRY-LOK-: www.wrmeadows.com/#sle.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- B. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.
 - 1. Material: ASTM D1751, cellulose fiber.

2.07 CURING MATERIALS

- A. Evaporation Reducer: Liquid thin-film-forming compound that reduces rapid moisture loss caused by high temperature, low humidity, and high winds; intended for application immediately after concrete placement.
 - 1. Manufacturers:
 - a. W. R. Meadows, Inc; Evapre or Evapre-RTU: www.wrmeadows.com/#sle.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- B. Curing Compound, Naturally Dissipating: Clear, water-based, liquid membrane-forming compound; complying with ASTM C309.
 - 1. Product dissipates within 4 to 6 weeks.
 - 2. Manufacturers:
 - a. W. R. Meadows, Inc; 1100-Clear: www.wrmeadows.com/#sle.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- C. Curing and Sealing Compound, Moisture Emission Reducing: Liquid, membrane-forming, clear sealer, for application to newly placed concrete; capable of providing adequate bond for flooring adhesives, initially and over the long term; with sufficient moisture vapor impermeability to prevent deterioration of flooring adhesives due to moisture emission.
 - 1. Use this product to cure and seal all slabs to receive adhesively applied flooring or roofing.
 - 2. Manufacturers:
 - a. Floor Seal Technology, Inc; VaporSeal 309 System: www.floorseal.com/#sle.
 - b. Sinak Corporation; VC5: www.sinak.com/#sle.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- D. Curing Compound, Non-dissipating: Liquid, membrane-forming, clear, non-yellowing acrylic; complying with ASTM C309.
 - 1. Application: Use at slabs.
 - 2. Vehicle: Water-based.
 - 3. Solids by Mass: 18 percent, minimum.
 - 4. VOC Content: OTC compliant.

5. Manufacturers:
 - a. The QUIKRETE Companies; QUIKRETE® Acrylic Concrete Cure & Seal: www.quikrete.com/#sle.
 - b. W. R. Meadows, Inc; VOCOMP-20: www.wrmeadows.com/#sle.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

2.08 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
 1. Replace as much Portland cement as possible with fly ash, ground granulated blast furnace slag, silica fume, or rice hull ash as is consistent with ACI recommendations.
- B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
 1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
- C. Normal Weight Concrete:
 1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 3,000 pounds per square inch.
 2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.

2.09 MIXING

- A. Transit Mixers: Comply with ASTM C94/C94M.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

- A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
- B. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in according to bonding agent manufacturer's instructions.
 1. Use latex bonding agent only for non-load-bearing applications.
- C. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

- A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.
- B. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.

3.04 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. Notify Architect not less than 24 hours prior to commencement of placement operations.
- C. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.

3.05 SLAB JOINTING

- A. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab.

3.06 FLOOR FLATNESS AND LEVELNESS TOLERANCES

- A. Maximum Variation of Surface Flatness:
 - 1. Exposed Concrete Floors: 1/4 inch in 10 feet.
- B. Correct the slab surface if tolerances are less than specified.

3.07 CONCRETE FINISHING

- A. Repair surface defects, including tie holes, immediately after removing formwork.
- B. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
 - 1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.
- C. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
 - 1. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI 302.1R; thin floor coverings include carpeting, resilient flooring, and seamless flooring.
 - 2. Other Surfaces to Be Left Exposed: Trowel as described in ACI 302.1R, minimizing burnish marks and other appearance defects.
 - a. Chemical Hardener: See Section 03 3511.
- D. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1:100 nominal.

3.08 CURING AND PROTECTION

- A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

3.09 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.
- B. Provide free access to concrete operations at project site and cooperate with appointed firm.
- C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
- D. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.
- E. Compressive Strength Tests: ASTM C39/C39M. For each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cubic yards or less of each class of concrete placed.

3.10 DEFECTIVE CONCRETE

- A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.
- B. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

END OF SECTION

This page intentionally left blank

**SECTION 04 2613
MASONRY VENEER**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete Block.
- B. Clay Facing Brick.
- C. Reinforcement and Anchorage.
- D. Flashings.
- E. Installation of Lintels.
- F. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 05 5000 - Metal Fabrications: Loose steel lintels.
- B. Section 06 1000 - Rough Carpentry: Wood stud backup for masonry veneer.

1.03 REFERENCE STANDARDS

- A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata (2024).
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- C. ASTM C55 - Standard Specification for Concrete Building Brick; 2011.
- D. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2014.
- E. ASTM C91/C91M - Standard Specification for Masonry Cement; 2012.
- F. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units; 2011.
- G. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).
- H. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale); 2014.
- I. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2014a.
- J. ASTM C476 - Standard Specification for Grout for Masonry; 2010.
- K. ASTM C652 - Standard Specification for Hollow Brick (Hollow Masonry Units Made From Clay or Shale); 2014.
- L. ASTM D4637/D4637M - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane; 2013.
- M. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing; 2005.
- N. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls; 2005.
- O. BIA Technical Notes No. 46 - Maintenance of Brick Masonry; 2005.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for masonry units and mortar.
- C. Samples: Submit four samples of facing brick units to illustrate color, texture, and extremes of color range.
- D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of the contract documents.
- 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. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

1.07 FIELD CONDITIONS

- A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards and as follows:
 - 1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depth of 8 inches.
 - 2. Special Shapes: Provide non-standard blocks configured for corners.
 - 3. Load-Bearing Units: ASTM C90, normal weight.
 - a. Hollow block, as indicated.
 - b. Exposed Faces: Manufacturer's standard color and texture where indicated.
 - c. Pattern: match existing.
 - 4. Non-Loadbearing Units: ASTM C129.
 - a. Hollow block, as indicated.
 - b. Normal weight.

2.02 BRICK UNITS

- A. Manufacturers:
 - 1. Match existing.
- B. Facing Brick: ASTM C216, Type FBS Smooth, Grade SW.
 - 1. Nominal Size: Match existing.

2.03 MORTAR AND GROUT MATERIALS

- A. Masonry Cement: ASTM C91/C91M Type N.
 - 1. Colored Mortar: Premixed cement as required to match Architect's color sample.
- B. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.
- C. Hydrated Lime: ASTM C207, Type S.
- D. Water: Clean and potable.

2.04 REINFORCEMENT AND ANCHORAGE

- A. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A 153/A 153M, Class B.
 - 1. Wire ties: Manufacturer's standard shape, 0.1875 inch thick.
 - 2. Vertical adjustment: Not less than 3-1/2 inches.
 - 3. Manufacturers:
 - a. Hohmann & Barnard, Inc; _____ : www.h-b.com/#sle.
 - b. Substitutions: See Section 01 6000 - Product Requirements.

2.05 FLASHINGS

- A. EPDM Flashing: ASTM D4637/D4637M, Type I, 0.040 inch thick.
 - 1. Manufacturers:

- a. _____.
- B. Flashing Sealant/Adhesives: Silicone, polyurethane, or silyl-terminated polyether/polyurethane, or other type required or recommended by flashing manufacturer; type capable of adhering to type of flashing used.

2.06 ACCESSORIES

- A. Weeps: Molded PVC grilles, insect resistant.
 - 1. Manufacturers:
 - a. CavClear/Archovations, Inc: www.cavclear.com/#sle.
 - b. Mortar Net USA, Ltd; Product ____: www.mortarnet.com.
- B. Termination Bars: Stainless steel; compatible with membrane and adhesives.
- C. Drip Edge: Stainless steel; compatible with membrane and adhesives.
- D. Lap Sealants and Tapes: As recommended by flashing manufacturer; compatible with membrane and adhesives.
- E. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.07 MORTAR AND GROUT MIXES

- A. Mortar for Unit Masonry: ASTM C270, Proportion Specification.
 - 1. Masonry below grade and in contact with earth; Type S.
 - 2. Exterior, non-loadbearing masonry; Type N.
- B. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.
- C. 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.
- D. 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.

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. Concrete Masonry Units:
 - 1. Bond: Match existing.
- D. Brick Units:
 - 1. Bond: Match existing.
 - 2. 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. Remove excess mortar as work progresses.
- D. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

- E. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

3.04 WEEPS/CAVITY VENTS

- A. Install weeps in veneer walls at 24 inches on center horizontally above through-wall flashing, above shelf angles and lintels, and at bottom of walls.

3.05 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

- A. Masonry Back-Up: Embed anchors to bond veneer at maximum 16 inches on center vertically and 36 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.

3.06 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.
 - 1. Extend flashings full width at such interruptions and at least 6 inches, minimum, into adjacent masonry or turn up at least 8 inches, minimum, to form watertight pan at non-masonry construction.
 - 2. Seal lapped ends and penetrations of flashing before covering with mortar.
- B. Extend EPDM flashings to within 1/4 inch of exterior face of masonry.
- C. Lap end joints of flashings at least 6 inches, minimum, and seal watertight with flashing sealant/adhesive.

3.07 LINTELS

- A. Install loose steel lintels over openings.
- B. Maintain minimum 8 inch bearing on each side of opening.

3.08 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.

3.09 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.

**SECTION 05 5000
METAL FABRICATIONS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated steel items.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.
- B. Section 04 2613 - Masonry Veneer: Placement of metal fabrications in masonry.
- C. Section 09 9113 - Exterior Painting: Paint finish.

1.03 REFERENCE STANDARDS

- A. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- B. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

1.04 SUBMITTALS

- A. See Section 01 3000 - 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.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Sections: ASTM A36/A36M.
- B. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.
- C. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. 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.

2.03 FABRICATED ITEMS

- A. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.
- B. Lintels: As detailed; galvanized finish.

2.04 FINISHES - STEEL

- A. Prime paint steel items.
 - 1. Exceptions: Galvanize items to be embedded in concrete and items to be embedded in masonry.
 - 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. Prime Painting: One coat.
- C. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.05 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.

- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 PREPARATION

- A. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.02 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Perform field welding in accordance with AWS D1.1/D1.1M.
- C. After erection, prime welds, abrasions and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.03 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.

**SECTION 05 5213
PIPE AND TUBE RAILINGS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall mounted handrails.
- B. Free-standing railings at ramps and steps.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Placement of anchors in concrete.
- B. Section 09 2116 - Gypsum Board Assemblies: Placement of backing plates in stud wall construction.
- C. Section 09 9113 - Exterior Painting: Paint finish.
- D. Section 09 9123 - Interior Painting: Paint finish.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- D. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
- E. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2013.
- F. ASTM E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings; 2000 (Reapproved 2006).
- G. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).
- H. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Handrail Brackets
 - 1. Julius Blum & Co, Inc.; 386 Malleable Iron
 - 2. Substitutions: See Section 01 6000-Product Requirements.

2.02 RAILINGS - GENERAL REQUIREMENTS

- A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of ASTM E985 and applicable local code.
- B. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 75 pounds per linear foot applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935
- C. Concentrated Loads: Design railing assembly, wall rails, and attachments to resist a concentrated force of 200 pounds applied at any point on the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935

- D. Allow for expansion and contraction of members and building movement without damage to connections or members.
- E. Dimensions: See drawings for configurations and heights.
 - 1. Top Rails and Wall Rails: 1-1/2 inches diameter, round.
 - 2. Intermediate Rails: 1-1/2 inches diameter, round.
 - 3. Posts: 1-1/2 inches diameter, round.
- F. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
 - 1. For anchorage to concrete, provide inserts to be cast into concrete, for bolting anchors.
 - 2. For anchorage to stud walls, provide backing plates, for bolting anchors.
- G. Provide welding fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

2.03 STEEL RAILING SYSTEM

- A. Steel Tube: ASTM A500/A500M Grade B cold-formed structural tubing.
- B. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.
- C. Galvanizing: In accordance with requirements of ASTM A123/A123M.
 - 1. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20 Type I - Inorganic.
- D. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.04 FABRICATION

- A. Accurately form components to suit specific project conditions and for proper connection to building structure.
- B. Fit and shop assemble components in largest practical sizes for delivery to site.
- C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.
- D. Welded Joints:
 - 1. Exterior Components: Continuously seal joined pieces by intermittent welds and plastic filler. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
 - 2. Interior Components: Continuously seal joined pieces by intermittent welds and plastic filler.
 - 3. 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.

PART 3 EXECUTION

3.01 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete or embedded in masonry with setting templates, for installation as work of other sections.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.
- C. Install railings in compliance with ADA Standards for accessible design at applicable locations.
- D. Anchor railings securely to structure.

- E. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

3.03 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

This page intentionally left blank

**SECTION 06 1000
ROUGH CARPENTRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Rough opening framing for doors, windows, and roof openings.
- B. Concealed wood blocking, nailers, and supports.

1.02 RELATED REQUIREMENTS

- A. Section 06 4100 - Architectural Wood Casework

1.03 REFERENCE STANDARDS

- A. AWC (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings; 2015.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- C. AWPA U1 - Use Category System: User Specification for Treated Wood; 2012.
- D. PS 20 - American Softwood Lumber Standard; 2010.
- E. WWPA G-5 - Western Lumber Grading Rules; 2011.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a one year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. Species: Douglas Fir-Larch, unless otherwise indicated.
 - 2. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
 - 3. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
 - 4. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.
- B. Lumber fabricated from old growth timber is not permitted.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Grading Agency: Western Wood Products Association; WWPA G-5.
- 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. Species: Douglas Fir-Larch.
 2. Grade: No. 1.
- E. Joist and Rafter Framing (2 by 6 through 4 by 16):
1. Species: Douglas Fir-Larch.
 2. Grade: No. 1.
- 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:
1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

2.04 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWP A U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWP A standards.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

3.02 FRAMING INSTALLATION

- A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
- B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.
- C. Install structural members full length without splices unless otherwise specifically detailed.
- D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes and AWC (WFCM) Wood Frame Construction Manual.
- E. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

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. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- C. Provide the following specific non-structural framing and blocking:
1. Cabinets and shelf supports.
 2. Wall brackets.
 3. Handrails.
 4. Grab bars.
 5. Towel and bath accessories.
 6. Wall-mounted door stops.

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.

END OF SECTION

This page intentionally left blank

**SECTION 06 4100
ARCHITECTURAL WOOD CASEWORK**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specially fabricated cabinet units.
- B. Countertops.
- C. Cabinet hardware.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- C. Section 07 9200 - Joint Sealants
- D. Section 08 8000 - Glazing: Glass for casework.

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0; 2016.
- C. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2009.
- D. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

1.04 SUBMITTALS

- A. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
 - 2. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
- B. Samples for Verification: Submit two samples of each casework finish material, 12 by 12 inches in size.
- C. Product Data: Provide data for hardware accessories.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
- B. Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section.
- C. AWI certification is not required.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect units from moisture damage.

1.07 FIELD CONDITIONS

- A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS

2.01 CABINETS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Wood Veneer Faced Cabinet:
 - 1. Exposed Surfaces: HPVA HP-1 Grade A, Maple, plain sliced, random-matched.

- C. Plastic Laminate Faced Cabinets: Custom grade.
- D. Cabinets:
 - 1. Finish - Exposed Exterior Surfaces: Decorative laminate and wood.
 - 2. Finish - Concealed Surfaces: Manufacturer's option.
 - 3. Door and Drawer Front Edge Profiles: Square edge with thin applied band.
 - 4. Casework Construction Type: Type A - Frameless.
 - 5. Grained Face Layout for Cabinet and Door Fronts: Flush panel.
 - a. Custom Grade: Doors, drawer fronts and false fronts wood grain to run and match vertically within each cabinet unit.
 - 6. Cabinet Design Series: As indicated on drawings.
 - 7. Adjustable Shelf Loading: 50 lbs. per sq. ft.
 - 8. Cabinet Style: Flush overlay.
 - 9. Cabinet Doors and Drawer Fronts: Flush style.

2.02 WOOD-BASED COMPONENTS

- A. Wood fabricated from old growth timber is not permitted.

2.03 LAMINATE MATERIALS

- A. Manufacturers:
 - 1. PL-1:
 - a. Formica Corporation Color to be selected.
 - 2. PL-2:
 - a. Formica Corporation; Color to be selected.
- B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.

2.04 COUNTERTOPS

- A. Plastic Laminate Countertops: Medium density fiberboard substrate covered with HPDL, conventionally fabricated, with decorative PVC edge.
- B. Plastic Laminate Countertops with sinks: Moisture resistant industrial particle board substrate covered with HPDL, conventionally fabricated, with decorative PVC edge.

2.05 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Plastic Edge Banding: Extruded 3mm PVC, flat shaped; smooth finish; self locking serrated tongue; of width to match component thickness.
 - 1. Color: As selected by Architect from manufacturer's standard range.
 - 2. Use at all exposed door and drawer edges.
 - 3. Use at all exposed shelf edges.
- C. Vinyl Countertop Edge: PVC anchor type tee-molding edging in width to match thickness of countertop, color as indicated, used at locations as indicated.

2.06 HARDWARE

- A. Hardware: BHMA A156.9, types as recommended by fabricator for quality grade specified.
- B. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards or multiple holes for pin supports and coordinated self rests, polished chrome finish, for nominal 1 inch spacing adjustments.
- C. Drawer and Door Pulls: "U" shaped wire pull, steel with satin finish, 4 inch centers.
- D. Drawer Slides:
 - 1. Type: Full extension.
 - 2. Static Load Capacity: Commercial grade.
 - 3. Mounting: Side mounted.
 - 4. Stops: Integral type.

5. Manufacturers:
 - a. Accuride International, Inc: www accuride.com/#sle.
 - b. Hettich America, LP: www.hettich.com/#sle.
 - c. Knappe & Vogt Manufacturing Company: www.knapeandvogt.com/#sle.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- E. Hinges: European style concealed self-closing type, steel with satin finish.
 1. Manufacturers:
 - a. Grass America Inc: www.grassusa.com.
 - b. Hettich America, LP: www.hettich.com/#sle.
 - c. Blum, Inc: www.blum.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.

2.07 FABRICATION

- A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
- E. Mechanically fasten back splash to countertops with steel brackets at 16 inches on center.
- F. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

2.08 SHOP FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. On items to receive transparent finishes, use wood filler matching or blending with surrounding surfaces and of types recommended for applied finishes.
- C. 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.
 - b. Sheen: Flat.
 - c. Products:
 - 1) Sherwin-Williams Sayerlack Premium Polyurethane Clear Topcoat, TZL71 Series, AWI Finishing System 11.
 - 2) Substitutions: Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.

3.02 INSTALLATION

- A. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- B. Use fixture attachments in concealed locations for wall mounted components.
- C. Use concealed joint fasteners to align and secure adjoining cabinet units.
- D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

3.03 ADJUSTING

- A. Adjust installed work.
- B. Adjust moving or operating parts to function smoothly and correctly.

3.04 CLEANING

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION

SECTION 07 9200 JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Self-leveling pourable joint sealants.
- C. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.
- B. Section 08 8000 - Glazing: Glazing sealants and accessories.
- C. Section 09 2116 - Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.

1.03 REFERENCE STANDARDS

- A. ASTM C834 - Standard Specification for Latex Sealants; 2014.
- B. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2012.
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- D. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
- E. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2008 (Reapproved 2012).

1.04 SUBMITTALS

- A. See Section 01 3000 - 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.
- C. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.

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.

1.06 WARRANTY

- A. See Section 01 7800 - 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 MANUFACTURERS

- A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
 - 1. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 - 2. Bostik Inc: www.bostik-us.com.
 - 3. Hilti, Inc: www.us.hilti.com/#sle.
 - 4. Pecora Corporation: www.pecora.com.
 - 5. Tremco Global Sealants: www.tremcosealants.com.
 - 6. Sherwin-Williams Company: www.sherwin-williams.com.
 - 7. Substitutions: See Section 01 6000 - Product Requirements.

2.02 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. 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. Other joints indicated below.
 - 3. Do not seal the following types of joints.
 - a. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
 - b. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - c. Joints where installation of sealant is specified in another section.
 - d. Joints between suspended panel ceilings/grid and walls.
- B. Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.
- C. Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.
 - 1. Wall and Ceiling Joints in Non-Wet Areas: Acrylic emulsion latex sealant.

2.03 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products with levels of volatile organic compound (VOC) content as indicated in Section 01 6116.

2.04 NONSAG JOINT SEALANTS

- A. Type 1 - 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.
- B. Type 2 - Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
 - 1. Color: Clear.
 - 2. Applications:
 - a. Joint between countertops and backsplash.

- C. Type 3 - 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: To be selected by Architect from manufacturer's standard range.
 - 3. Manufacturers:
 - a. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 - b. Pecora Corporation: www.pecora.com.
 - c. Sika Corporation; Sikaflex-1a: www.usa-sika.com/#sle.
 - d. Substitutions: See Section 01 6000 - Product Requirements.

2.05 SELF-LEVELING SEALANTS

- A. Type 4 - Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
 - 1. Movement Capability: Plus and minus 25 percent, minimum.
 - 2. Color: To be selected by Architect from manufacturer's standard range.

2.06 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. 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.

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. Install bond breaker backing tape where backer rod cannot be used.
- D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- E. 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.
- F. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

3.04 CLEANING

- A. Clean adjacent soiled surfaces.

3.05 PROTECTION

- A. Protect sealants until cured.

END OF SECTION

**SECTION 08 1113
HOLLOW METAL DOORS AND FRAMES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hollow metal frames for wood doors.
- B. Fire-rated hollow metal doors and frames.
- C. Thermally insulated hollow metal doors with frames.

1.02 RELATED REQUIREMENTS

- A. Section 08 7100 - Door Hardware.
- B. Section 08 8000 - Glazing: Glass for doors and borrowed lites.
- C. Section 09 9113 - Exterior Painting: Field painting.
- D. Section 09 9123 - Interior Painting: Field painting.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.
- C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.
- D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2015.
- G. 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; 2014.
- H. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014.
- I. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.
- J. NAAMM HMMA 805 - Recommended Selection and Usage Guide for Hollow Metal Doors and Frames; 2012.
- K. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.
- L. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.
- M. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.
- N. NAAMM HMMA 860 - Guide Specifications for Hollow Metal Doors and Frames; 2013.
- O. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2006.
- P. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2013.

1.04 SUBMITTALS

- A. See Section 01 3000 - 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.

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 Doors and Frames:
 - 1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com.
 - 2. Republic Doors: www.republicdoor.com.
 - 3. Steelcraft, an Allegion brand: www.allegion.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DESIGN CRITERIA

- A. Requirements for Hollow Metal Doors and Frames:
 - 1. Steel used for fabrication of doors and frames shall comply with one or more of the following requirements; Galvannealed steel conforming to ASTM A653/A653M, cold-rolled steel conforming to ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel conforming to ASTM A1011/A1011M, Commercial Steel (CS) Type B for each.
 - 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
 - 3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
 - 4. Door Edge Profile: Manufacturers standard for application indicated.
 - 5. Typical Door Face Sheets: Flush.
 - 6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturers standard.
 - 7. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
 - 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.
 - a. Based on SDI Standards: Provide at least A40/ZF120 (galvannealed) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvannealed) for corrosive locations.
- 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 DOORS

- A. Exterior Doors: Thermally insulated.
 - 1. Based on NAAMM HMMA Custom Guidelines:

- a. Comply with guidelines of NAAMM HMMA 860 for Hollow Metal Doors and Frames.
- b. Performance Level 2 - Moderate Duty, in accordance with NAAMM HMMA 805.
- c. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
- d. Door Face Metal Thickness: 20 gage, 0.032 inch, minimum.
- e. Zinc Coating: G90/Z275 galvanized coating; ASTM A653/A653M.
- 2. Core Material: Manufacturers standard core material/construction and in compliance with requirements.
- 3. Door Thickness: 1-3/4 inch, nominal.

2.04 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Exterior Door Frames: Full profile/continuously welded type.
 - 1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
 - 2. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.
 - 3. Frame Finish: Factory primed and field finished.
 - 4. Thermally broken frame.
 - 5. Weatherstripping: Separate, see Section 08 7100.
- C. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
 - 1. Frame Metal Thickness: 18 gage, 0.042 inch, minimum.
 - 2. Frame Finish: Factory primed and field finished.
- D. Door Frames, Fire-Rated: Full profile/continuously welded type.
 - 1. Fire Rating: Same as door, labeled.
 - 2. Frame Metal Thickness: 18 gage, 0.042 inch, minimum.
 - 3. Frame Finish: Factory primed and field finished.

2.05 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.06 ACCESSORIES

- A. Glazing: As specified in Section 08 8000, 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. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.

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 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

- A. Install 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. Install door hardware as specified in Section 08 7100.
- E. Comply with glazing installation requirements of Section 08 8000.
- F. Coordinate installation of electrical connections to electrical hardware items.

3.04 TOLERANCES

- A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861
- B. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

3.05 ADJUSTING

- A. Adjust for smooth and balanced door movement.

3.06 SCHEDULE

- A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

**SECTION 08 1416
FLUSH WOOD DOORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flush wood doors; flush and flush glazed configuration; fire-rated and non-rated.

1.02 RELATED REQUIREMENTS

- A. Section 06 2000 - Finish Carpentry: Wood door frames.
- B. Section 08 1113 - Hollow Metal Doors and Frames.
- C. Section 08 7100 - Door Hardware.

1.03 REFERENCE STANDARDS

- A. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2014.
- B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0; 2016.
- D. ICC (IBC) - International Building Code; 2015.
- E. WDMA I.S. 1A - Interior Architectural Wood Flush Doors; 2013.

1.04 SUBMITTALS

- A. See Section 01 3000 - 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 two samples of door veneer, 12 by 12 inch in size illustrating wood grain, stain color, and sheen.
- E. Manufacturer's Installation Instructions: Indicate special installation instructions.
- F. Warranty, executed in Story County'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.
- C. 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. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging. Inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Interior Doors: Provide manufacturer's warranty for the life of the installation.

- C. 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. Eggers Industries: www.eggersindustries.com.
 - 2. Graham Wood Doors: www.grahamdoors.com.
 - 3. Marshfield DoorSystems, Inc: www.marshfeldddoors.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DOORS AND PANELS

- A. Doors: Refer to drawings for locations and additional requirements.
 - 1. Quality Standard: Custom Grade, Heavy 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.
- B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
 - 1. Provide solid core doors at each location.
 - 2. Wood veneer facing with factory transparent finish where indicated on drawings.

2.03 DOOR AND PANEL CORES

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.
- B. Fire-Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

2.04 DOOR FACINGS

- A. Veneer Facing for Transparent Finish: White Maple, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
 - 1. Vertical Edges: Any option allowed by quality standard for grade.

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 FACTORY FINISHING - WOOD VENEER DOORS

- A. 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.
 - b. Stain: As selected by Architect.
 - c. Sheen: Satin.
- B. Factory finish doors in accordance with custom color sample to match existing doors.
- C. Seal door top edge with color sealer to match door facing.

2.07 ACCESSORIES

- A. Hollow Metal Door Frames: As specified in Section 08 1113.
- B. Door Hardware: As specified in Section 08 7100.

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.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Use machine tools to cut or drill for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.

3.03 TOLERANCES

- A. Conform to specified quality standard for fit and clearance tolerances.
- B. Conform to specified quality standard for telegraphing, warp, and squareness.

3.04 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.

END OF SECTION

This page intentionally left blank

**SECTION 08 4313
ALUMINUM-FRAMED STOREFRONTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum-framed storefront, with vision glass.
- B. Aluminum doors and frames.
- C. Weatherstripping.
- D. Door hardware.

1.02 RELATED REQUIREMENTS

- A. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.
- B. Section 08 8000 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

- A. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.
- B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- E. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
- F. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, internal drainage details.
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.
- D. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.
- E. Manufacturer Qualifications Statement.
- F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Story County's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.06 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.

1.07 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.

1.08 WARRANTY

- A. Correct defective Work within a five year period after Date of Substantial Completion.
- B. 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.
- C. 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 BASIS OF DESIGN -- FRAMING FOR INSULATING GLAZING

- A. Center-Set Style, Thermally-Broken:
 - 1. Basis of Design: Kawneer 451T with 350 entrances.
 - 2. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.

2.02 BASIS OF DESIGN -- SWINGING DOORS

- A. Medium Stile, Monolithic Glazing:
 - 1. Basis of Design: Kawneer 350.
 - 2. Thickness: 1-3/4 inches.
- B. Medium Stile, Insulating Glazing, Thermally-Broken:
 - 1. Basis of Design: Kawneer 350.
 - 2. Thickness: 1-3/4 inches.

2.03 MANUFACTURERS

- A. Aluminum-Framed Storefront and Doors:
 - 1. Kawneer North America: www.kawneer.com/#sle.

2.04 STOREFRONT

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
 - 1. Glazing Position: Centered (front to back).
 - 2. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.
 - 3. Finish Color: Clear Anodized.
 - 4. 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.
 - 5. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
 - 6. 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.
 - 7. 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.
 - 8. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
 - 9. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

2.05 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
 - 1. Glazing Stops: Flush.
- B. Glazing: As specified in Section 08 8000.
- C. Swing Doors: Glazed aluminum.
 - 1. Thickness: 1-3/4 inches.
 - 2. Top Rail: 4 inches wide.
 - 3. Vertical Stiles: 4-1/2 inches wide.
 - 4. Bottom Rail: 10 inches wide.
 - 5. Glazing Stops: Square.
 - 6. Finish: Same as storefront.

2.06 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Fasteners: Stainless steel.
- C. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

2.07 FINISHES

- A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

2.08 HARDWARE

- A. For each door, include weatherstripping, sill sweep strip, and threshold.
- B. Other Door Hardware: Storefront manufacturer's standard type to suit application.
 - 1. Finish on Hand-Contacted Items: satin chrome.
 - 2. For each door, include butt hinges, pull handle, exit device, and closer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 INSTALLATION

- A. Install wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Set thresholds in bed of sealant and secure.
- J. Install hardware using templates provided.

- K. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

- A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.

3.04 ADJUSTING

- A. Adjust operating hardware and sash for smooth operation.

3.05 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

3.06 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

**SECTION 08 4413
GLAZED ALUMINUM CURTAIN WALLS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum-framed curtain wall, with vision glazing and glass infill panels.

1.02 RELATED REQUIREMENTS

- A. Section 08 8000 - Glazing.

1.03 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- B. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- C. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- D. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2009).
- E. ASTM E547 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Differential; 2000 (Reapproved 2009).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, internal drainage details, glazing, and infill.
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.
- D. Warranty: Submit manufacturer warranty and ensure forms have been completed in Story County's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.06 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.

1.07 FIELD CONDITIONS

1.08 WARRANTY

- A. See Section 01 7800 - 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 excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 BASIS OF DESIGN

- A. Basis of Design: Kawneer 1600

Story County Attorney Office Remodel 2024	08 4413 - 1	Glazed Aluminum Curtain Walls
--	-------------	-------------------------------

- B. Other Manufacturers: Provide either product identified as "Basis of Design" or an equivalent product of one of the manufacturers listed below.
 - 1. C.R. Laurence Company, Inc; U.S. Aluminum: www.crl-arch.com/#sle.
 - 2. EFCO, a Pella Company: www.efcocorp.com/#sle.
- C. Substitutions: See Section 01 6000 - Product Requirements.

2.02 CURTAIN WALL

- A. Aluminum-Framed Curtain Wall: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
 - 1. Outside glazed, with pressure plate and mullion cover, where indicated on drawings.
 - 2. Fabrication Method: Field fabricated stick system.
 - 3. Glazing Method: Field glazed system.
 - 4. Vertical Mullion Depth From Face of Glazing to Back of Frame: 6-1/4 inches.
 - 5. Finish: Class I natural anodized.
 - 6. Provide flush joints and corners, weathersealed, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for imposed loads.
 - 7. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
 - 8. 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.
- B. Water Penetration Resistance: No uncontrolled water on indoor face when tested as follows:
 - 1. Test Pressure Differential: 10 psf.
 - 2. Test Method: ASTM E331.
- C. Air Leakage: Maximum of 0.06 cu ft/min sq ft of wall area, when tested in accordance with ASTM E283 at 6.27 psf pressure differential across assembly.

2.03 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
- B. Glazing: As specified in Section 08 8000.

2.04 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).

2.05 FINISHES

- A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other related work.
- B. Verify that curtain wall openings and adjoining air and vapor seal materials are ready to receive work of this section.
- C. Verify that anchorage devices have been properly installed and located.

3.02 INSTALLATION

- A. Install curtain wall system in accordance with manufacturer's instructions.
- B. Provide alignment attachments and shims to permanently fasten system to building structure.
- C. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- D. Provide thermal isolation where components penetrate or disrupt building insulation.

Story County Attorney Office Remodel 2024	08 4413 - 2	Glazed Aluminum Curtain Walls
--	-------------	-------------------------------

- E. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

3.03 TOLERANCES

- A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 0.5 inches per 100 ft, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.
- C. Sealant Space Between Curtain Wall Mullions and Adjacent Construction: Maximum of 3/4 inch and minimum of 1/4 inch.

3.04 ADJUSTING

- A. Adjust operating sash for smooth operation.

3.05 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

3.06 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

This page intentionally left blank

SECTION 08 7100 DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hardware for wood and hollow metal doors.
- B. Thresholds.
- C. Gate locks.

1.02 RELATED REQUIREMENTS

- A. Section 06 2000 - Finish Carpentry: Wood door frames.
- B. Section 08 1113 - Hollow Metal Doors and Frames.
- C. Section 08 1416 - Flush Wood Doors.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. BHMA A156.1 - American National Standard for Butts and Hinges; 2013.
- C. BHMA A156.2 - American National Standard for Bored and Preamsembled Locks & Latches; 2011.
- D. BHMA A156.13 - American National Standard for Mortise Locks & Latches Series 1000; 2012.
- E. BHMA A156.16 - American National Standard for Auxiliary Hardware; 2013.
- F. BHMA A156.18 - American National Standard for Materials and Finishes; 2012.
- G. BHMA A156.21 - American National Standard for Thresholds; 2014.
- H. BHMA A156.22 - American National Standard for Door Gasketing and Edge Seal Systems, Builders Hardware Manufacturers Association; 2012.
- I. BHMA A156.28 - American National Standard for Recommended Practices for Mechanical Keying Systems; 2013.
- J. BHMA A156.115W - Hardware Preparation in Wood Doors with Wood or Steel Frames; 2006.
- K. DHI (KSN) - Keying Systems and Nomenclature; 1989.
- L. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames; 2004.
- M. DHI WDHS.3 - Recommended Locations for Architectural Hardware for Flush Wood Doors; 1993; also in WDHS-1/WDHS-5 Series, 1996.
- N. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.
- B. Convey building tenant keying requirements to manufacturer.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.
- C. Shop Drawings - Door Hardware Schedule: Submit detailed listing that includes each item of hardware to be installed on each door. Use door numbering scheme as included in Contract Documents.
 - 1. Prepared by or under supervision of Architectural Hardware Consultant (AHC).

2. Provide complete description for each door listed.
3. Provide manufacturer's and product names, and catalog numbers; include functions, types, styles, sizes and finishes of each item.
- D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- E. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
- F. Keying Schedule:
 1. Submit three (3) copies of Keying Schedule in compliance with requirements established during Keying Requirements Meeting unless otherwise indicated.
- G. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Story County's name and registered with manufacturer.
- H. Project Record Documents: Record actual locations of concealed equipment, services, and conduit.
- I. Maintenance Materials and Tools: Furnish the following for Story County's use in maintenance of project.
 1. See Section 01 6000 - Product Requirements, for additional provisions.
 2. Tools: One set of each special wrench or tool applicable for each different or special hardware component, whether supplied by hardware component manufacturer or not.

1.06 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 for commercial door hardware with at least three years of documented experience.
- C. Supplier Qualifications: Company with certified Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC) to assist in work of this section.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Warranty against defects in material and workmanship for period indicated, from Date of Substantial Completion.
 1. Locksets and Cylinders: Three years, minimum.
 2. Other Hardware: Two years, minimum.

PART 2 PRODUCTS

2.01 DESIGN AND PERFORMANCE CRITERIA

- A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.
- B. Provide individual items of single type, of same model, and by same manufacturer.
- C. Provide door hardware products that comply with the following requirements:
 1. Applicable provisions of federal, state, and local codes.
 2. Accessibility: ADA Standards and ICC A117.1.
 3. Hardware Preparation for Wood Doors with Wood or Steel Frames: BHMA A156.115W.

2.02 HINGES

- A. Manufacturers:
 1. Basis of Design: Stanley Black & Decker: www.stanleyblackanddecker.com.

2. McKinney; an Assa Abloy Group company: www.assaabloydss.com.
 3. Hager Companies: www.hagerco.com.
- B. Hinges: Complying with BHMA A156.1, Grade 1.
1. Provide five-knuckle full mortise butt hinges unless otherwise indicated.
 2. Provide ball-bearing hinges at each door with closer.
 3. Provide non-removable pins on exterior outswinging doors.
 4. Provide following quantity of butt hinges for each door:
 - a. Doors From 60 inches High up to 90 inches High: Three hinges.

2.03 LOCK CYLINDERS

- A. Lock Cylinders: Provide key access on outside of each lock, unless otherwise indicated.
1. Provide cylinders from same manufacturer as locking device.
 2. Provide cams and/or tailpieces as required for locking devices.

2.04 CYLINDRICAL LOCKS

- A. Manufacturers:
1. Corbin Russwin, Sargent, or Yale; an Assa Abloy Group company: www.assaabloydss.com.
 2. Best Access Systems, division of Stanley Access Technologies LLC: www.bestaccess.com.
 3. Schlage, an Allegion brand: www.allegion.com/us.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Cylindrical Locks (Bored): Complying with BHMA A156.2, Grade 1, 4000 Series.
1. Bored Hole: 2-1/8 inch diameter.
 2. Latchbolt Throw: 1/2 inch, minimum.
 3. Backset: 2-3/4 inch unless otherwise indicated.
 4. Strikes: Provide manufacturer's standard strike for each latchset or lockset with strike box and curved lip extending to protect frame in compliance with indicated requirements.
 - a. Finish: To match lock or latch.

2.05 FLOOR STOPS

- A. Floor Stops: Complying with BHMA A156.16, Grade 1 and Resilient Material Retention Test as described in this standard.
1. Type: Manual hold-open, with pencil floor stop.
 2. Material: Aluminum housing with rubber insert.

2.06 WALL STOPS

- A. Wall Stops: Complying with BHMA A156.16, Grade 1 and Resilient Material Retention Test as described in this standard.
1. Type: Bumper, concave, wall stop.
 2. Material: Aluminum housing with rubber insert.

2.07 THRESHOLDS

- A. Manufacturers:
1. Pemko; an Assa Abloy Group company: www.assaabloydss.com.
 2. Hager Companies: www.hagerco.com.
 3. National Guard Products, Inc: www.ngpinc.com.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Thresholds: Complying with BHMA A156.21.
1. Provide threshold at each exterior door, unless otherwise indicated.
 2. Type: Flat surface.
 3. Material: Aluminum.
 4. Threshold Surface: Fluted horizontal grooves across full width.
 5. Field cut threshold to profile of frame and width of door sill for tight fit.

6. Provide non-corroding fasteners at exterior locations.

2.08 WEATHERSTRIPPING AND GASKETING

- A. Manufacturers:
 1. Pemko; an Assa Abloy Group company: www.assaabloydss.com.
 2. Hager Companies: www.hagerco.com.
 3. National Guard Products, Inc: www.ngpinc.com.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Weatherstripping and Gasketing: Complying with BHMA A156.22.
 1. Head and Jamb Type: Adjustable.
 2. Door Sweep Type: Encased in retainer.
 3. Material: Aluminum, with brush weatherstripping.
 4. Provide weatherstripping on each exterior door at head, jambs, and meeting stiles of door pairs, unless otherwise indicated; .
 5. Provide door bottom sweep on each exterior door, unless otherwise indicated.

2.09 KEY CONTROL SYSTEMS

- A. Manufacturers:
 1. Sargent; an Assa Abloy Group company: www.assaabloydss.com.
- B. Key Control Systems: Complying with guidelines of BHMA A156.28.
 1. Provide keying information in compliance with DHI (KSN) standards.
 2. **Coordinate new hardware with Owner supplied access control system.**
 3. Keying: Grand master keyed.
 4. Supply keys in following quantities:
 - a. 1 each Grand Master keys.

2.10 FINISHES

- A. Finishes: Provide door hardware of same finish, unless otherwise indicated.
 1. Primary Finish: 626; satin chromium plated over nickel, with brass or bronze base material (former US equivalent US26D); BHMA A156.18.
 2. Exceptions:
 - a. Where base material metal is specified to be different, provide finish that is an equivalent appearance in accordance with BHMA A156.18.
 - b. Door Closer Covers and Arms: Color as selected by Architect from manufacturer's standard colors unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that doors and frames are ready to receive this work; labeled, fire-rated doors and frames are properly installed, and dimensions are as indicated on shop drawings.

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Use templates provided by hardware item manufacturer.
- C. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list; unless noted otherwise in Door Hardware Schedule or on drawings.
 1. For Steel Doors and Frames: Install in compliance with DHI (LOCS) recommendations.
 2. For Wood Doors: Install in compliance with DHI WDHS.3 recommendations.
 3. Mounting heights in compliance with ADA Standards:
 - a. Locksets: 40-5/16 inch.
- D. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel

countersunk screws.

3.03 FIELD QUALITY CONTROL

- A. Perform field inspection and testing under provisions of Section 01 4000 - Quality Requirements.

3.04 ADJUSTING

- A. Adjust work under provisions of Section 01 7000 - Execution and Closeout Requirements.
- B. Adjust hardware for smooth operation.

3.05 CLEANING

- A. Clean adjacent surfaces soiled by hardware installation.

3.06 PROTECTION

- A. Protect finished Work under provisions of Section 01 7000 - Execution and Closeout Requirements.
- B. Do not permit adjacent work to damage hardware or finish.

END OF SECTION

This page intentionally left blank

SECTION 08 8000 GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Glazing units.
- B. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 08 1113 - Hollow Metal Doors and Frames: Glazed borrowed lites.
- B. Section 08 4313 - Aluminum-Framed Storefronts: Glazing furnished as part of storefront assembly.
- C. Section 08 4413 - Glazed Aluminum Curtain Walls: Glazing furnished as part of wall assembly.

1.03 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test; 2010.
- C. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2011).
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- E. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2014.
- F. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
- G. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2012a.
- H. GANA (GM) - GANA Glazing Manual; 2009.
- I. GANA (SM) - GANA Sealant Manual; 2008.
- J. GANA (LGRM) - Laminated Glazing Reference Manual; 2009.
- K. ICC (IBC) - International Building Code; 2015.
- L. IGMA TM-3000 - North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use; 1990 (2004).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.
- C. Samples: Submit two samples 12 by 12 inch in size of glass units.
- D. Certificate: Certify that products of this section meet or exceed specified requirements.
- E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Story County's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA (GM), GANA (SM), GANA (LGRM), and IGMA TM-3000 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.

1.06 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.

1.07 WARRANTY

- A. See Section 01 7800 - 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 replacement of failed units.
- C. Laminated Glass: Provide a five (5) year manufacturer warranty to include coverage for delamination, including replacement of failed units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Float Glass Manufacturers:
 - 1. Cardinal Glass Industries: www.cardinalcorp.com.
 - 2. Guardian Glass, LLC: www.guardianglass.com.
 - 3. Pilkington North America Inc: www.pilkington.com/na.
 - 4. PPG Industries, Inc: www.ppgideascales.com.
 - 5. Substitutions: Refer to Section 01 6000 - 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. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
 - 2. 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.
 - 3. Glass thicknesses listed are minimum.
- B. Vapor Retarder and Air Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier.
 - 1. In conjunction with vapor retarder and joint sealer materials described in other sections.
- C. Thermal and Optical Performance: Provide glass 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 6.3 computer program.
 - 2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 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 noted otherwise.
 - 1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality-Q3.
 - 2. Heat-Strengthened and Fully Tempered Types: ASTM C1048, Kind HS and FT.
 - 3. Fully Tempered Safety Glass: Complies with ANSI Z97.1 and 16 CFR 1201 criteria.
 - 4. Tinted Type: ASTM C1036, Class 2 - Tinted, Quality-Q3, 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. Manufacturers:
 - 1. Any of the manufacturers specified for float glass.
- B. 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.
 - 6. Color: Black.
 - 7. Purge interpane space with dry air, hermetically sealed.
- C. Type ISG - Insulating Glass Units: Vision glass, double glazed.
 - 1. Applications: Exterior glazing unless otherwise indicated.
 - 2. Space between lites filled with air.
 - 3. Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
 - a. Tint: Match existing.
 - b. Coating: Low-E (passive type), on #2 surface.
 - 4. Inboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
 - a. Tint: Clear.
 - 5. Total Thickness: 1 inch.

2.05 GLAZING UNITS

- A. Type SG - Monolithic Safety Glazing: Non-fire-rated.
 - 1. Applications:
 - a. Glazed lites in doors, except fire doors.
 - b. Glazed sidelights to doors, except in fire-rated walls and partitions.
 - c. Other locations required by applicable federal, state, and local codes and regulations.
 - d. Other locations indicated on drawings.
 - 2. Glass Type: Fully tempered safety glass as specified.
 - 3. Tint: Clear.
 - 4. Thickness: 1/4 inch, nominal.

2.06 GLAZING COMPOUNDS

- A. Type GC-5 - Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; clear color.

2.07 ACCESSORIES

- A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.
- C. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.

2.08 SOURCE QUALITY CONTROL

- A. Provide shop inspection and testing for Type G-6 glass.

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.
- C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.

3.04 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)

- A. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.05 FIELD QUALITY CONTROL

- A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.
- B. Monitor and report installation procedures and unacceptable conditions.

3.06 CLEANING

- A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- B. Remove non-permanent 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.

3.07 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

Story County Attorney Office Remodel 2024	08 8000 - 5	Glazing
--	-------------	---------

This page intentionally left blank

**SECTION 09 0561
COMMON WORK RESULTS FOR FLOORING PREPARATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This section applies to all floors identified in the contract documents as to receive the following types of floor coverings:
 - 1. Resilient tile and sheet.
 - 2. Carpet tile.
- 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. 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 such remediation is indicated by testing agency's report and is due to a condition not under Contractor's control or could not have been predicted by examination prior to entering into the contract, a contract modification will be issued.
- F. Remedial floor coatings.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Moisture emission reducing curing and sealing compound for slabs to receive adhered flooring, to prevent moisture content-related flooring failures; to remain in place, not to be removed.
- B. Section 03 3000 - Cast-in-Place Concrete: Concrete admixture for slabs to receive adhered flooring, to prevent moisture content-related flooring failures.
- C. Section 03 3000 - Cast-in-Place Concrete: Limitations on curing requirements for new concrete floor slabs.

1.03 REFERENCE STANDARDS

- A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- B. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2011.
- C. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; Resilient Floor Covering Institute; October 2011.

1.04 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. Adhesive Bond and Compatibility Test Report.
- D. Remedial Materials Product Data: Manufacturer's published data on each product to be used for remediation.

1.05 QUALITY ASSURANCE

- A. Contractor may perform adhesive and bond test with his own personnel or hire a testing agency.
- B. 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.

1.06 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.

1.07 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. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.
- B. Alternate Flooring Adhesive: Floor covering manufacturer's recommended product, suitable for the moisture and pH conditions present; low-VOC. In the absence of any recommendation from flooring manufacturer, provide a product recommended by adhesive manufacturer as suitable for substrate and floor covering and for conditions present.
- 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 alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.
 - 1. Thickness: As required for application and in accordance with manufacturer's installation instructions.
 - 2. Use product recommended by testing agency.
 - 3. Products:
 - a. ARDEX Engineered Cements; ARDEX MC RAPID: www.ardexamericas.com/#sle.
 - b. LATICRETE International, Inc; LATICRETE DRYTEK Moisture Vapor Barrier with LATICRETE DRYTEK Skimcoat: www.laticrete.com/#sle.
 - c. Sika Corporation; Sikafloor Moisture Tolerance Epoxy Primer and Sikafloor Self-Leveling Moisture Tolerant Resurfacer: www.sikafloorusa.com/#sle.
 - d. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 CONCRETE SLAB PREPARATION

- A. Follow recommendations of testing agency.
- B. Perform following operations in the order indicated:
 - 1. Existing concrete slabs (on-grade and elevated) with existing floor coverings:
 - a. Visual observation of existing floor covering, for adhesion, water damage, alkaline deposits, and other defects.
 - b. Removal of existing floor covering.

2. Preliminary cleaning.
 3. 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.
 4. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
 5. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
 6. Specified remediation, if required.
 7. Patching, smoothing, and leveling, as required.
 8. Other preparation specified.
 9. Adhesive bond and compatibility test.
 10. Protection.
- 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 Alkalinity (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 over entire suspect floor area.

3.02 REMOVAL OF EXISTING FLOOR COVERINGS

- A. Comply with local, State, and federal regulations and recommendations of RFCI Recommended Work Practices for Removal of Resilient Floor Coverings, 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. 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.

3.05 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.

3.06 ADHESIVE BOND AND COMPATIBILITY TESTING

- A. Comply with requirements and recommendations of floor covering manufacturer.

3.07 APPLICATION OF REMEDIAL FLOOR COATING

- A. Comply with requirements and recommendations of coating manufacturer.

END OF SECTION

**SECTION 09 2116
GYPSUM BOARD ASSEMBLIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall framing.
- C. Acoustic insulation.
- D. Gypsum wallboard.
- E. Joint treatment and accessories.
- F. Textured finish system.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Building framing and sheathing.
- B. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.

1.03 REFERENCE STANDARDS

- A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.
- B. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.
- C. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.
- D. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.
- E. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.
- F. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.
- G. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
- H. ASTM E413 - Classification for Rating Sound Insulation; 2010.
- I. GA-216 - Application and Finishing of Gypsum Board; 2013.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on gypsum board, accessories, and joint finishing system.
- C. Samples: Submit two samples of predecorated gypsum board, 12 by 12 inches in size, illustrating finish color and texture.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum 5 years of experience.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
 - 1. See PART 3 for finishing requirements.
- B. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with the following characteristics:
 - 1. Acoustic Attenuation: STC of 45-49 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

2.02 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
 - 1. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com.
 - 2. Marino: www.marinoware.com.
 - 3. Phillips Manufacturing Company: www.phillipsmfg.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.
 - 1. Studs: "C" shaped with flat or formed webs with knurled faces.
 - 2. Runners: U shaped, sized to match studs.
 - 3. Resilient Furring Channels: 1/2 inch depth, for attachment to substrate through one leg only.
- C. Partition Head To Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and fastened as indicated on drawings.

2.03 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
 - 1. CertainTeed Corporation: www.certainteed.com.
 - 2. Georgia-Pacific Gypsum: www.gpgypsum.com.
 - 3. National Gypsum Company: www.nationalgypsum.com/#sle.
 - 4. USG Corporation: www.usg.com.
- B. Gypsum Wallboard: Paper-faced gypsum panels 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. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - a. Mold resistant board is required in wet locations.
 - 3. Thickness:
 - a. Vertical Surfaces: 5/8 inch.
 - b. Ceilings: 5/8 inch.
 - 4. Mold Resistant Paper Faced Products:
 - a. American Gypsum Company; M-Bloc.

2.04 ACCESSORIES

- A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced. Thickness: 3-1/2 inch.
- B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
- C. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, 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.
 - 3. Products:
 - a. Same manufacturer as framing materials.
- D. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
 - 1. Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
 - 2. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
 - 3. Ready-mixed vinyl-based joint compound.

4. Powder-type vinyl-based joint compound.
5. Chemical hardening type compound.
- E. High Build Drywall Surfer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.
 1. Products:
 - a. Tuff-Hide by USG..
 - b. Builders Solution Surfer by Sherwin Williams.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- F. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.
- G. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion resistant.

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 C754 and manufacturer's instructions.
 1. Install horizontal bridging at all interior partitions.
 - a. Install bridging at mid-height of walls up to 10' in height and no more than 60" O.C. in walls over 10' in height.
- B. Studs: Space studs at 16 inches on center.
 1. Extend partition framing to structure in all locations.
 2. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.
- C. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

3.03 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
 1. Place one bead continuously on substrate before installation of perimeter framing members.
 2. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

3.04 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
 1. Exception: Tapered edges to receive joint treatment at right angles to framing.
- C. Installation on Wood Framing: For rated assemblies, comply with requirements of listing authority. For non-rated assemblies, install as follows:
 1. Single-Layer Applications: Screw attachment.

3.05 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as follows:
 1. Not more than 30 feet apart on walls and ceilings over 50 feet long.

- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.06 JOINT TREATMENT

- A. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.
- B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 - 1. Level 5: Walls and ceilings 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 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
 - 4. Level 1: Wall areas above finished ceilings, whether or not accessible in the completed construction.
- C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 - 1. Feather coats of joint compound so that camber is maximum 1/32 inch.
- D. At all surfaces to receive sprayed texture finish apply high build drywall surfacer over entire surface after joints have been properly treated and before texture is applied; achieve a flat and tool mark-free finish.

3.07 TEXTURE FINISH

- A. Apply finish texture coating by means of spraying apparatus in accordance with manufacturer's instructions and to match existing texture.
- B. Texture Required: Light Orange Peel.

3.08 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

**SECTION 09 5100
ACOUSTICAL CEILINGS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

1.02 REFERENCE STANDARDS

- A. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2013a.
- B. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2013.
- 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; 2014.
- D. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2014.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on suspension system components.
- C. Samples: Submit two samples 6 x 6 inch in size illustrating material and finish of acoustical units.
- D. Manufacturer's Installation Instructions: Indicate special procedures.
- E. Maintenance Materials: Furnish the following for Story County's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Acoustical Units: 20 sq ft of each type.

PART 2 PRODUCTS

2.01 ACOUSTICAL UNITS

- A. Acoustical Units - General: ASTM E1264, Class A.
- B. Acoustical Panels Type ACT: Painted mineral fiber, ASTM E1264 Type III, with the following characteristics:
 - 1. Size: 24 by 24 inches.
 - 2. Thickness: 3/4 inches.
 - 3. Composition: Wet felted.
 - 4. Edge: Match Existing.
 - 5. Surface Color: White.
 - 6. Surface Pattern: Match Existing.

2.02 SUSPENSION SYSTEM(S)

- A. Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.
- B. Exposed Steel Suspension System Type ACT: Formed steel, commercial quality cold rolled; heavy-duty.
 - 1. Profile: Tee; 15/16 inch wide face.
 - 2. Construction: Double web.
 - 3. Finish: White painted.

2.03 ACCESSORIES

- A. Perimeter Moldings: Same material and finish as grid.

1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.

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 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, ASTM C636/C636M, ASTM E580/E580M, 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. Locate system according to reflected plan.
- D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- E. 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. 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.

3.03 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Fit border trim neatly against abutting surfaces.
- D. Install units after above-ceiling work is complete.
- E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- F. Cutting Acoustical Units:
 1. Make field cut edges of same profile as factory edges.

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 6500
RESILIENT FLOORING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Resilient sheet flooring.
- B. Resilient base.
- C. Installation accessories.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 03 3000 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors.
- C. Section 09 0561 - Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, removal of existing floor coverings, cleaning, and preparation.

1.03 REFERENCE STANDARDS

- A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- B. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2004 (Reapproved 2014).
- C. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008 (Reapproved 2012).
- D. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; Resilient Floor Covering Institute; October 2011.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Verification Samples: Submit two samples, 12 by 12 inch in size illustrating color and pattern for each resilient flooring product specified.
- D. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of sub-floor is acceptable.
- E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- F. Maintenance Materials: Furnish the following for Story County's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Flooring Material: 16 square feet of each type and color.
 - 3. Extra Wall Base: 50 linear feet of each type and color.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- 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.
- D. Protect roll materials from damage by storing on end.

1.06 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.

PART 2 PRODUCTS

2.01 SHEET FLOORING

- A. Vinyl Sheet Flooring - Type SV-1: Homogeneous without backing, with color and pattern throughout full thickness.
 - 1. Manufacturers:
 - a. Teknoflor Medscapes HPDV2.
 - 2. Minimum Requirements: Comply with ASTM F1913.
 - 3. Thickness: 0.080 inch nominal.
 - 4. Integral coved base with cap strip.
 - 5. Color: Gray Quartz, 88701P.
- B. Vinyl Sheet Flooring - Type SV-2: Transparent or translucent vinyl wear layer over interlayer and backing.
 - 1. Manufacturers:
 - a. Mannington Entwined Burlap.
 - 2. Minimum Requirements: Comply with ASTM F1303, Type I, with Class A fibrous backing.
 - 3. Wear Layer Thickness: 0.020 inch minimum.
 - 4. Total Thickness: 0.080 inch minimum.
 - 5. Sheet Width: 144 inch minimum.
 - 6. Seams: Heat welded.
 - 7. Color: To be selected by Architect from manufacturer's full range.
- C. Welding Rod: Solid bead in material compatible with flooring, produced by flooring manufacturer for heat welding seams, and in color matching field color.

2.02 RESILIENT BASE

- A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove.
 - 1. Manufacturers:
 - a. Burke Flooring: www.burkeflooring.com.
 - b. Johnsonite, a Tarkett Company: www.johnsonite.com.
 - c. Roppe Corp: www.roppe.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Height: 4 inch.
 - 3. Thickness: 0.125 inch.
 - 4. Finish: Satin.
 - 5. Length: Roll.
 - 6. Color: To be selected by Architect from manufacturer's full range.

2.03 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.
 - 1. VOC Content Limits: As specified in Section 01 6116.
- C. Moldings, Transition and Edge Strips: Same material as flooring.
- D. Filler for Coved Base: Plastic.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface

hardeners, and other chemicals that might interfere with bonding of flooring to substrate.

3.02 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install in accordance with manufacturer's written instructions.
- C. Spread only enough adhesive to permit installation of materials before initial set.
- D. Fit joints and butt seams tightly.
- E. Set flooring in place, press with heavy roller to attain full adhesion.
- F. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- G. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
- H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.03 INSTALLATION - SHEET FLOORING

- A. Lay flooring with joints and seams parallel to longer room dimensions, to produce minimum number of seams. Lay out seams to avoid widths less than 1/3 of roll width; match patterns at seams.
- B. Seal seams by heat welding where indicated.
- C. Coved Base: Install per manufacturers recommendations, using coved base filler as backing at floor to wall junction. Extend sheet flooring vertically to 4", and cover top edge with metal cap strip.

3.04 INSTALLATION - RESILIENT BASE

- A. Remove existing resilient base in all areas indicated.
- B. Use care to avoid wall damage above level of existing base.
- C. Repair any wall damage that remains visible above level of new base.
- D. Fit joints tightly and make vertical. Maintain minimum dimension of 144 inches between joints.
- E. Fit joints tightly and make vertical. Maintain minimum dimension of 96 inches between joints.
- F. Miter internal corners. At external corners, "V" cut back of base strip to 2/3 of its thickness and fold.
- G. Install base on solid backing. Bond tightly to wall and floor surfaces.
- H. Scribe and fit to door frames and other interruptions.

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 intentionally left blank

**SECTION 09 6813
TILE CARPETING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Carpet tile, fully adhered.
- B. Removal of existing carpet.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 03 3000 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors.
- C. Section 09 0561 - Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, removal of existing floor coverings, cleaning, and preparation.
- D. Section 26 0539 - Underfloor Raceways for Electrical Systems: Electrical and telephone floor cover plate with recess for carpet.

1.03 REFERENCE STANDARDS

- A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2014c.
- B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- C. CRI 104 - Standard for Installation of Commercial Carpet; 2015.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Shop Drawings: Indicate layout of joints.
- D. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
- E. Manufacturer's Installation Instructions: Indicate special procedures.
- F. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- G. Maintenance Materials: Furnish the following for Story County's use in maintenance of project.
 - 1. See Section 01 6000 - 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. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Tile Carpeting, Type CPT: Tufted, manufactured in one color dye lot.
 - 1. Product: Passages manufactured by J & J Flooring.
 - 2. Tile Size: 24 by 24 inch, nominal.
 - 3. Color: Alley 2049.

2.02 ACCESSORIES

- A. Edge Strips: Vinyl, color as selected by Architect.
- B. Adhesives:
 - 1. Compatible with materials being adhered; maximum VOC content as specified in Section 01 6116.
- C. Carpet Tile Adhesive: Recommended by carpet tile manufacturer; releasable type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.
- C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for flooring installation by testing for moisture and pH.
 - 1. Test in accordance with Section 09 0561.
 - 2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.
- D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Remove existing carpet.
- B. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- C. Remove sub-floor ridges and bumps at all areas of remodeling work. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.
- D. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Lay carpet tile in quarter-turn pattern, with pile direction alternating to next unit, set parallel to building lines.
- F. Trim carpet tile neatly at walls and around interruptions.
- G. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING

- A. Clean and vacuum carpet surfaces.

END OF SECTION

**SECTION 09 9113
EXTERIOR PAINTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish new exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 - 5. Glass.
 - 6. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 09 9123 - Interior Painting.

1.03 REFERENCE STANDARDS

- A. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.
- B. SSPC-SP 1 - Solvent Cleaning; 2015.
- C. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
- C. Samples: Submit three 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.
- D. Manufacturer's Instructions: Indicate special surface preparation procedures.
- E. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.
- F. Maintenance Materials: Furnish the following for Story County's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, 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 three years experience and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.07 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. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
 - 1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
- B. Paints:
 - 1. Base Manufacturer: Sherwin Williams.
 - 2. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
- C. Primer Sealers: Same manufacturer as top coats.
- D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.
 - 1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Supply each paint material in quantity required to complete entire project's work from a single production run.
 - 3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content: Comply with Section 01 6116.

2.03 PAINT SYSTEMS - EXTERIOR

- A. Exterior Surfaces to be Painted, Unless Otherwise Indicated: Including primed metal.
 - 1. Two top coats and one coat primer.
 - 2. Top Coat(s): Exterior Latex.
 - a. Products:
 - 1) Sherwin Williams, Pro Industrial Multi-Surface Acrylic, Semi-Gloss
- B. Paint ME-OP-2L - Ferrous Metals, Primed, Latex, 2 Coat:
 - 1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.

2. Semi-gloss: Two coats of latex enamel.

2.04 PRIMERS

- A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
 1. Anti-Corrosive Alkyd Primer for Metal; MPI #79.
 2. Alkyd Primer for Galvanized Metal.

2.05 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- C. Test shop-applied primer for compatibility with subsequent cover materials.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
- 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. Galvanized Surfaces:
- G. Ferrous Metal:
 1. Solvent clean according to SSPC-SP 1.
 2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
 3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

3.03 APPLICATION

- A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- C. Apply each coat to uniform appearance.
- D. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- E. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

3.06 SCHEDULE - PAINT SYSTEMS

- A. Shop-Primed Metal Items: Finish surfaces exposed to view.
 - 1. Finish the following items:
 - 2. Exterior: Paint-ME-OP-2L, semi-gloss.

END OF SECTION

**SECTION 09 9123
INTERIOR PAINTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints, stains, and varnishes.
- C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
 - 5. Floors, unless specifically indicated.
 - 6. Brick, architectural concrete, cast stone, integrally colored plaster and stucco.
 - 7. Glass.
 - 8. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

1.03 DEFINITIONS

- A. Conform to ASTM D16 for interpretation of terms used in this section.

1.04 REFERENCE STANDARDS

- A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2014.
- B. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.
- C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
 - 4. Manufacturer's installation instructions.
 - 5. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.
- C. Samples: Submit three 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. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens definitely not required.
- D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.

- E. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.
- F. Maintenance Materials: Furnish the following for Story County's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
 - 3. Label each container with color in addition to the manufacturer's label.

1.06 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 5 years experience and approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Minimum Application Temperatures for Paints: 50 degrees F for interiors unless required otherwise by manufacturer's instructions.
- D. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior, unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
 - 1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
- B. Paints:
 - 1. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
- C. Transparent Finishes:
 - 1. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
- D. Stains:
 - 1. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
- E. Primer Sealers: Same manufacturer as top coats.
- F. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.

1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 2. Supply each paint material in quantity required to complete entire project's work from a single production run.
 3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content: Comply with Section 01 6116.
- C. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
- D. Colors: As indicated on drawings.
1. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Story County.
 2. Extend colors to surface edges; colors may change at any edge as directed by Architect.
 3. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.

2.03 PAINT SYSTEMS - INTERIOR

- A. Paint I-OP - Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board and plaster.
1. Two top coats and one coat primer.
 2. Top Coat(s): Institutional Low Odor/VOC Interior Latex.
 - a. Products:
 - 1) Sherwin-Williams ProMar 200 Zero VOC Interior Latex, Semi-Gloss.
 3. Top Coat Sheen:
 - a. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
 4. Primer: As recommended by top coat manufacturer for specific substrate.
- B. Paint I-OP-MD-DT - Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals and wood:
1. Medium duty applications include doors, door frames, railings, handrails, guardrails, and balustrades.
 2. Two top coats and one coat primer.
 3. Top Coat(s): Interior Light Industrial Coating, Water Based; MPI #151, 153 or 154.
 - a. Products:
 - 1) Sherwin-Williams Pro Industrial Acrylic Coating, Semi-Gloss. (MPI #153)
 4. Top Coat Sheen:
 - a. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
 5. Primer: As recommended by top coat manufacturer for specific substrate.
- C. Paint I-TR -W - Transparent Finish on Wood.
1. 1 top coat over sanding sealer over stain.
 2. Stain: Semi-Transparent Stain for Wood; MPI #90.
 - a. Products:
 - 1) Sherwin-Williams Wood Classics 250 VOC Oil Stain. (MPI #90)
 - 2) Substitutions: Section 01 6000 - Product Requirements.
 3. Sealer: Alkyd, Sanding Sealer, Clear; MPI #102.
 - a. Products:
 - 1) Sherwin-Williams Wood Classics FastDry Sanding Sealer. (MPI #102)
 4. Top Coat(s): Polyurethane Varnish, Oil Modified; MPI #56 or 57.
 - a. Products:
 - 1) Sherwin-Williams Wood Classics Polyurethane Varnish, Satin. (MPI #57)

2.04 PRIMERS

- A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
 - 1. Stain Blocking Primer; MPI #136.
 - a. Products:
 - 1) Sherwin Williams White Pigmented Shellac Primer. (MPI #136)
 - 2) Sherwin Williams White Synthetic Shellac Interior Stain Blocking Primer. (MPI #136).
 - 3) Substitutions: Section 01 6000 - Product Requirements.

2.05 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- C. Test shop-applied primer for compatibility with subsequent cover materials.
- D. 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. Plaster and Stucco: 12 percent.
 - 3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- F. Plaster: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- G. 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.
- H. 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.
- I. Wood Doors to be Field-Finished: Seal wood door top and bottom edge surfaces with clear sealer.

3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- E. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- F. Sand wood and metal surfaces lightly between coats to achieve required finish.
- G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- H. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- I. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

This page intentionally left blank

**SECTION 10 2800
TOILET, BATH, AND LAUNDRY ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Commercial toilet accessories.

1.02 RELATED REQUIREMENTS

- A. Section 061000 Rough Carpentry: Concealed supports for accessories, including in wall framing and plates.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2015a.
- C. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
- C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Commercial Toilet, Shower, and Bath Accessories:
 - 1. American Specialties, Inc: www.americanspecialties.com.
 - 2. Bradley Corporation: www.bradleycorp.com.
 - 3. Substitutions: Section 01 6000 - Product Requirements.
- B. All items of each type to be made by the same manufacturer.

2.02 MATERIALS

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
- B. Mirror Glass: Tempered safety glass, ASTM C1048; and ASTM C1036 Type I, Class 1, Quality Q2, with silvering as required.

2.03 FINISHES

- A. Stainless Steel: Satin finish, unless otherwise noted.
- B. Baked Enamel: Pretreat to clean condition, apply one coat primer and minimum two coats epoxy baked enamel.

2.04 COMMERCIAL TOILET ACCESSORIES

- A. Toilet Paper Dispenser: Double roll, surface mounted bracket type, stainless steel, spindleless type for tension spring delivery designed to prevent theft of tissue roll.
- B. Paper Towel Dispenser: Folded paper type, stainless steel, semi-recessed, with viewing slots on sides as refill indicator and tumbler lock.
 - 1. Capacity: 300 C-fold minimum.

- C. Mirrors: Stainless steel framed, 1/4" (6.4 mm) thick tempered glass mirror.
 - 1. Products:
 - a. American Specialties, Inc; Roval 20650-B2436: www.americanspecialties.com.
 - b. Substitutions: Section 01 6000 - Product Requirements.
 - 2. Size: 24 inch by 36 inch.
 - 3. Frame: 18 gauge type 304 stainless steel alloy 18-8, with mitered, welded and polished corners, radiused edges, and tamperproof mounting; No.4 finish.
- D. Grab Bars: Stainless steel, nonslip grasping surface finish.
 - 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. Length and Configuration: As indicated on drawings.
- E. Sanitary Napkin Disposal Unit: Stainless steel, surface-mounted, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. See Section 06 1000 Rough Carpentry for installation of blocking, reinforcing plates, and concealed anchors in walls and ceilings.

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.
 - 1. Grab Bars: As indicated on drawings.
 - 2. Other Accessories: As indicated on drawings.

3.03 PROTECTION

- A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

**SECTION 31 2316
EXCAVATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Excavating for stoops.

1.02 RELATED REQUIREMENTS

- A. Section 31 2323 - Fill: Fill materials, filling, and compacting.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PREPARATION

- A. Identify required lines, levels, contours, and datum locations.
- B. Locate, identify, and protect utilities that remain and protect from damage.
- C. Notify utility company to remove and relocate utilities.

3.02 EXCAVATING

- A. Excavate to accommodate new stoop.
- B. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- C. Do not interfere with 45 degree bearing splay of foundations.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.
- B. Provide for visual inspection of load-bearing excavated surfaces before placement of foundations.

3.04 PROTECTION

- A. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

END OF SECTION

This page intentionally left blank

**SECTION 31 2323
FILL**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Filling, backfilling, and compacting for footings, slabs-on-grade, and paving.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete.
- B. Section 31 2316 - Excavation: Removal and handling of soil to be re-used.

1.03 REFERENCE STANDARDS

- A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; 2010.
- B. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)); 2012.
- C. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN m/m³)); 2012.
- D. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used, including manufactured fill.
- C. Compaction Density Test Reports.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. When necessary, store materials on site in advance of need.
- B. When fill materials need to be stored on site, locate stockpiles where designated.
 - 1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
 - 2. Prevent contamination.
 - 3. Protect stockpiles from erosion and deterioration of materials.

PART 2 PRODUCTS

2.01 FILL MATERIALS

- A. General Fill: Subsoil excavated on-site.
 - 1. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
 - 2. Conforming to ASTM D2487 Group Symbol CL.
- B. Granular Fill - Gravel : Pit run washed stone; free of shale, clay, friable material and debris.
 - 1. Graded in accordance with ASTM D2487 Group Symbol GW.
- C. Sand: Natural river or bank sand; washed; free of silt, clay, loam, friable or soluble materials, and organic matter.
 - 1. Grade in accordance with ASTM D2487 Group Symbol SW.
- D. Topsoil: Topsoil excavated on-site.
 - 1. Free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds and foreign matter.

2.02 SOURCE QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for general requirements for testing and analysis of soil material.
- B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.

- C. If tests indicate materials do not meet specified requirements, change material and retest.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Identify required lines, levels, contours, and datum locations.
- B. See Section 31 2200 for additional requirements.

3.02 PREPARATION

- A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.
- B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
- C. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

3.03 FILLING

- A. Fill to contours and elevations indicated using unfrozen materials.
- B. Employ a placement method that does not disturb or damage other work.
- C. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- D. Maintain optimum moisture content of fill materials to attain required compaction density.
- E. Granular Fill: Place and compact materials in equal continuous layers not exceeding 8 inches compacted depth.
- F. Soil Fill: Place and compact material in equal continuous layers not exceeding 12 inches compacted depth.
- G. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.
- H. Correct areas that are over-excavated.
 - 1. Other areas: Use general fill, flush to required elevation, compacted to minimum 97 percent of maximum dry density.
- I. Compaction Density Unless Otherwise Specified or Indicated:
 - 1. Under paving, slabs-on-grade, and similar construction: 97 percent of maximum dry density.
- J. Reshape and re-compact fills subjected to vehicular traffic.

3.04 FILL AT SPECIFIC LOCATIONS

- A. Use general fill unless otherwise specified or indicated.
- B. At Foundation Walls and Footings:
 - 1. Use general fill.
 - 2. Fill up to subgrade elevation.
 - 3. Compact each lift to 90 percent of maximum dry density.
 - 4. Do not backfill against unsupported foundation walls.
 - 5. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.
- C. At Lawn Areas:
 - 1. Use general fill.
 - 2. Compact to 95 percent of maximum dry density.
 - 3. See Section 31 2200 for topsoil placement.
- D. Under Monolithic Paving :
 - 1. Compact subsoil to 95 percent of its maximum dry density before placing fill.
 - 2. Use general fill.
 - 3. Compact to 95 percent of maximum dry density.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.
- B. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with AASHTO T 180, ASTM D1557 ("modified Proctor"), ASTM D698 ("standard Proctor"), AASHTO T 180, ASTM D1557 ("modified Proctor"), ASTM D698 ("standard Proctor"), AASHTO T 180, ASTM D1557 ("modified Proctor"), or ASTM D698 ("standard Proctor").
- C. If tests indicate work does not meet specified requirements, remove work, replace and retest.

3.06 CLEANING

- A. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.
- B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION

This page intentionally left blank

**SECTION 32 1313
CONCRETE PAVING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete sidewalks and parking areas.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete.
- B. Section 31 2323 - Fill: Compacted subbase for paving.

1.03 REFERENCE STANDARDS

- A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).
- B. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).
- C. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000.
- D. ACI 305R - Hot Weather Concreting; 2010.
- E. ACI 306R - Cold Weather Concreting; 2010.
- F. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.
- G. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2017.
- H. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2015a.
- I. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.
- J. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2011.
- K. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2013).
- L. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2004a (Reapproved 2013).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on joint filler, admixtures, and curing compound.
- C. Design Data: Indicate pavement thickness, designed concrete strength, reinforcement, and typical details.

PART 2 PRODUCTS

2.01 PAVING ASSEMBLIES

- A. Comply with applicable requirements of ACI 301.

2.02 FORM MATERIALS

- A. Wood form material, profiled to suit conditions.
- B. Joint Filler: Preformed; non-extruding bituminous type (ASTM D1751) or sponge rubber or cork (ASTM D1752).

2.03 REINFORCEMENT

- A. Steel Welded Wire Reinforcement: Plain type, ASTM A1064/A1064M; in flat sheets; unfinished.
- B. Dowels: ASTM A615/A615M, Grade 40 - 40,000 psi yield strength; deformed billet steel bars; unfinished finish.

2.04 CONCRETE MATERIALS

- A. Concrete Materials: As specified in Section 03 3000.

2.05 ACCESSORIES

- A. Curing Compound: ASTM C309, Type 1, Class A.
- B. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.

2.06 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
 - 1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.

2.07 MIXING

- A. Transit Mixers: Comply with ASTM C94/C94M.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.

3.02 PREPARATION

- A. Moisten base to minimize absorption of water from fresh concrete.
- B. Notify Architect minimum 24 hours prior to commencement of concreting operations.

3.03 FORMING

- A. Place and secure forms to correct location, dimension, profile, and gradient.

3.04 REINFORCEMENT

- A. Place reinforcement at midheight of slabs-on-grade.
- B. Provide doweled joints 18 inch on center at joints with existing pavement.

3.05 COLD AND HOT WEATHER CONCRETING

- A. Follow recommendations of ACI 305R when concreting during hot weather.
- B. Follow recommendations of ACI 306R when concreting during cold weather.
- C. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

3.06 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.
- C. Apply salt protection coating to all exposed surfaces in accordance with manufacturer's instructions.

3.07 JOINTS

- A. Align curb, gutter, and sidewalk joints.
- B. Provide scored joints.
 - 1. At 3 feet intervals.
 - 2. Between sidewalks and curbs.
 - 3. Between curbs and pavement.
- C. Saw cut contraction joints 3/16 inch wide at an optimum time after finishing. Cut 1/3 into depth of slab.

3.08 FINISHING

- A. Area Paving: Light broom, texture perpendicular to pavement direction.
- B. Sidewalk Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius.
- C. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.09 TOLERANCES

- A. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.
- B. Maximum Variation From True Position: 1/4 inch.

3.10 FIELD QUALITY CONTROL

- A. Compressive Strength Tests: ASTM C39/C39M; for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cu yd or less of each class of concrete placed.
 - 1. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
 - 2. Perform one slump test for each set of test cylinders taken.
- B. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.11 PROTECTION

- A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.
- B. Do not permit vehicular traffic over pavement for 7 days minimum after finishing.

END OF SECTION

This page intentionally left blank

**SECTION 32 1723
PAVEMENT MARKINGS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Painted pavement markings.

1.02 RELATED REQUIREMENTS

- A. Section 32 1313 - Concrete Paving.
- B. Section 32 1623 - Sidewalks.

1.03 REFERENCE STANDARDS

- A. AASHTO MP 24 - Standard Specification for Waterborne White and Yellow Traffic Paints; 2015 (Reapproved 2020).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used.
- C. Installer's qualification statement.
- D. Maintenance Materials: Furnish the following for Story County's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements for additional provisions.
 - 2. Extra Paint: One container, 1 gallon size, of each type and color.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.

1.07 FIELD CONDITIONS

- A. Do not install products under environmental conditions outside manufacturer's absolute limits.
- B. Do not apply paint if temperature of surface to be painted or the atmosphere is less than 50 degrees F or more than 95 degrees F.

1.08 SEQUENCING

- A. Allow new pavement surfaces to cure for a period of not less than 14 days before application of markings.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Painted Pavement Markings:
 - 1. PPG Traffic Solutions; Ennis Flint Fast Dry Waterborne Traffic Paint, 9852x Series.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PAINTED PAVEMENT MARKINGS

- A. Painted Pavement Markings: As indicated on drawings.
 - 1. Marking Paint: In accordance with AASHTO MP 24.
 - a. Parking Lots: Yellow.
 - 2. Obliterating Paint: Type I, in accordance with AASHTO MP 24.
 - a. Bituminous Pavement: Black.
 - b. Concrete Pavement: Gray.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Identify existing markings for removal.
- B. Verification of Conditions: Verify that pavement is dry and ready for installation.
- C. Notify Architect of unsatisfactory conditions before proceeding.

3.02 PREPARATION

- A. Clean surfaces prior to installation.
 - 1. Remove dust, dirt, and other debris.
 - 2. Remove rubber deposits, existing paint markings, and other coatings.

3.03 INSTALLATION

- A. General:
 - 1. Position pavement markings as indicated on drawings.
 - 2. Field location adjustments require approval of Architect.
- B. Painted Pavement Markings:
 - 1. Apply in accordance with manufacturer's instructions.
 - 2. Apply in accordance with State of Iowa Highway Department standards.
 - 3. Obliterating Paint: Apply as necessary to cover existing markings completely.
 - 4. Marking Paint: Apply uniformly, with sharp edges.
 - a. Applications: One coat.
 - b. Wet Film Thickness: 0.015 inch, minimum.
 - c. Length Tolerance: Plus or minus 3 inches.

3.04 TOLERANCES

- A. Maximum Variation From True Position: 3 inches (76 mm).
- B. Maximum Offset From True Alignment: 3 inches (76 mm).

3.05 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements for additional requirements.
- B. If inspections indicate work does not meet specified requirements, rework and reinspect at no cost to Story County.
- C. Allow the pavement marking to set at least the minimum time recommended by manufacturer.

3.06 PROTECTION

- A. Prevent approaching traffic from crossing newly applied pavement markings.
- B. Replace damaged or removed markings at no additional cost to Story County.

END OF SECTION

SECTION 21 0500
COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Above ground piping.
- B. Pipe hangers and supports.

1.02 RELATED REQUIREMENTS

- A. Section 21 1300 - Fire-Suppression Sprinkler Systems: Sprinkler systems design.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide manufacturer's catalog information. Indicate valve data and ratings.
- C. Shop Drawings: Indicate pipe materials used, jointing methods, supports, and floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.
- D. Project Record Documents: Record actual locations of components and tag numbering.
- E. Operation and Maintenance Data: Include installation instructions and spare parts lists.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Comply with FM (AG), UL (DIR), and ITS (DIR) or Warnock Hersey requirements.
- C. Valves: Bear FM (AG), UL (DIR), and ITS (DIR) or Warnock Hersey product listing label or marking. Provide manufacturer's name and pressure rating marked on valve body.
- D. Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store valves in shipping containers, with labeling in place.
- 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.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Sprinkler-based System:
 - 1. Comply with NFPA 13.
 - 2. See Section 21 1300.
- B. Welding Materials and Procedures: Comply with ASME BPVC-IX.
- C. Provide system pipes, fittings, sleeves, escutcheons, seals, and other related accessories.

2.02 ABOVE GROUND PIPING

- A. Steel Pipe: ASTM A795 Schedule 40, black.

1. Steel Fittings: ASME B16.5 steel flanges and fittings.
2. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings and ASME B16.4, threaded fittings.
3. Malleable Iron Fittings: ASME B16.3, threaded fittings and ASTM A47/A47M.
4. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.
5. Mechanical Formed Fittings: Carbon steel housing with integral pipe stop and O-ring pocked and O-ring, uniformly compressed into permanent mechanical engagement onto pipe.

2.03 PIPE HANGERS AND SUPPORTS

- A. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
- B. Hangers for Pipe Sizes 2 inches and Over: Carbon steel, adjustable, clevis.
- C. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

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. Install sprinkler system and service main piping, hangers, and supports in accordance with NFPA 13.
- B. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- C. Install piping to conserve building space, to not interfere with use of space and other work.
- D. Group piping whenever practical at common elevations.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Pipe Hangers and Supports:
 1. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 2. Place hangers within 12 inches of each horizontal elbow.
 3. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 4. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- G. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
- H. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of

zinc-rich primer to welding.

- I. Do not penetrate building structural members unless indicated.
- J. Escutcheons:
 - 1. Install and firmly attach escutcheons at piping penetrations into finished spaces.
 - 2. Provide escutcheons on both sides of partitions separating finished areas through which piping passes.
 - 3. Use chrome plated escutcheons in occupied spaces and to conceal openings in construction.
- K. 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, unions, and couplings for servicing are consistently provided.

END OF SECTION

This page intentionally left blank

SECTION 21 1300
FIRE-SUPPRESSION SPRINKLER SYSTEMS

PART 1 GENERAL

1.01 SCOPE

- A. Work includes removal and relocation of sprinkler branches and heads as needed for removal and reinstallation of HVAC equipment and/or ducting.

1.02 SECTION INCLUDES

- A. Wet-pipe sprinkler system.

1.03 RELATED REQUIREMENTS

- A. Section 21 0500 - Common Work Results for Fire Suppression: Pipe and fittings.

1.04 REFERENCE STANDARDS

- A. FM (AG) - FM Approval Guide; Current Edition.
- B. NFPA 13 - Standard for the Installation of Sprinkler Systems; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. UL (DIR) - Online Certifications Directory; Current Edition.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

1.06 QUALITY ASSURANCE

- A. Comply with FM (AG) requirements.
- B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section and approved by manufacturer.
- D. Equipment and Components: Provide products that bear FM (AG) label or marking.
- E. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.08 EXTRA MATERIALS

- A. Provide extra sprinklers of type and size matching those installed, in quantity required by referenced NFPA design and installation standard.
- B. Provide suitable wrenches for each sprinkler type.

PART 2 PRODUCTS

2.01 SPRINKLERS

- A. Suspended Ceiling Type: Concealed pendant type with matching push on escutcheon plate.
 - 1. Finish: Enamel, color white .
 - 2. Escutcheon Plate Finish: Enamel, color white .
 - 3. Fusible Link: Fusible solder link type temperature rated for specific area hazard.
- B. Exposed Area Type: Standard upright type .
 - 1. Finish: Chrome plated.
 - 2. Fusible Link: Fusible solder link type temperature rated for specific area hazard.
- C. Sidewall Type: Recessed horizontal sidewall type with matching push on escutcheon plate .
 - 1. Finish: Enamel, color white .
 - 2. Escutcheon Plate Finish: Enamel, color white .
 - 3. Fusible Link: Fusible solder link type temperature rated for specific area hazard.
- D. Dry Sprinklers: Standard pendant type with matching push on escutcheon plate.
 - 1. Finish: Brass.
 - 2. Escutcheon Plate Finish: Brass.
 - 3. Fusible Link: Fusible solder link type temperature rated for specific area hazard.
- E. Guards: Finish to match sprinkler finish.

2.02 PIPING SPECIALTIES

- A. Water Flow Switch: Vane type switch for mounting horizontal or vertical, with two contacts; rated 10 amp at 125 volt AC and 2.5 amp at 24 volt DC.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with referenced NFPA design and installation standard.
- B. Install equipment in accordance with manufacturer's instructions.
- C. Install buried shut-off valves in valve box. Provide post indicator.
- D. Locate fire department connection with sufficient clearance from walls, obstructions, or adjacent siamese connectors to allow full swing of fire department wrench handle.
- E. Locate outside alarm gong on building wall as indicated.
- F. Place pipe runs to minimize obstruction to other work.
- G. Place piping in concealed spaces above finished ceilings.
- H. Center sprinklers in two directions in ceiling tile and provide piping offsets as required.
- I. Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting. Replace painted sprinklers.
- J. Flush entire piping system of foreign matter.
- K. Install guards on sprinklers where indicated.
- L. Hydrostatically test entire system.

M. Require test be witnessed by Fire Marshal.

3.02 INTERFACE WITH OTHER PRODUCTS

A. Ensure required devices are installed and connected as required to fire alarm system.

END OF SECTION

This page intentionally left blank

SECTION 22 0500
COMMON PLUMBING REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Specification and the accompanying drawings govern the work involved in furnishing, installing, testing and placing into satisfactory operation the Mechanical Systems as shown on the drawings and specified herein.
- B. Each Contractor shall provide all new materials as indicated in the schedules on the drawings, and/or in these specifications, and all items required to make his portion of the Mechanical System a complete, finished and working system.

1.02 WORK SEQUENCE

- A. All construction work that will produce excessive noise levels and interference with normal building operations or access, as determined by the Owner, shall be scheduled with the Owner. It may be necessary to schedule such work during regular hours. The Owner shall reserve the right to set policy as to when restricted construction hours will be required.
- B. The successful Bidders shall be responsible for scheduling overtime hours for the following work:
 - 1. This Contractor shall reference the work sequence as outlined in the Architectural specifications. Work in existing areas shall be coordinated with the General Contractor to minimize construction schedule in existing areas.

1.03 DIVISION OF WORK BETWEEN MECHANICAL, ELECTRICAL & CONTROL CONTRACTORS

- A. Definitions:
 - 1. "Mechanical Contractors" as referred to herein refers to the following Contractors:
 - a. HVAC Contractor
 - b. Plumbing Contractor
 - c. Temperature Control Contractor
 - 2. Motor Power Wiring. The single phase or 3 phase wiring extending from the power source (transformer, panelboard, feeder circuits, etc.) through disconnect switches and motor controllers to, and including the connections to the terminals of the motor.
 - 3. Motor Control Circuit Wiring. The wiring associated with the remote operation of the magnetic coil of a magnetic motor starter or relay, or the wiring which permits the direct cycling of the motor by means of a device in series with the motor power wiring. In the latter case the devices are usually single phase and are usually (but not always) connected into the motor power wiring through a manual motor starter having "Manual-Off-Auto" provisions.
 - 4. Control devices such as start-stop push buttons, thermostats, pressure switches, flow switches, other relays, etc., generally represent the type of equipment associated with motor control circuit wiring.

5. Motor control circuit wiring is single phase and usually will be 120 volts. In some instances, the voltage will be the same as the motor power wiring. Generally, where the motor power wiring exceeds 120 volts, a control transformer is provided to give a control voltage of 120 volts.
6. Temperature Control Wiring. The wiring associated with the operation of a motorized damper, solenoid valve or motorized valve, etc., either modulating or two (2) position, as opposed to wiring which directly powers or controls a motor used to drive equipment such as fans, pumps, etc. This wiring will be from a 120 volt source and may continue as 120 volt if applicable or be reduced in voltage (24 volt) in which case a control transformer shall be furnished as part of the temperature and comfort control wiring.
7. Control Motor. Where the term "Control Motor" is used without other clarification, it means an electrical device used to operate dampers, valves, etc. It may be of such a design to produce two position or modulating operation of the operated device. Conventional characteristics of such a motor are 24 volts, 60 cycles, 1 phase, although other voltages at times may be encountered.

B. General:

1. The purpose of these Specifications is to outline the Electrical and Mechanical Contractor's work responsibilities as related to control wiring, starters, disconnects and other electrical work required for items such as temperature controls, mechanical equipment, fans, chillers, compressors and the like. The exact wiring requirements for much of the equipment cannot be determined until the systems have been purchased and submittals reviewed. Therefore, only known wiring, as related to such items, is shown on the electrical drawings as being by the Electrical Contractor. Other wiring not shown on the electrical drawings but required for the mechanical equipment and systems shall be the responsibility of the Mechanical Contractor.
2. Where the drawings require the Electrical Contractor to wire between various pieces of equipment furnished by the Mechanical Contractor, such wiring shall be terminated at terminals provided in the equipment. It is the Mechanical Contractor's responsibility to provide complete wiring diagrams and supervision to the Electrical Contractor and to designate the terminal numbers for the correct wiring of the equipment.
3. The electrical work for all equipment and systems shall conform to the National Electrical Code requirements. All provisions of the Electrical Specifications concerning wiring, protection, etc., shall apply to wiring provided by the Mechanical Contractor.
4. All Contractors assigned to the project shall establish utility elevations prior to fabrication. All Contractors shall coordinate their material and equipment with other trades. When a conflict arises, priority is as follows:
 - a. Light Fixtures
 - b. Sheet Metal

- c. Electrical Cable Trays
 - d. Hydronic Piping
 - e. Conduit
- C. Mechanical Contractor's Responsibility:
 - 1. Assumes all responsibility for the internal wiring of all equipment provided by the Mechanical Contractor, for example:
 - a. Burners
 - b. Gas Trains
 - c. Air Handlers
 - d. Fans
 - e. Condensing Units
 - 2. Assumes all responsibility for miscellaneous items that require wiring, but are not shown on the electrical drawings or specified in the Electrical Specification. If items such as relays, flow switches, or interlocks are required to make the system function correctly or are required by the manufacturer, they are the responsibility of the Mechanical Contractor.
- D. Temperature Control Contractor's Responsibility:
 - 1. Assumes all responsibility for the complete wiring of any devices necessary to make the Temperature Control System functional.
 - 2. Assumes the responsibility for verifying any control wiring shown on the electrical drawings as being by the Electrical Contractor. If any wiring is required for the Control System, but not shown or scheduled on the electrical drawings, it shall be the responsibility of the Temperature Control Sub-contractor.
 - 3. Assumes the responsibility of coordinating equipment locations (such as PE's EP's, relays, transformer and etc.) with the Electrical Contractor where the wiring of the equipment is shown to be by the Electrical Contractor.
- E. Electrical Contractor's Responsibility:
 - 1. Furnishes and installs all combination starters as shown on the Materials Schedule of the Electrical Drawings and as indicated to be by the Electrical Contractor on the Mechanical Equipment Schedule of the Mechanical Drawings.
 - 2. Furnishes and installs all manual starters and disconnect devices as shown on the Materials Schedule of the Electrical Drawings and as indicated to be by the Electrical Contractor on the Mechanical Equipment Schedule of the Mechanical Drawings.
 - 3. Installs and wires to all remote control devices furnished by the Mechanical Contractor or Temperature Control Subcontractor when such items are noted on the Electrical Drawings.
 - 4. Provides motor control wiring where so noted on the drawings.
 - 5. Provides temperature control wiring where so noted on the drawings.

6. Electrical Contractor shall furnish, install and connect all relays, etc., for automatic shutdown of certain supply units and exhaust fans upon actuation of the Fire Alarm System as indicated and specified in Article "Fire Alarm System".

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Only products of reputable manufacturers will be acceptable.
2. Each Contractor and his subcontractors shall employ only workmen who are skilled in their respective trades.

B. Compliance with Codes, Laws, Ordinances:

1. This Contractor shall conform to all requirements of Local and State of Iowa Codes, Laws, Ordinances and other regulations having jurisdiction over this installation.
2. In the event there are no local codes having jurisdiction over this job, the state codes in existence shall be followed.
3. If there is a discrepancy between the codes and regulations having jurisdiction over this installation, and these specifications, the Engineer shall determine the method or equipment used.
4. If the Contractor notes, at the time of bidding, any parts of the drawings and specifications which are not in accord with the applicable codes or regulations, he shall inform the Architect/Engineer in writing, requesting a clarification. If there is insufficient time to follow this procedure, he shall submit with his proposal a separate price required to make the system shown on the drawings comply with the codes and regulations.
5. All changes to the system made after the letting of the contract, in order to comply with the applicable codes or the requirements of the Inspector, shall be made by the Contractor without cost to the Owner.
6. If there is a discrepancy between the manufacturer's recommendations and these specifications, the manufacturer's recommendations shall determine the method or equipment used.

C. Permits, Fees, Taxes, Inspections:

1. Procure all applicable permits and licenses.
2. Abide by all applicable laws, regulations, ordinances, and other rules of the State or Political Subdivision wherein the work is done, or as required by any duly constituted public authority.
3. Pay all applicable charges for such permits or licenses that may be required.
4. Pay all applicable fees and taxes imposed by the State, Municipal and/or other regulatory bodies.
5. Pay all charges arising out of required inspections by the codes, permits, licenses or as otherwise may be required by an authorized body.

6. Where applicable, all fixtures, equipment and materials shall be as approved or listed by the following:
 - a. Underwriters' Laboratories, Inc.
- D. Utility Company Requirements:
 1. Secure from the appropriate utility company (privately or publicly owned) all applicable requirements that must be followed to make the job comply with their requirements.
 2. Make the installation comply with the utility company requirements.
- E. Examination of Drawings:
 1. The drawings for the mechanical work are completely diagrammatic, intended to convey the scope of the work and to indicate the general arrangements and locations of equipment, outlets, etc., and the approximate sizes of equipment.
 2. Contractor shall determine the exact locations of equipment and rough-ins, and the exact routing of pipes and ducts so as to best fit the layout of the job.
 3. Scaling of the drawings will not be sufficient or accurate for determining these locations.
 4. Where job conditions require reasonable changes in indicated arrangements and locations, such changes shall be made by the Contractor at no additional cost to the Owner.
 5. Because of the scale of the drawings, certain basic items, such as fittings, boxes, valves, unions, etc., may not be shown, but where such items are required by other sections of the specifications or where they are required for proper installation of the work, such items shall be furnished and installed.
 6. If an item is either shown on the drawings or called for in the specifications, it shall be considered sufficient for including same in this contract.
 7. The determination of quantities of material and equipment required shall be made by the Contractor from the drawings. Schedules on the drawings and in the specifications are completed as an aid to the Contractor but where discrepancies arise, the greater number shall govern.
 8. Where words "provide", "install", or "furnished" are used on the drawings or in the specifications, it shall be taken to mean, to furnish, install and connect up complete and ready for operation, the items mentioned.
- F. Field Measurements:
 1. Before ordering any materials or fabricating any supports, pipes or ducts, This Contractor shall verify all pertinent dimensions at the job site and be responsible for their accuracy.

1.05 SUBMITTALS

- A. In addition to the provisions of Division 1, the following is required:
 1. Submittals shall include all fabrication, erection, layout, and setting drawings; manufacturers' standard drawings; schedules; descriptive literature, catalogs and brochures; performance and test data; wiring and control diagrams; and all other drawings

and descriptive data of materials of construction as may be required to show that the materials, equipment or systems and the location thereof conform to the requirements of the contract documents.

2. The Contractor shall submit seven (7) copies of each shop drawing for review by the Architect /Engineer BEFORE releasing any equipment for manufacture or shipment.
3. The Contractor shall thoroughly review and approve all shop drawings before submitting them to the Architect/Engineer. APPROVAL WILL INDICATE THE CONTRACTOR'S REVIEW of all material and a COMPLETE UNDERSTANDING OF EXACTLY WHAT IS TO BE FURNISHED. Contractor shall clearly mark all deviations from the contract documents on all submittals. IF DEVIATIONS ARE NOT MARKED BY THE CONTRACTOR, THEN THE ITEM SHALL BE REQUIRED TO MEET ALL DRAWING AND SPECIFICATION REQUIREMENTS.
4. The Contractor shall clearly mark each item with the same nomenclature applied on the drawings or in the specifications.
5. The Contractor shall clearly indicate the size, finish, material, etc.
6. All submittals shall be assembled in sets such as all air handling units, plumbing fixtures, or all fans, etc. All sets shall be identical.
7. Each set shall be bound in a manufacturer's folder.
8. Each set shall contain an index of the items enclosed with a general topic description on the cover.
9. Where more than one model is shown on a manufacturer's sheet, the Contractor shall clearly indicate exactly which item and which data is relevant to the work.
10. Failure to comply with the above shall be reason to resubmit all shop drawing submittals.
11. Reviewing one set of shop drawing submittals for each product shall be the Engineer's responsibility. if the first submittal is incomplete or does not comply with the drawings and/or specifications, the Contractor shall be responsible to bear the cost for the Engineer to recheck and handle the additional shop drawing submittals.
12. Submittals shall be required for the items identified in each section.

1.06 PRODUCT DELIVERY, STORAGE, HANDLING & MAINTENANCE

- A. Exercise care in transporting and handling to avoid damage to fixtures, equipment and materials. Store materials on the site so as to prevent damage. Keep fixtures, equipment and materials clean, dry and free from deleterious conditions.
- B. Keep all bearings properly lubricated. Keep all belts properly tensioned and aligned.

1.07 WARRANTY

- A. Provide one-year warranty, to the Owner, for all fixtures, equipment, materials, and workmanship.
- B. The warranty period for the entire installation described in this Division of the specifications shall commence on the date of final acceptance unless a whole or partial system or any

separate piece of equipment or component is put into use for the benefit of any party other than the installing contractor with the prior written authorization. In this instance, the warranty period shall commence on the date when such whole system, partial system or separate piece of equipment or component is placed in operation and accepted in writing by the Owner or his representative.

- C. Warranty requirements shall extend to correction, without cost to the final user, of all Work found to be defective or nonconforming to the contract documents. The Contractor shall bear the cost of correcting all damage resulting from such defects or nonconformance with contract documents exclusive of repairs required as a result of improper maintenance or operation, or of normal wear.

1.08 INSURANCE

- A. This Contractor shall maintain insurance coverage as set forth in Division 1 of these specifications.

1.09 MATERIAL SUBSTITUTION

- A. Where several manufacturer's names are given, the manufacturer for which a catalog number is given constitutes the basis for job design and establishes the equipment quality required to be used in this contract. Alternate manufacturers may be listed for the convenience of the contractor, but must conform to the requirements established by the basis for design given.
- B. This Contractor, at his option, may use equivalent equipment as manufactured by the other named manufacturers. This Contractor is responsible to ensure that all items submitted by these other manufacturers meets all requirements of the drawings and specifications and fits in the allocated space.
- C. Any material, article or equipment of other unnamed manufacturers which will adequately perform the services and duties imposed by the design and is of a quality equal to or better than the material, article or equipment identified by the drawings and specifications may be used if approval is secured in writing from the Architect/Engineer not later than ten (10) days prior to the bid opening date.
- D. Any material, article or equipment of other unnamed manufacturers which will adequately perform the services and duties imposed by the design and is of a quality equal to or better than the material, article or equipment identified by the drawings and specifications may be used but is contingent upon Architect/Engineer's approval during the submittal process.
- E. This Contractor assumes all costs that may be incurred as a result of using the offered material, article or equipment necessitating extra expense on his part or on the part of other Contractors whose work is affected.
- F. This Contractor may list voluntary add or deduct prices for alternate materials on the bid form. These items will not be used in determining the low bidder.
- G. All material substitutions requested later than ten (10) days prior to bid opening must be listed as voluntary changes on the bid form.

1.10 MANUFACTURERS AND MODEL NUMBERS

- A. Where drawing schedules call out specific manufacturer's model numbers, the numbers are listed solely for the convenience of the contractor.
- B. Where specific manufacturer's model numbers are called out, the Contractor and Material Supplier are responsible for verifying the correct model number. Where scheduled capacities, options, or accessories conflict with model numbers specified, the greater capacity, options, or accessories shall be bid upon and supplied unless addressed by the Engineer prior to Bid date.
- C. Incorrect model numbers shall be brought to the attention of the Engineer when discovered.

1.11 RESOLUTION OF DISCREPANCIES

- A. If discrepancies are found to exist between the project drawings and project specifications, the more restrictive and obligatory document shall prevail as the project requirement.
- B. If discrepancies are found to exist between the requirements of the; Electrical Specifications, the Mechanical Specifications, the Architectural Specifications, and/or the Specification Front End Documents (Bidding Requirements-Agreement, Bonds, and Closeout Documents-Project Forms-Conditions of the Contract), the more restrictive and obligatory document/section(s) shall prevail as the project requirement.

PART 2 PRODUCTS

2.01 NOT APPLICABLE

PART 3 EXECUTION

3.01 EXCAVATION, FILL, BACKFILL, COMPACTION

- A. General:
 - 1. The Contractor shall do all necessary excavating, filling, backfilling and compacting in connection with his work.
- B. Excavation:
 - 1. Excavations for structures, manholes, pits and trenches shall be excavated to accurate, solid, undisturbed foundation beds required for foundations, slabs on ground, etc., and to proper dimensions to permit installation and inspection of forms and other work.
 - 2. Where excavations are carried in error below indicated levels, concrete of same strength as specified for the foundations or thoroughly compacted sand-gravel fill, as determined by the Architect/Engineer shall be placed in such excess excavations under foundation. Thoroughly compacted, clean, stable soil fill shall be placed in excess excavations under slabs on ground, all at the Contractor's expense.
 - 3. Bottom and sides of excavations shall be trimmed to required grade and lines to receive foundations.
 - 4. Excavations shall be protected against frost action and freezing.
 - 5. Care shall be exercised in excavating so as to not damage surrounding structures, equipment or buried pipe. In no case shall any major structural footing or foundation be undermined.

6. All trenching shall be performed in a manner to prevent cave-ins and risk to workmen.
 7. Mechanical excavation of the trench to line and grade of the pipe shall be permitted.
 8. Where original surface is pavement or concrete, the surface shall be saw cut to provide clean edges and assist in the surface restoration.
 9. Where satisfactory bearing soil for foundations is not found at the indicated levels, the Architect /Engineer or their representative shall be notified immediately, and no further work shall be done until further instructions are given by the Architect /Engineer or their representative.
- C. Dewatering:
1. The Contractor shall be responsible for the furnishing, installation, operation and removal of all dewatering pumps and lines necessary to keep trenches and pits free of water at all times.
- D. Underground Obstructions:
1. Known underground piping, foundations, or other underground obstructions in the vicinity of construction are shown on the drawings. The Contractor shall use great care in making his installation in the vicinity of underground obstructions.
 2. If objects not shown on the drawings are encountered in area of new construction, remove, relocate, or perform extra work as directed by the Architect/Engineer.
- E. Fill and Backfilling:
1. No rubbish or waste material shall be permitted in excavations for trench fill and backfill.
 2. The Contractor shall provide the necessary sand for backfilling.
 3. Dispose of the excess excavated earth as directed.
 4. Soils for backfill shall be suitable for required stability and compaction, clean and free from perishable materials and free from stones greater than 4 inches in diameter. Under no circumstances shall water be permitted to rise in unbackfilled trenches after installation has been placed. No material shall be used for backfilling which contains stones having any dimension greater than 4 inches, frozen earth, debris or earth with an exceptionally high void content.
 5. All trenches and excavations shall be backfilled immediately after installation of pipe, or removal of forms, is made unless other protection is directed.
 6. Around piers and isolated foundations and structures, backfill and fill shall be placed and consolidated simultaneously on all sides to prevent wedge action and displacement. Fill and backfill materials shall be spread in 6 inch thick uniform horizontal layers with each layer being compacted separately to required density.
 7. All piping shall be laid on a compacted bed of sand at least 3 inches deep. Backfill around the pipe with sand, spread in 6 inch layers, and compact each layer.
 8. Use sand for backfill up to grade for all piping located under building slabs or paved areas. All other piping shall have sand backfill to 6 inches above the top of the pipe.

9. The backfilling above the sand shall be placed in uniform layers not exceeding 6 inches in depth. Each layer shall be placed, then carefully and uniformly tamped, so as to eliminate the possibility of lateral or vertical displacement.
 10. Where the fill and backfilling will ultimately be under a building, floor or paving, each layer of fill shall be compacted to 95% of the maximum density as determined by AASHTO Designation T-99 or ASTM Designation D-698. Moisture content of soil at time of compaction shall not exceed plus or minus 2% of optimum moisture content as determined by AASHTO T-99 or ASTM D-698 test.
- F. Surface Restoration:
1. Where trenches are cut through graded, planted or landscaped areas, the areas shall be restored to the original condition at completion of the work. All planting removed or damaged during the course of the work shall be replaced to its original condition. A minimum of 6 inches of topsoil shall be applied where disturbed areas are to be seeded or sodded.
 2. Concrete or asphalt type pavement, seal coat, rock, gravel or earth surfaces removed or damaged during the course of the work shall be replaced with comparable materials and restored to original condition.

3.02 PROJECT CLOSEOUT

- A. Refer to the Division 1 Section: PROJECT CLOSEOUT for requirements. The following paragraphs supplement the requirements of Division 1.
1. Before final payment will be authorized, This Contractor must have completed the following:
 - a. Submitted operation and maintenance manuals to the Architect/Engineer for review.
 - b. Submitted bound copies of approved shop drawings.
 - c. Submitted record documents for Architect/Engineer review including marked-up drawings and specifications.
 - d. Submitted a report stating the instructions given to the Owner's representative complete with the number of hours spent in the instruction. The report shall bear the signature of an authorized agent of This Contractor and shall be signed by the Owner's representative as having received the instructions.
 - e. Submitted inspection report by the State Fire Marshal of the fire protection system.
 - f. Submitted start-up reports on all equipment requiring a factory installation inspection and/or start.

3.03 OPERATION AND MAINTENANCE MANUAL

- A. As part of instructing the Owner, This Contractor shall assemble, organize, and bind operation and maintenance manuals on the mechanical systems installed.
- B. Submit three (3) properly indexed and bound copies of the manual to the Architect/Engineer for approval. Make all corrections or additions required.

- C. Operation and Maintenance Manuals shall consist of the following:
 - 1. Title page with project title, Architect, Engineer, and Contractor, with addresses, telephone numbers, and contacts.
 - 2. Table of Contents describing index.
 - 3. Listing of all Subcontractors and major equipment suppliers with addresses, telephone numbers, and contacts.
 - 4. Index tabs dividing information by specification section, major equipment, or systems.
 - 5. Copy of final approved test and balance report.
- D. Operation and maintenance data shall consist of written instructions for the care, maintenance, and operation of the equipment and systems. Instruction books, cards, manuals furnished with the equipment shall be included.
- E. Provide three (3) separate manuals with original or reproductions of approved shop drawings with title page and index system similar to operation and maintenance manual.

3.04 INSTRUCTING THE OWNER'S REPRESENTATIVE

- A. Adequately instruct the Owner's designated representative or representatives in the maintenance, care, and operation of the complete systems installed under this contract.
- B. Provide verbal and written instructions to the Owner's representative or representatives by FACTORY PERSONNEL in the care, maintenance, and operation of the equipment and systems.
- C. The Owner has the option to video tape the instructions to the Owner. Coordinate schedule of, instructions to facilitate this recording.
- D. The instructions shall include:
 - 1. Explanation of all system flow diagrams.
 - 2. Explanation of all air handling systems.
 - 3. Temperature control system operation including calibration, adjustment and proper operating conditions of all sensors.
 - 4. Maintenance of equipment.
 - 5. Start-up procedures for each major piece of equipment.
 - 6. Explanation of seasonal system changes.
 - 7. Description of emergency system operation.
- E. The Architect/Engineer shall be notified of the time and place for the verbal instructions to be given to the Owner's representative so that either he or his representative can be present if desirable.
- F. Minimum manhours of instruction time for each item and/or system, as outlined above, shall be as follows:
 - 1. 2 Hours.
- G. Operating Instructions:

1. The Contractor is responsible for all instructions to the Owner and/or his operating staff on the mechanical and control systems.
2. If the Contractor does not have Engineers and/or Technicians on staff that can adequately provide the required instructions on system operation, performance, troubleshooting, care and maintenance, he shall include in his bid an adequate amount to hire the Engineer to perform these instructions.

3.05 SYSTEM COMMISSIONING

- A. The mechanical systems included in the construction documents are to be complete and operating systems. The Architect /Engineer will make periodic job site observations during the construction period. The system start-up, testing, balancing, and satisfactory system performance is the responsibility of the Contractor. This shall include all calibration and adjustments of controls, noise level adjustments and final comfort factor adjustments that may be required.
- B. This Contractor shall adjust the mechanical systems and controls at season changes during the one year warranty period, as required, to provide satisfactory operation and to prove performance of system used in all seasons.
- C. All operating conditions and control sequences shall be simulated and tested during the start-up period. Testing shall also include all interlocks, safety shut-downs, damper position controls, and alarms.
- D. The Contractor, subcontractors, and equipment suppliers are expected to have skilled technicians to insure that the system performs as designed. If the Architect/Engineer is requested to visit the job site for the purpose of trouble shooting, assisting in the satisfactory start-up, obtaining satisfactory equipment operation, resolving installation and/or workmanship problems, equipment substitution issues or unsatisfactory system performance, including call backs during the warranty period through no fault of the design; the Contractor shall reimburse the Architect /Engineer on a time and material basis for services rendered at the Architect /Engineer's standard hourly rates in effect at the time the services are requested. The Contractor shall be responsible for making payment to the Architect /Engineer for services required that are product, installation or workmanship related. Payment is due within 30 days after services are rendered.

3.06 RECORD DOCUMENTS

- A. Refer to the Division 1 Section: PROJECT CLOSEOUT for requirements. The following paragraphs supplement the requirements of Division 1.
- B. Mechanical Contractor shall maintain at the job site a separate and complete set of mechanical drawings and specifications upon which he shall clearly and permanently mark and note in complete detail any changes made to the location and arrangement of the mechanical apparatus or changes made in the mechanical system and piping as a result of building construction conditions or as a result of instructions from the Architect or Engineer.

- C. Mark drawings to indicate revisions to piping and ductwork, size and location both exterior and interior; including locations of coils, dampers, other control devices, filters, boxes, and similar units requiring periodic maintenance or repair; actual equipment locations, dimensioned for column lines; actual inverts and locations of underground piping; concealed equipment, dimensioned to column lines; mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e. traps, strainers, expansion compensators, tanks, etc.) Change Orders; concealed control system devices.
- D. Before the completion of the project, a set of reproducible mechanical drawings will be given to the Contractor for transfer of all as-built conditions from the paper set maintained at the job site. All marks on reproducibles shall be clearly made in a permanent fashion.
- E. Mark specifications to indicate approved substitutions; Change Orders, actual equipment and materials used.
- F. Such record of changes shall be made daily by This Contractor and the marked drawings shall be available for the Architect and Engineer's examination at any normal work time.
- G. Upon completion of the job, and before final payment is made, This Contractor shall give the marked-up drawings to the Architect/Engineer.

3.07 PAINTING

- A. This Contractor shall paint any equipment which is marred or damaged prior to the Owner's acceptance and occupancy. Paint and color shall match original equipment paint and shall be obtained from the equipment supplier when available.
- B. Equipment located in finished areas and which will be painted to match the room decor will be painted by others. Should This Contractor install equipment in a finished area after the area has been painted by others, he shall be responsible for having the equipment and all of its supports, hangers, etc., painted to match the room decor.
- C. Equipment cabinets, casings, covers, metal jackets, etc., located in equipment rooms or concealed spaces, shall be furnished in standard or prime finish free from scratches, abrasions, chippings, etc.
- D. Equipment located in occupied spaces, or if standard to the unit, shall have a baked primer with baked enamel finish coat free from scratches, abrasions, chipping, etc. if color option is specified or color option given as standard to the unit, This Contractor shall, before ordering, verify with the Architect /Engineer his color preference and shall furnish this color.
- E. This Contractor shall paint equipment located in unfinished areas such as boiler room, mechanical spaces, storage room, etc., furnished by him. If certain equipment is furnished with a factory coat of paint and enamel, it need not be painted, providing the factory applied finish is in no way marred or spattered. If so, the item or piece of equipment shall be refinished with the same paint or enamel that was factory applied.

- F. After surfaces have been thoroughly cleaned and are free of oil, dirt or other foreign matter, the pipes or equipment shall be painted with the following paint materials:
1. Bare Metal Surfaces - Apply one coat of metal primer suitable for use on metal being painted. Finish with two coats of Alkyd base enamel paint.
 2. Insulated Surfaces - Paint insulation jacket with two coats of semi-gloss acrylic latex paint.
 3. Color of paint shall be verified with the Architect.

3.08 ADJUST AND CLEAN

- A. Contractor shall thoroughly clean all equipment and systems prior to the Owner's final acceptance of the project.
- B. Contractor shall clean all foreign paint, grease, oil, dirt, labels, stickers, and other foreign material from equipment and fixtures.
- C. Contractor shall remove all rubbish, debris, etc., accumulated during the Contractor's operations from the premises.

END OF SECTION

SECTION 22 0529

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Strut systems for pipe or equipment support.
- B. Pipe hangers.
- C. Pipe supports, guides, shields, and saddles.

1.02 RELATED REQUIREMENTS

- A. Section 05 5000 - Metal Fabrications.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- C. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General-Purpose Piping; 2023.
- D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2022).
- F. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2018.
- 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; 2023.
- 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; 2023.
- 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; 2023d.
- L. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.
- M. FM (AG) - FM Approval Guide; Current Edition.
- N. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).
- 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.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.

1.05 QUALITY ASSURANCE

- A. Comply with applicable building code.

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. 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 2.5. Include consideration for vibration, equipment operation, and shock loads where applicable.
- D. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
- E. Materials for Metal Fabricated Supports: Comply with Section 05 5000.
 - 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.
- F. Corrosion Resistance: Use corrosion-resistant metal-based materials fully compatible with exposed piping materials and suitable for the environment where installed.

2.02 STRUT SYSTEMS FOR PIPE OR EQUIPMENT SUPPORT

- A. Strut Channels:
 - 1. ASTM A653/A653M galvanized steel bracket with clamps for surface mounting of piping or plumbing equipment support.
 - 2. Channel or Bracket Kits: Include rods, brackets, end-fixed fittings, covers, clips, and other related hardware required to complete sectional trapeze section for piping or other support.
- B. 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.
- C. Channel Nuts:

1. Provide carbon steel channel nut with epoxy copper or zinc finish and long, regular, or short spring as indicated on drawings.

2.03 PIPE HANGERS

- A. Band Hangers, Adjustable:
 1. MSS SP-58 type 7 or 9, zinc-plated ASTM A1011/A1011M steel or ASTM A653/A653M carbon steel.
- B. Swivel Ring Hangers, Adjustable:
 1. MSS SP-58 type 10, epoxy-painted, zinc-colored.
 2. 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.
 3. FM (AG) and UL (DIR) listed for specific pipe size runs and loads.
- C. Clevis Hangers, Adjustable:
 1. Copper Tube: MSS SP-58 type 1, epoxy-plated copper.
 2. Standard-Duty: MSS SP-58 type 1, zinc-colored, epoxy plated.

2.04 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. MSS SP-58 type 40, ASTM A1011/A1011M steel or ASTM A653/A653M carbon steel.
 2. 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. Surface Burning Characteristics: Flame spread index/smoke developed index of 5/30, maximum, when tested in accordance with ASTM E84 or UL 723.
 - c. Provide pipe supports for 1/2 to 30 inch iron pipes.
 - d. 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 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. Secure fasteners according to manufacturer's recommended torque settings.
- I. Remove temporary supports.

END OF SECTION

SECTION 22 0553
MECHANICAL IDENTIFICATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Pipe markers.

1.02 RELATED REQUIREMENTS

- A. Section 09 9123 - Interior Painting: Identification painting.
- B. Section 22 6000 - Gas and Vacuum Systems for Laboratory and Healthcare Facilities: Supply of pipe labels for placement under this section.

1.03 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2023.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide manufacturers catalog literature for each product required.

PART 2 PRODUCTS

2.01 PLUMBING COMPONENT IDENTIFICATION GUIDELINE

- A. Pipe Markers: 3/4 inch diameter and higher.

2.02 MANUFACTURERS

- A. Brady Corporation: www.bradycorp.com.
- B. Champion America, Inc: www.Champion-America.com.
- C. Seton Identification Products: www.seton.com/aec.

2.03 NAMEPLATES

- A. Description: Laminated piece with up to three lines of text.
 - 1. Letter Color: White.
 - 2. Letter Height: 1/4 inch.
 - 3. Background Color: Black.

2.04 PIPE MARKERS

- A. Comply with ASME A13.1.
- B. 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.
- C. Flexible Tape Marker: Flexible, vinyl film tape with pressure-sensitive adhesive backing and printed markings.
- D. Identification Scheme, ASME A13.1:
 - 1. Primary: External Pipe Diameter, Uninsulated or Insulated.
 - 2. Secondary: Color scheme per fluid service.
 - a. Water; Potable, Cooling, Boiler Feed, and Other: White text on green background.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive identification products.

3.02 INSTALLATION

- A. Install flexible nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags in clear view and align with axis of piping
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Install plastic tape pipe marker around pipe in accordance with manufacturer's instructions.
- E. Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.
- F. Identify control panels and major control components outside panels with plastic nameplates.
- G. Identify thermostats relating to terminal boxes or valves with nameplates.
- H. Identify valves in main and branch piping with tags.
- I. Identify air terminal units and radiator valves with numbered tags.
- J. Tag automatic controls, instruments, and relays. Key to control schematic.
- K. Identify piping, concealed or exposed, with plastic pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION

SECTION 22 0719
PLUMBING PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Glass fiber insulation.
- B. Jacketing and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.

1.03 REFERENCE STANDARDS

- A. 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).
- B. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2019).
- C. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2022a.
- D. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2022.
- E. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2023).
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- G. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.
- H. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - 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.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the type of work specified in this section and approved by manufacturer.

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

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, UL 723, ASTM E84, or UL 723.

2.02 GLASS FIBER INSULATION

- 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.ocbuildingspec.com/#sle.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Insulation: ASTM C547 and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
 - 1. K Value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum Service Temperature: 650 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- 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.

2.03 JACKETING AND ACCESSORIES

- A. PVC Plastic Jacket:
 - 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, 0.010 inch.
 - 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, pump bodies, 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. 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.
- G. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
- H. Insulation shall continue through all hangers and supports, broken only as required for inserts. Fit inserts tightly to insulation with no gaps. Maintain vapor barrier through support and inserts with NO penetrations.
- I. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, see Section 07 8400.
- J. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with PVC jacket and fitting covers.

3.03 SCHEDULES

- A. Refer to the drawings for the piping and insulation schedule.

END OF SECTION

This page intentionally left blank

SECTION 22 1005
PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sanitary waste piping, buried within 5 feet of building.
- B. Sanitary waste piping, above grade.
- C. Domestic water piping, above grade.
- D. Storm drainage piping, buried within 5 feet of building.
 - 1. Storm drainage piping, above grade.
 - 2. Natural gas piping, buried within 5 feet of building.
 - 3. Natural gas piping, above grade.
 - 4. Pipe flanges, unions, and couplings.
 - 5. Pipe hangers and supports.
 - 6. Ball valves.

1.02 RELATED REQUIREMENTS

- A. Section 22 0553 - MECHANICAL IDENTIFICATION.

1.03 REFERENCE STANDARDS

- A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.
- B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.
- C. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings: DWV; 2021.
- D. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder-Joint Drainage Fittings—DWV; 2022.
- E. ASME B31.9 - Building Services Piping; 2020.
- F. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2022).
- G. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2021.
- H. ASTM B32 - Standard Specification for Solder Metal; 2020.
- I. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2022.
- J. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2020.
- K. ASTM B306 - Standard Specification for Copper Drainage Tube (DWV); 2020.
- L. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2016.
- M. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2023.
- N. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2020a.
- O. ASTM C1277 - Standard Specification for Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings; 2020.

- P. ASTM C1540 - Standard Specification for Heavy-Duty Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings; 2020.
- Q. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2020.
- R. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2020.
- S. 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.
- T. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2023.
- U. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- V. AWWA C606 - Grooved and Shouldered Joints; 2022.
- W. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2021.
- X. 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.
- Y. FM 1680 - Approval Standard for Couplings Used in Hubless Cast Iron Systems for Drain, Waste or Vent, Sewer, Rainwater or Storm Drain Systems Above and Below Ground, Industrial/ Commercial and Residential; 1989.
- Z. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).
- AA. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .
- BB. NSF 61 - Drinking Water System Components - Health Effects; 2023, with Errata.
- CC. NSF 372 - Drinking Water System Components - Lead Content; 2022.
- DD. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - 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.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

- B. 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 WASTE PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. PVC Pipe: ASTM D2665 or ASTM D3034.
 - 1. Fittings: PVC.
 - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.03 SANITARY WASTE PIPING, ABOVE GRADE

- A. Cast Iron Pipe: ASTM A74, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.
- B. 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.
- C. Copper Tube: ASTM B306, DWV.
 - 1. Fittings: ASME B16.29, wrought copper, or ASME B16.23, solvent.
 - 2. Joints: ASTM B32, alloy Sn50 solder.

2.04 DOMESTIC WATER PIPING, ABOVE GRADE

- A. Copper Pipe: ASTM B88 (ASTM B88M), Type K (A), Drawn (H).
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - 2. Joints: ASTM B32, alloy Sn95 solder.
 - 3. Joints: Grooved mechanical couplings.

2.05 STORM DRAINAGE PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. PVC Pipe: ASTM D2665 or ASTM D3034.
 - 1. Fittings: PVC.
 - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.06 STORM DRAINAGE PIPING, ABOVE GRADE

- A. PVC Pipe: ASTM D2665.
 - 1. Fittings: PVC.
 - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.07 PIPE FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Pipe Sizes 3 inch and Under:
 - 1. 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. Gasket Material: Nitrile rubber suitable for operating temperature range from minus 20 degrees F to 180 degrees F.
 - 4. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
 - 5. When pipe is field grooved, provide coupling manufacturer's grooving tools.
- C. No-Hub Couplings:
 - 1. Testing: In accordance with ASTM C1277 and CISPI 310.
 - 2. Gasket Material: Neoprene complying with ASTM C564.
 - 3. Band Material: Stainless steel.
 - 4. Eyelet Material: Stainless steel.
- D. Shielded, Heavy Duty No-Hub Couplings:
 - 1. Testing: In accordance with ASTM C1540 and FM 1680.
 - 2. Gasket Material: Neoprene complying with ASTM C564.
 - 3. Band Material: Stainless steel.
 - 4. Eyelet Material: Stainless steel.
- E. Grooved and Shouldered Pipe End Couplings:
 - 1. Housing: Malleable iron clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; steel bolts, nuts, and washers; galvanized for galvanized pipe.
 - 2. Sealing gasket: "C" shape composition sealing gasket.
- F. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.08 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.
- B. Plumbing Piping - Drain, Waste, and Vent:
 - 1. Conform to ASME B31.9.

2. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
 3. Hangers for Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.
 4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 5. Vertical Support: Steel riser clamp.
 6. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- C. Plumbing Piping - Water:
1. Conform to ASME B31.9.
 2. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
 3. Hangers for Cold Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.
 4. Hangers for Hot Pipe Sizes 2 to 4 inch: Carbon steel, adjustable, clevis.
 5. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.09 BALL VALVES

- A. Manufacturers:
1. Apollo Valves: www.apollovalves.com/#sle.
 2. Grinnell Products: www.grinnell.com/#sle.
 3. Nibco, Inc: www.nibco.com/#sle.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Construction, 4 inch and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle, solder or grooved ends.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- 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 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. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- 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. Install bell and spigot pipe with bell end upstream.

- J. Install valves with stems upright or horizontal, not inverted. See Section 22 0523.
- K. Install water piping to ASME B31.9.
- L. 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.
- M. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- N. 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 other floor. Support riser piping independently of connected horizontal piping.
 - 7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 - 8. Provide copper plated hangers and supports for copper piping.

3.03 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 ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

3.04 SCHEDULES

- A. Pipe Hanger Spacing:
 - 1. Metal Piping:
 - a. Pipe Size: 1/2 inch to 1-1/4 inch:
 - 1) Maximum Hanger Spacing: 6.5 ft.
 - 2) Hanger Rod Diameter: 3/8 inches.

END OF SECTION

SECTION 22 1006
PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Drains.
- B. Cleanouts.
- C. Water hammer arrestors.
- D. Mixing valves.

1.02 RELATED REQUIREMENTS

- A. Section 22 1005 - Plumbing Piping.
- B. Section 22 4000 - Plumbing Fixtures.

1.03 REFERENCE STANDARDS

- A. ASME A112.6.3 - Floor Drains; 2022.
- B. ASSE 1016 - Performance Requirements for Automatic Compensating Valves for Individual Showers and Tub/Shower Combinations; 2017 (Reaffirmed 2021).
- C. ASSE 1017 - Performance Requirements for Temperature Actuated Mixing Valves for Hot Water Distribution Systems; 2023.
- D. NSF 61 - Drinking Water System Components - Health Effects; 2023, with Errata.
- E. NSF 372 - Drinking Water System Components - Lead Content; 2022.
- F. PDI-WH 201 - Water Hammer Arresters; 2017.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- C. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

1.06 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. Josam Company: www.josam.com/#sle.
 - 2. Jay R. Smith Manufacturing Company: www.jayrsmith.com.
 - 3. Watts Industries.

4. Zurn Industries, LLC: www.zurn.com/#sle.
- B. Floor Drain:
 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. Cleanouts at Interior Finished Floor Areas:
 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.
- B. Cleanouts at Interior Finished Wall Areas:
 1. Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.
- C. Cleanouts at Interior Unfinished Accessible Areas: Calked or threaded type. Provide bolted stack cleanouts on vertical rainwater leaders.

2.04 WATER HAMMER ARRESTORS

- A. Manufacturers:
 1. Jay R. Smith Manufacturing Company: www.jrsmith.com/#sle.
 2. Watts Regulator Company, a part of Watts Water Technologies: www.wattsregulator.com/#sle.
 3. Zurn Industries, LLC: www.zurn.com/#sle.
- B. Water Hammer Arrestors:
 1. Stainless steel construction, bellows type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range minus 100 to 300 degrees F and maximum 250 psi working pressure.

2.05 MIXING VALVES

- A. Thermostatic Master Mixing Valves:
 1. Valve: ASSE 1017, bronze or brass body; thermostatic element; corrosion- and lime-resistant internal components; integral locking temperature adjustment.
 2. Accessories:
 - a. Strainer stop checks on inlets.
 - b. Shut-off valve on outlet.
 - c. Stem thermometer on outlet.
- B. Automatic Compensating Valves for Individual Showers and Tub and Shower Combinations:
 1. Valve: ASSE 1016, combination thermostatic and pressure balancing, bronze or brass body with inlet checkstops; integral volume and temperature control with adjustable high-temperature limit stop.
 2. Valve Trim: Escutcheon with ADA-compliant lever handle.

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. Pipe relief from backflow preventer to nearest drain.
- G. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to lavatory sinks or water closets.

END OF SECTION

This page intentionally left blank

SECTION 22 3000
PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tankless electric water heaters.

1.02 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittals procedures.
- B. Product Data:
 - 1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
- C. Shop Drawings:
 - 1. Indicate dimensions of tanks, tank lining methods, anchors, attachments, lifting points, tapings, and drains.
- D. Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.
- E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.03 WARRANTY

- A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 WATER HEATERS

- A. Manufacturers:
 - 1. A.O. Smith Water Products Co: www.hotwater.com/#sle.
 - 2. Bock Water Heaters, Inc: www.bockwaterheaters.com/#sle.
 - 3. Bradford White Corporation: www.bradfordwhite.com/#sle.
 - 4. Rheem Manufacturing Company: www.rheem.com/#sle.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Tankless Electric Water Heater:
 - 1. Manufacturers:
 - a. Bosch Thermotechnology: www.bosch-thermotechnology.us/#sle.
 - b. Bradford White Corporation: www.bradfordwhite.com/#sle.
 - c. Chronomite, Inc: www.chronomite.com/#sle.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Minimum Efficiency Required: ASHRAE Std 90.1 I-P.
 - 3. Heater Type: Self-contained, wall-mounted unit capable of handling listed capacity, water-inlet strainer, removable thermally-insulated front panel, and threaded water pipe-end connections.

4. Heater-Heat Exchanger: Stainless steel, thermally insulated and encased assembly in corrosion-resistant steel jacket; baked-on enamel finish.
5. Safeties: Provide internal safeties for water flow, electrical load, and thermal load.
6. Controls: Local temperature display with setpoint dial interface for internal controls; temperature range adjustable from 120 to 170 degrees F using flanged or screw-in nichrome elements. Wire double-element units so elements do not operate simultaneously.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions required for applicable certifications.
- B. Electrical Work: Provide automatic control and protective devices with associated wiring to interconnect related interfaced devices required for specified operation.
- C. Coordinate system, equipment, and piping work with applicable electrical support interconnections as included or provided by other trades.

3.02 SCHEDULES

- A. See Contract Drawings.

END OF SECTION

SECTION 22 4000
PLUMBING FIXTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flush valve water closets.
- B. Lavatories.
- C. Sinks.
- D. Shower receptors.
- E. Bi-level, electric water coolers.

1.02 RELATED REQUIREMENTS

- A. Section 22 1005 - Plumbing Piping.
- B. Section 22 1006 - Plumbing Piping Specialties.

1.03 REFERENCE STANDARDS

- A. ASHRAE Std 18 - Methods of Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration; 2008 (Reaffirmed 2013).
- B. ASME A112.19.2 - Ceramic Plumbing Fixtures; 2018, with Errata.
- C. ASME A112.19.3 - Stainless Steel Plumbing Fixtures; 2022.
- D. ASSE 1070 - Performance Requirements for Water Temperature Limiting Devices; 2020.
- E. NSF 61 - Drinking Water System Components - Health Effects; 2023, with Errata.
- F. NSF 372 - Drinking Water System Components - Lead Content; 2022.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
- C. Maintenance Data: Include fixture trim exploded view and replacement parts lists.
- D. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.06 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.

1.07 WARRANTY

- A. See Section 01 7800 - 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 REGULATORY REQUIREMENTS

- A. Comply with applicable codes for installation of plumbing systems.
- B. Perform work in accordance with local health department regulations.

2.03 FLUSH VALVE WATER CLOSETS

- A. Water Closets:
 - 1. Vitreous china, ASME A112.19.2, floor mounted, siphon jet flush action, china bolt caps.
 - 2. Flush Volume: 1.6 gallon, maximum.
 - 3. Flush Valve: Exposed (top spud).
 - 4. Flush Operation: Sensor operated.
 - 5. Handle Height: 44 inches or less.
 - 6. Manufacturers:
 - a. American Standard Inc: www.americanstandard.com.
 - b. Eljer, Inc: www.eljer.com.
 - c. Kohler Company: www.kohler.com/#sle.
 - d. Zurn Industries, Inc: www.zurn.com/#sle.
 - e. Substitutions: See Section 01 6000 - Product Requirements.
- B. Flush Valves:
 - 1. Manufacturers:
 - a. American Standard, Inc: www.americanstandard-us.com/#sle.
 - b. Sloan Valve Company: www.sloanvalve.com/#sle.
 - c. Zurn Industries, Inc: www.zurn.com/#sle.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- C. Manufacturers:
 - 1. Coyne & Delany Co: www.coynedelany.com.
 - 2. Sloan Valve Company: www.sloanvalve.com.
 - 3. Zurn Industries, Inc: www.zurn.com.
- D. Exposed Flush Valve:
 - 1. ASME A112.18.1; exposed chrome plated, diaphragm type with oscillating handle, escutcheon, seat bumper, integral screwdriver stop and vacuum breaker; maximum 1.6 gallon flush volume.
- E. Toilet Seats:
 - 1. Manufacturers:
 - a. Bemis Manufacturing Company: www.bemismfg.com/#sle.
 - b. Church Seat Company: www.churchseats.com/#sle.

- c. Olsonite: www.olsonite.com/#sle.
- 2. Plastic: Black finish, open front, extended back, self-sustaining hinge, brass bolts, with cover.

2.04 LAVATORIES

- A. Manufacturers:
 - 1. American Standard, Inc: www.americanstandard-us.com/#sle.
 - 2. Kohler Company: www.kohler.com/#sle.
 - 3. Zurn Industries, Inc: www.zurn.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Supply Faucet:
 - 1. ASME A112.18.1; chrome plated combination supply fitting with open grid strainer, water economy aerator with maximum flow of 2.2 gallons per minute, single lever handle.
- C. Thermostatic Mixing Valve:
 - 1. ASSE 1070 listed with combination stop, strainer, and check valves, and flexible stainless steel connectors.
- D. Accessories:
 - 1. Chrome plated 17 gage brass P-trap with clean-out plug and arm with escutcheon.

2.05 SINKS

- A. Manufacturers:
 - 1. Elkay
 - 2. American Standard, Inc: www.americanstandard-us.com/#sle.
 - 3. Kohler Company: www.kohler.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. -----
- C. Use the following paragraph to specify basis of design products from selected manufacturers or use the paragraphs above to specify generic, nonproprietary descriptions.
- D. -----
- E. Single Compartment Bowl:
 - 1. ASME A112.19.3; 18 gauge thick, Type 302 stainless steel, self rimming and undercoated, with ledge back drilled for trim.
 - a. Drain: 1-1/2 inch chromed brass drain.
- F. Trim: ASME A112.18.1; chrome plated brass supply with high rise swing spout, vandal proof water laminar flow aerator with maximum {ch\#3} flow, single lever handle .
- G. Accessories: Chrome plated 17 gage brass P-trap with clean-out plug and arm with escutcheon, wheel handle stop, rigid supplies.

2.06 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 6000 - Product Requirements.
- B. Water Cooler: Bi-level, electric, mechanically refrigerated; surface mounted, ADA compliant; stainless steel top, vinyl on 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.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
- B. 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 loose key 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 9005, color to match fixture.

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 SCHEDULES

- A. Fixture Heights: Install fixtures to heights above finished floor as indicated.

1. Water Closet:
 - a. Standard: 15 inches to top of bowl rim.
 - b. Accessible: 18 inches to top of seat.
 2. Lavatory:
 - a. Standard: 31 inches to top of basin rim.
 - b. Accessible: 34 inches to top of basin rim.
- B. Fixture Rough-In
1. Water Closet (Flush Valve Type):
 - a. Cold Water: 1 Inch.
 - b. Waste: 4 Inch.
 - c. Vent: 2 Inch.
 2. Lavatory:
 - a. Hot Water: 1/2 Inch.
 - b. Cold Water: 1/2 Inch.
 - c. Waste: 1-1/2 Inch.
 - d. Vent: 1-1/4 Inch.
 3. Sink:
 - a. Hot Water: 1/2 Inch.
 - b. Cold Water: 1/2 Inch.
 - c. Waste: 1-1/2 Inch.
 - d. Vent: 1-1/4 Inch.
 4. Service Sink:
 - a. Hot Water: 1/2 Inch.
 - b. Cold Water: 1/2 Inch.
 - c. Waste: 3 Inch.
 - d. Vent: 1-1/2 Inch.
 5. Shower:
 - a. Hot Water: 1/2 Inch.
 - b. Cold Water: 1/2 Inch.
 - c. Waste: 1-1/2 Inch.
 - d. Vent: 1-1/4 Inch.

END OF SECTION

This page intentionally left blank

SECTION 23 0500
COMMON HVAC REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Specification and the accompanying drawings govern the work involved in furnishing, installing, testing and placing into satisfactory operation the Mechanical Systems as shown on the drawings and specified herein.
- B. Each Contractor shall provide all new materials as indicated in the schedules on the drawings, and/or in these specifications, and all items required to make his portion of the Mechanical System a complete, finished and working system.
- C. Reference Division 1 Sections for all Bid Package definitions and scopes. The scope of work listed below is for the convenience of the contractor and lists normal breakdown of the subcontracts.

1.02 WORK SEQUENCE

- A. All construction work that will produce excessive noise levels and interference with normal building operations or access, as determined by the Owner, shall be scheduled with the Owner. It may be necessary to schedule such work during regular hours. The Owner shall reserve the right to set policy as to when restricted construction hours will be required.
- B. The successful Bidders shall be responsible for scheduling overtime hours for the following work:
 - 1. This Contractor shall reference the work sequence as outlined in the Architectural specifications. Work in existing areas shall be coordinated with the General Contractor to minimize construction schedule in existing areas.

1.03 DIVISION OF WORK BETWEEN MECHANICAL, ELECTRICAL & CONTROL CONTRACTORS

- A. Definitions:
 - 1. "Mechanical Contractors" as referred to herein refers to the following Contractors:
 - a. HVAC Contractor
 - b. Plumbing Contractor
 - c. Temperature Control Contractor (Not Owner's BMS Integrator)
 - 2. Motor Power Wiring. The single phase or 3 phase wiring extending from the power source (transformer, panelboard, feeder circuits, etc.) through disconnect switches and motor controllers to, and including the connections to the terminals of the motor.
 - 3. Motor Control Circuit Wiring. The wiring associated with the remote operation of the magnetic coil of a magnetic motor starter or relay, or the wiring which permits the direct cycling of the motor by means of a device in series with the motor power wiring. In the latter case the devices are usually single phase and are usually (but not always) connected into the motor power wiring through a manual motor starter having "Manual-Off-Auto" provisions.

4. Control devices such as start-stop push buttons, thermostats, pressure switches, flow switches, other relays, etc., generally represent the type of equipment associated with motor control circuit wiring.
5. Motor control circuit wiring is single phase and usually will be 120 volts. In some instances, the voltage will be the same as the motor power wiring. Generally, where the motor power wiring exceeds 120 volts, a control transformer is provided to give a control voltage of 120 volts.
6. Temperature Control Wiring. The wiring associated with the operation of a motorized damper, solenoid valve or motorized valve, etc., either modulating or two (2) position, as opposed to wiring which directly powers or controls a motor used to drive equipment such as fans, pumps, etc. This wiring will be from a 120 volt source and may continue as 120 volt if applicable or be reduced in voltage (24 volt) in which case a control transformer shall be furnished as part of the temperature and comfort control wiring.
7. Control Motor. Where the term "Control Motor" is used without other clarification, it means an electrical device used to operate dampers, valves, etc. It may be of such a design to produce two position or modulating operation of the operated device. Conventional characteristics of such a motor are 24 volts, 60 cycles, 1 phase, although other voltages at times may be encountered.

B. General:

1. The purpose of these Specifications is to outline the Electrical and Mechanical Contractor's work responsibilities as related to control wiring, starters, disconnects and other electrical work required for items such as temperature controls, mechanical equipment, fans, chillers, compressors and the like. The exact wiring requirements for much of the equipment cannot be determined until the systems have been purchased and submittals reviewed. Therefore, only known wiring, as related to such items, is shown on the electrical drawings as being by the Electrical Contractor. Other wiring not shown on the electrical drawings but required for the mechanical equipment and systems shall be the responsibility of the Mechanical Contractor.
2. Where the drawings require the Electrical Contractor to wire between various pieces of equipment furnished by the Mechanical Contractor, such wiring shall be terminated at terminals provided in the equipment. It is the Mechanical Contractor's responsibility to provide complete wiring diagrams and supervision to the Electrical Contractor and to designate the terminal numbers for the correct wiring of the equipment.
3. The electrical work for all equipment and systems shall conform to the National Electrical Code requirements. All provisions of the Electrical Specifications concerning wiring, protection, etc., shall apply to wiring provided by the Mechanical Contractor.
4. All Contractors assigned to the project shall establish utility elevations prior to fabrication. All Contractors shall coordinate their material and equipment with other trades. When a

conflict arises, priority is as follows:

- a. Light Fixtures
- b. Equipment
- c. Sheet Metal
- d. Electrical Cable Trays
- e. Hydronic Piping
- f. Conduit

C. Mechanical Contractor's Responsibility:

1. Assumes all responsibility for the internal wiring of all equipment provided by the Mechanical Contractor, for example:
 - a. Burners
 - b. Gas Trains
 - c. Air Handlers
 - d. Fans
 - e. Condensing Units
2. Assumes all responsibility for miscellaneous items that require wiring, but are not shown on the electrical drawings or specified in the Electrical Specification. If items such as relays, flow switches, or interlocks are required to make the system function correctly or are required by the manufacturer, they are the responsibility of the Mechanical Contractor.
3. Assumes all responsibility for the Temperature Control wiring, since the Temperature Control Contractor is a Subcontractor to the Mechanical Contractor.

D. Temperature Control Contractor's Responsibility:

1. Assumes all responsibility for the complete wiring of any devices necessary to make the Temperature Control System functional.
2. Assumes the responsibility for verifying any control wiring shown on the electrical drawings as being by the Electrical Contractor. If any wiring is required for the Control System, but not shown or scheduled on the electrical drawings, it shall be the responsibility of the Temperature Control Sub-contractor.
3. Assumes the responsibility of coordinating equipment locations (such as PE's EP's, relays, transformer and etc.) with the Electrical Contractor where the wiring of the equipment is shown to be by the Electrical Contractor.

E. Electrical Contractor's Responsibility:

1. Furnishes and installs all combination starters as shown on the Materials Schedule of the Electrical Drawings and as indicated to be by the Electrical Contractor on the Mechanical Equipment Schedule of the Mechanical Drawings.
2. Furnishes and installs all manual starters and disconnect devices as shown on the Materials Schedule of the Electrical Drawings and as indicated to be by the Electrical Contractor on the Mechanical Equipment Schedule of the Mechanical Drawings.

3. Installs and wires to all remote control devices furnished by the Mechanical Contractor or Temperature Control Subcontractor when such items are noted on the Electrical Drawings.
4. Provides motor control wiring where so noted on the drawings.
5. Provides temperature control wiring where so noted on the drawings.
6. Electrical Contractor shall furnish, install and connect all relays, etc., for automatic shutdown of certain supply units and exhaust fans upon actuation of the Fire Alarm System as indicated and specified in Article "Fire Alarm System".

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Only products of reputable manufacturers will be acceptable.
2. Each Contractor and his subcontractors shall employ only workmen who are skilled in their respective trades.

B. Compliance with Codes, Laws, Ordinances:

1. This Contractor shall conform to all requirements of Local and State of Iowa Codes, Laws, Ordinances and other regulations having jurisdiction over this installation.
2. In the event there are no local codes having jurisdiction over this job, the state codes in existence shall be followed.
3. If there is a discrepancy between the codes and regulations having jurisdiction over this installation, and these specifications, the Engineer shall determine the method or equipment used.
4. If the Contractor notes, at the time of bidding, any parts of the drawings and specifications which are not in accord with the applicable codes or regulations, he shall inform the Architect/Engineer in writing, requesting a clarification. If there is insufficient time to follow this procedure, he shall submit with his proposal a separate price required to make the system shown on the drawings comply with the codes and regulations.
5. All changes to the system made after the letting of the contract, in order to comply with the applicable codes or the requirements of the Inspector, shall be made by the Contractor without cost to the Owner.
6. If there is a discrepancy between the manufacturer's recommendations and these specifications, the manufacturer's recommendations shall determine the method or equipment used.

C. Permits, Fees, Taxes, Inspections:

1. Procure all applicable permits and licenses.
2. Abide by all applicable laws, regulations, ordinances, and other rules of the State or Political Subdivision wherein the work is done, or as required by any duly constituted public authority.
3. Pay all applicable charges for such permits or licenses that may be required.

4. Pay all applicable fees and taxes imposed by the State, Municipal and/or other regulatory bodies.
 5. Pay all charges arising out of required inspections by the codes, permits, licenses or as otherwise may be required by an authorized body.
 6. Where applicable, all fixtures, equipment and materials shall be as approved or listed by the following:
 - a. Underwriters' Laboratories, Inc.
- D. Utility Company Requirements:
1. Secure from the appropriate utility company (privately or publicly owned) all applicable requirements that must be followed to make the job comply with their requirements.
 2. Make the installation comply with the utility company requirements.
- E. Examination of Drawings:
1. The drawings for the mechanical work are completely diagrammatic, intended to convey the scope of the work and to indicate the general arrangements and locations of equipment, outlets, etc., and the approximate sizes of equipment.
 2. Contractor shall determine the exact locations of equipment and rough-ins, and the exact routing of pipes and ducts so as to best fit the layout of the job.
 3. Scaling of the drawings will not be sufficient or accurate for determining these locations.
 4. Where job conditions require reasonable changes in indicated arrangements and locations, such changes shall be made by the Contractor at no additional cost to the Owner.
 5. Because of the scale of the drawings, certain basic items, such as fittings, boxes, valves, unions, etc., may not be shown, but where such items are required by other sections of the specifications or where they are required for proper installation of the work, such items shall be furnished and installed.
 6. If an item is either shown on the drawings or called for in the specifications, it shall be considered sufficient for including same in this contract.
 7. The determination of quantities of material and equipment required shall be made by the Contractor from the drawings. Schedules on the drawings and in the specifications are completed as an aid to the Contractor but where discrepancies arise, the greater number shall govern.
 8. Where words "provide", "install", or "furnished" are used on the drawings or in the specifications, it shall be taken to mean, to furnish, install and connect up complete and ready for operation, the items mentioned.
- F. Field Measurements:
1. Before ordering any materials or fabricating any supports, pipes or ducts, This Contractor shall verify all pertinent dimensions at the job site and be responsible for their accuracy.

1.05 SUBMITTALS

- A. In addition to the provisions of Division 1, the following is required:
1. Submittals shall include all fabrication, erection, layout, and setting drawings; manufacturers' standard drawings; schedules; descriptive literature, catalogs and brochures; performance and test data; wiring and control diagrams; and all other drawings and descriptive data of materials of construction as may be required to show that the materials, equipment or systems and the location thereof conform to the requirements of the contract documents.
 2. The Contractor shall submit seven (7) copies of each shop drawing for review by the Architect /Engineer BEFORE releasing any equipment for manufacture or shipment.
 3. The Contractor shall thoroughly review and approve all shop drawings before submitting them to the Architect/Engineer. APPROVAL WILL INDICATE THE CONTRACTOR'S REVIEW of all material and a COMPLETE UNDERSTANDING OF EXACTLY WHAT IS TO BE FURNISHED. Contractor shall clearly mark all deviations from the contract documents on all submittals. IF DEVIATIONS ARE NOT MARKED BY THE CONTRACTOR, THEN THE ITEM SHALL BE REQUIRED TO MEET ALL DRAWING AND SPECIFICATION REQUIREMENTS.
 4. The Contractor shall clearly mark each item with the same nomenclature applied on the drawings or in the specifications.
 5. The Contractor shall clearly indicate the size, finish, material, etc.
 6. All submittals shall be assembled in sets such as all air handling units, plumbing fixtures, or all fans, etc. All sets shall be identical.
 7. Each set shall be bound in a manufacturer's folder.
 8. Each set shall contain an index of the items enclosed with a general topic description on the cover.
 9. Where more than one model is shown on a manufacturer's sheet, the Contractor shall clearly indicate exactly which item and which data is relevant to the work.
 10. Failure to comply with the above shall be reason to resubmit all shop drawing submittals.
 11. Reviewing one set of shop drawing submittals for each product shall be the Engineer's responsibility. if the first submittal is incomplete or does not comply with the drawings and/or specifications, the Contractor shall be responsible to bear the cost for the Engineer to recheck and handle the additional shop drawing submittals.
 12. Submittals shall be required for the items identified in each section.

1.06 PRODUCT DELIVERY, STORAGE, HANDLING & MAINTENANCE

- A. Exercise care in transporting and handling to avoid damage to fixtures, equipment and materials. Store materials on the site so as to prevent damage. Keep fixtures, equipment and materials clean, dry and free from deleterious conditions.
- B. Keep all bearings properly lubricated. Keep all belts properly tensioned and aligned.

1.07 WARRANTY

- A. Provide one-year warranty, to the Owner, for all fixtures, equipment, materials, and workmanship.
- B. The warranty period for the entire installation described in this Division of the specifications shall commence on the date of final acceptance unless a whole or partial system or any separate piece of equipment or component is put into use for the benefit of any party other than the installing contractor with the prior written authorization. In this instance, the warranty period shall commence on the date when such whole system, partial system or separate piece of equipment or component is placed in operation and accepted in writing by the Owner or his representative.
- C. Warranty requirements shall extend to correction, without cost to the final user, of all Work found to be defective or nonconforming to the contract documents. The Contractor shall bear the cost of correcting all damage resulting from such defects or nonconformance with contract documents exclusive of repairs required as a result of improper maintenance or operation, or of normal wear.

1.08 INSURANCE

- A. This Contractor shall maintain insurance coverage as set forth in Division 1 of these specifications.

1.09 MATERIAL SUBSTITUTION

- A. Where several manufacturer's names are given, the manufacturer for which a catalog number is given constitutes the basis for job design and establishes the equipment quality required to be used in this contract. Alternate manufacturers may be listed for the convenience of the contractor, but must conform to the requirements established by the basis for design given.
- B. This Contractor, at his option, may use equivalent equipment as manufactured by the other named manufacturers. This Contractor is responsible to ensure that all items submitted by these other manufacturers meets all requirements of the drawings and specifications and fits in the allocated space.
- C. Any material, article or equipment of other unnamed manufacturers which will adequately perform the services and duties imposed by the design and is of a quality equal to or better than the material, article or equipment identified by the drawings and specifications may be used if approval is secured in writing from the Architect/Engineer not later than ten (10) days prior to the bid opening date.
- D. Any material, article or equipment of other unnamed manufacturers which will adequately perform the services and duties imposed by the design and is of a quality equal to or better than the material, article or equipment identified by the drawings and specifications may be used but is contingent upon Architect/Engineer's approval during the submittal process.
- E. This Contractor assumes all costs that may be incurred as a result of using the offered material, article or equipment necessitating extra expense on his part or on the part of other Contractors

whose work is affected.

- F. This Contractor may list voluntary add or deduct prices for alternate materials on the bid form. These items will not be used in determining the low bidder.
- G. All material substitutions requested later than ten (10) days prior to bid opening must be listed as voluntary changes on the bid form.

1.10 MANUFACTURERS AND MODEL NUMBERS

- A. Where drawing schedules call out specific manufacturer's model numbers, the numbers are listed solely for the convenience of the contractor.
- B. Where specific manufacturer's model numbers are called out, the Contractor and Material Supplier are responsible for verifying the correct model number. Where scheduled capacities, options, or accessories conflict with model numbers specified, the greater capacity, options, or accessories shall be bid upon and supplied unless addressed by the Engineer prior to Bid date.
- C. Incorrect model numbers shall be brought to the attention of the Engineer when discovered.

1.11 RESOLUTION OF DISCREPANCIES

- A. If discrepancies are found to exist between the project drawings and project specifications, the more restrictive and obligatory document shall prevail as the project requirement.
- B. If discrepancies are found to exist between the requirements of the; Electrical Specifications, the Mechanical Specifications, the Architectural Specifications, and/or the Specification Front End Documents (Bidding Requirements-Agreement, Bonds, and Closeout Documents-Project Forms-Conditions of the Contract), the more restrictive and obligatory document/section(s) shall prevail as the project requirement.

PART 2 PRODUCTS

2.01 NOT APPLICABLE

PART 3 EXECUTION

3.01 PROJECT CLOSEOUT

- A. Refer to the Division 1 Section: PROJECT CLOSEOUT for requirements. The following paragraphs supplement the requirements of Division 1.
 - 1. Before final payment will be authorized, This Contractor must have completed the following:
 - a. Submitted operation and maintenance manuals to the Architect/Engineer for review.
 - b. Submitted bound copies of approved shop drawings.
 - c. Submitted record documents for Architect/Engineer review including marked-up drawings and specifications.
 - d. Submitted a report stating the instructions given to the Owner's representative complete with the number of hours spent in the instruction. The report shall bear the signature of an authorized agent of This Contractor and shall be signed by the Owner's representative as having received the instructions.
 - e. Submitted inspection report by the State Fire Marshal of the fire protection system.

- f. Submitted start-up reports on all equipment requiring a factory installation inspection and/or start.

3.02 OPERATION AND MAINTENANCE MANUAL

- A. As part of instructing the Owner, This Contractor shall assemble, organize, and bind operation and maintenance manuals on the mechanical systems installed.
- B. Submit three (3) properly indexed and bound copies of the manual to the Architect/Engineer for approval. Make all corrections or additions required.
- C. Operation and Maintenance Manuals shall consist of the following:
 - 1. Title page with project title, Architect, Engineer, and Contractor, with addresses, telephone numbers, and contacts.
 - 2. Table of Contents describing index.
 - 3. Listing of all Subcontractors and major equipment suppliers with addresses, telephone numbers, and contacts.
 - 4. Index tabs dividing information by specification section, major equipment, or systems.
 - 5. Copy of final approved test and balance report.
- D. Operation and maintenance data shall consist of written instructions for the care, maintenance, and operation of the equipment and systems. Instruction books, cards, manuals furnished with the equipment shall be included.
- E. Provide three (3) separate manuals with original or reproductions of approved shop drawings with title page and index system similar to operation and maintenance manual.

3.03 INSTRUCTING THE OWNER'S REPRESENTATIVE

- A. Adequately instruct the Owner's designated representative or representatives in the maintenance, care, and operation of the complete systems installed under this contract.
- B. Provide verbal and written instructions to the Owner's representative or representatives by FACTORY PERSONNEL in the care, maintenance, and operation of the equipment and systems.
- C. The Owner has the option to video tape the instructions to the Owner. Coordinate schedule of, instructions to facilitate this recording.
- D. The instructions shall include:
 - 1. Explanation of all system flow diagrams.
 - 2. Explanation of all air handling systems.
 - 3. Temperature control system operation including calibration, adjustment and proper operating conditions of all sensors.
 - 4. Maintenance of equipment.
 - 5. Start-up procedures for each major piece of equipment.
 - 6. Explanation of seasonal system changes.
 - 7. Description of emergency system operation.

- E. The Architect/Engineer shall be notified of the time and place for the verbal instructions to be given to the Owner's representative so that either he or his representative can be present if desirable.
- F. Minimum manhours of instruction time for each item and/or system, as outlined above, shall be as follows:
 - 1. 2 Hours.
- G. Operating Instructions:
 - 1. The Contractor is responsible for all instructions to the Owner and/or his operating staff on the mechanical and control systems.
 - 2. If the Contractor does not have Engineers and/or Technicians on staff that can adequately provide the required instructions on system operation, performance, troubleshooting, care and maintenance, he shall include in his bid an adequate amount to hire the Engineer to perform these instructions.

3.04 SYSTEM COMMISSIONING

- A. The mechanical systems included in the construction documents are to be complete and operating systems. The Architect /Engineer will make periodic job site observations during the construction period. The system start-up, testing, balancing, and satisfactory system performance is the responsibility of the Contractor. This shall include all calibration and adjustments of controls, noise level adjustments and final comfort factor adjustments that may be required.
- B. This Contractor shall adjust the mechanical systems and controls at season changes during the one year warranty period, as required, to provide satisfactory operation and to prove performance of system used in all seasons.
- C. All operating conditions and control sequences shall be simulated and tested during the start-up period. Testing shall also include all interlocks, safety shut-downs, damper position controls, and alarms.
- D. The Contractor, subcontractors, and equipment suppliers are expected to have skilled technicians to insure that the system performs as designed. If the Architect/Engineer is requested to visit the job site for the purpose of trouble shooting, assisting in the satisfactory start-up, obtaining satisfactory equipment operation, resolving installation and/or workmanship problems, equipment substitution issues or unsatisfactory system performance, including call backs during the warranty period through no fault of the design; the Contractor shall reimburse the Architect /Engineer on a time and material basis for services rendered at the Architect /Engineer's standard hourly rates in effect at the time the services are requested. The Contractor shall be responsible for making payment to the Architect /Engineer for services required that are product, installation or workmanship related. Payment is due within 30 days after services are rendered.

3.05 RECORD DOCUMENTS

- A. Refer to the Division 1 Section: PROJECT CLOSEOUT for requirements. The following paragraphs supplement the requirements of Division 1.
- B. Mechanical Contractor shall maintain at the job site a separate and complete set of mechanical drawings and specifications upon which he shall clearly and permanently mark and note in complete detail any changes made to the location and arrangement of the mechanical apparatus or changes made in the mechanical system and piping as a result of building construction conditions or as a result of instructions from the Architect or Engineer.
- C. Mark drawings to indicate revisions to piping and ductwork, size and location both exterior and interior; including locations of coils, dampers, other control devices, filters, boxes, and similar units requiring periodic maintenance or repair; actual equipment locations, dimensioned for column lines; actual inverts and locations of underground piping; concealed equipment, dimensioned to column lines; mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e. traps, strainers, expansion compensators, tanks, etc.) Change Orders; concealed control system devices.
- D. Before the completion of the project, a set of reproducible mechanical drawings will be given to the Contractor for transfer of all as-built conditions from the paper set maintained at the job site. All marks on reproducibles shall be clearly made in a permanent fashion.
- E. Mark specifications to indicate approved substitutions; Change Orders, actual equipment and materials used.
- F. Such record of changes shall be made daily by This Contractor and the marked drawings shall be available for the Architect and Engineer's examination at any normal work time.
- G. Upon completion of the job, and before final payment is made, This Contractor shall give the marked-up drawings to the Architect/Engineer.

3.06 PAINTING

- A. This Contractor shall paint any equipment which is marred or damaged prior to the Owner's acceptance and occupancy. Paint and color shall match original equipment paint and shall be obtained from the equipment supplier when available.
- B. Equipment located in finished areas and which will be painted to match the room decor will be painted by others. Should This Contractor install equipment in a finished area after the area has been painted by others, he shall be responsible for having the equipment and all of its supports, hangers, etc., painted to match the room decor.
- C. Equipment cabinets, casings, covers, metal jackets, etc., located in equipment rooms or concealed spaces, shall be furnished in standard or prime finish free from scratches, abrasions, chippings, etc.
- D. Equipment located in occupied spaces, or if standard to the unit, shall have a baked primer with baked enamel finish coat free from scratches, abrasions, chipping, etc. if color option is

specified or color option given as standard to the unit, This Contractor shall, before ordering, verify with the Architect /Engineer his color preference and shall furnish this color.

- E. This Contractor shall paint equipment located in unfinished areas such as boiler room, mechanical spaces, storage room, etc., furnished by him. If certain equipment is furnished with a factory coat of paint and enamel, it need not be painted, providing the factory applied finish is in no way marred or spattered. If so, the item or piece of equipment shall be refinished with the same paint or enamel that was factory applied.
- F. After surfaces have been thoroughly cleaned and are free of oil, dirt or other foreign matter, the pipes or equipment shall be painted with the following paint materials:
 - 1. Bare Metal Surfaces - Apply one coat of metal primer suitable for use on metal being painted. Finish with two coats of Alkyd base enamel paint.
 - 2. Insulated Surfaces - Paint insulation jacket with two coats of semi-gloss acrylic latex paint.
 - 3. Color of paint shall be verified with the Architect.

3.07 ADJUST AND CLEAN

- A. Contractor shall thoroughly clean all equipment and systems prior to the Owner's final acceptance of the project.
- B. Contractor shall clean all foreign paint, grease, oil, dirt, labels, stickers, and other foreign material from equipment and fixtures.
- C. Contractor shall remove all rubbish, debris, etc., accumulated during the Contractor's operations from the premises.

END OF SECTION

SECTION 23 0529

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

1.02 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- C. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General-Purpose Piping; 2023.
- D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2022).
- F. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2018.
- 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; 2023.
- 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; 2023.
- 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; 2023d.
- L. FM (AG) - FM Approval Guide; Current Edition.
- M. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).
- 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.

1.03 SUBMITTALS

- A. See Section 01 3000 - 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.

1.04 QUALITY ASSURANCE

- A. Comply with applicable building code.

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 2.5. 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. Strut Channels:

1. ASTM A653/A653M galvanized steel bracket with clamps for surface mounting of piping or plumbing equipment support.
2. Channel or Bracket Kits: Include rods, brackets, end-fixed fittings, covers, clips, and other related hardware required to complete sectional trapeze section for piping or other support.

C. Channel Nuts:

1. Provide carbon steel channel nut with epoxy copper or zinc finish and long, regular, or short spring.

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.

E. Pipe Hangers:

1. Split Ring Hangers:
 - a. Provide hinged split ring and yoke roller hanger with epoxy copper or 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.

2. Band Hangers, Adjustable:
 - a. MSS SP-58 Type 7 or 9, Zinc-plated ASTM A1011/A1011M steel or ASTM A653/A653M carbon steel.
3. Swivel Ring Hangers, Adjustable:
 - a. MSS SP-58 Type 10, epoxy-painted, zinc-colored.
 - b. 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.
 - c. FM (AG) and UL (DIR) listed for specific pipe size runs and loads.
4. Clevis Hangers, Adjustable:
 - a. Copper Tube: MSS SP-58 Type 1, epoxy-plated copper.
 - b. Standard-Duty: MSS SP-58 Type 1, zinc-colored, epoxy plated.
- F. 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.
- G. Pipe Shields for Insulated Piping:
 1. 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. Minimum Service Temperature: Minus 40 degrees F.
 - e. Maximum Service Temperature: 178 degrees F.
 - f. Pipe shields to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
- H. Anchors and Fasteners:
 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

PART 3 EXECUTION

3.01 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. 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.

G. Secure fasteners according to manufacturer's recommended torque settings.

H. Remove temporary supports.

END OF SECTION

SECTION 23 0553

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Pipe markers.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

- A. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2017.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Product Data: Provide manufacturers catalog literature for each product required.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Air Handling Units: Nameplates.
- B. Air Terminal Units: Tags.
- C. Control Panels: Nameplates.
- D. Heat Transfer Equipment: Nameplates.
- E. Major Control Components: Nameplates.
- F. Pumps: Nameplates.
- G. Tanks: Nameplates.

2.02 NAMEPLATES

- A. Manufacturers:
 - 1. Substitutions: See Section 01 6000 - Product Requirements.
- B. Letter Color: White.
- C. Letter Height: 1/4 inch.
- D. Background Color: Black.
- E. Plastic: Comply with ASTM D709.

2.03 TAGS

- A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.

2.04 PIPE MARKERS

- A. Manufacturers:
 - 1. Brady Corporation: www.bradycorp.com/#sle.
 - 2. Brimar Industries, Inc: www.pipemarker.com/#sle.
 - 3. Craftmark Pipe Markers: www.craftmarkid.com/#sle.

4. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
 5. Seton Identification Products, a Tricor Company: www.seton.com/#sle.
 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Color: Comply with ASME A13.1.
 - C. 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.
 - D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure-sensitive adhesive backing and printed markings.
 - E. 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.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- F. Use tags on piping 3/4 inch diameter and smaller.
- G. Install in clear view and align with axis of piping.
- H. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION

SECTION 23 0593

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Testing, adjustment, and balancing of air systems.
- B. Measurement of final operating condition of HVAC systems.

1.02 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; 2008, with Errata (2019).
- 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; 2002.

1.03 SUBMITTALS

- A. See Section 01 3000 - 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. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
 - 1. Submit under provisions of Section 01 4000.
 - 2. Revise TAB plan to reflect actual procedures and submit as part of final report.
 - 3. 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.
 - 4. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
 - 5. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
 - 6. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
 - 7. Units of Measure: Report data in both I-P (inch-pound) and SI (metric) units.
 - 8. Test Reports: Indicate data on AABC MN-1 forms, forms prepared following ASHRAE Std 111, or NEBB forms. Submit data in SI (metric) units.
 - 9. 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 Architect/Engineer.
 - g. Project Contractor.
 - h. Report date.
- D. Project Record Documents: Record actual locations of flow measuring stations and balancing valves and rough setting.

1.04 QUALITY ASSURANCE

- A. Perform total system balance in accordance with AABC MN-1, ASHRAE Std 111, or NEBB Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.
- B. TAB Agency Qualifications: Independent Company specializing in the testing, adjusting, and balancing of systems specified in this Section with minimum three years documented experience certified by AABC.

1.05 SEQUENCING AND SCHEDULING

- A. Sequence work to commence after completion of systems and schedule completion of work before Substantial Completion of Project.

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. SMACNA (TAB).
- B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
- C. TAB Agency Qualifications:
 - 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
 - 2. Certified by one of the following:
 - a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.
 - b. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org/#sle.
- D. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

3.02 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
 - 1. Systems are started and operating in a safe and normal condition.
 - 2. Temperature control systems are installed complete and operable.

3. Proper thermal overload protection is in place for electrical equipment.
 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 5. Duct systems are clean of debris.
 6. Fans are rotating correctly.
 7. Fire and volume dampers are in place and open.
 8. Air coil fins are cleaned and combed.
 9. Access doors are closed and duct end caps are in place.
 10. Air outlets are installed and connected.
 11. Duct system leakage is minimized.
 12. Hydronic systems are flushed, filled, and vented.
 13. Pumps are rotating correctly.
 14. Proper strainer baskets are clean and in place.
 15. Service and balance valves are open.
- B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.

3.03 PREPARATION

- A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect/Engineer to facilitate spot checks during testing.
- B. Provide additional balancing devices as required.

3.04 ADJUSTMENT TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 10 percent of design for supply systems and plus or minus 0 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.
- C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.05 RECORDING AND ADJUSTING

- A. Ensure recorded data represents actual measured or observed conditions.
- B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

3.06 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 extend 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 to check leakage.
- K. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.
- L. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries.
- M. For variable air volume system powered units set volume controller to air flow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable air volume temperature control.
- N. On fan powered VAV boxes, adjust air flow switches for proper operation.

3.07 WATER SYSTEM PROCEDURE

- A. Adjust water systems to provide required or design quantities.
- B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gauges to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.
- C. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.
- D. Effect system balance with automatic control valves fully open to heat transfer elements.

- E. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.
- F. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

3.08 SCOPE

- A. Test, adjust, and balance the following:
 - 1. Packaged Roof Top Heating/Cooling Units.
 - 2. Unit Air Conditioners.
 - 3. Air Coils.
 - 4. Air Handling Units.
 - 5. Fans.
 - 6. Air Inlets and Outlets.

END OF SECTION

This page intentionally left blank

SECTION 23 0713
DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Duct insulation.
- B. Duct liner.

1.02 REFERENCE STANDARDS

- A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.
- B. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).
- C. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation; 2020.
- D. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2019.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- F. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
- G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 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.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section and approved by manufacturer.

1.04 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.

1.05 FIELD CONDITIONS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, UL 723, ASTM E84, or UL 723.

2.02 GLASS FIBER, FLEXIBLE

- A. Manufacturer:
 - 1. Johns Manville: www.jm.com/#sle.
 - 2. Owens Corning Corporation: www.ocbuildingspec.com/#sle.
 - 3. CertainTeed Corporation: www.certainteed.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Insulation: ASTM C553; flexible, noncombustible blanket.
 - 1. K value: 0.36 at 75 degrees F, when tested in accordance with ASTM C518.
- C. Vapor Barrier Jacket:
 - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
- D. Vapor Barrier Tape:
 - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure-sensitive rubber-based adhesive.

2.03 DUCT LINER

- A. Manufacturers:
 - 1. Johns Manville: www.jm.com/#sle.
 - 2. Owens Corning Corp: www.owenscorning.com.
- B. Insulation: Incombustible glass fiber complying with ASTM C 1071; flexible blanket and rigid board; impregnated surface and edges coated with poly vinyl acetate polymer or acrylic polymer shown to be fungus and bacteria resistant by testing to ASTM G 21.
 - 1. Apparent Thermal Conductivity: Maximum of 0.31 at 75 degrees F.
 - 2. Service Temperature: Up to 250 degrees F.
 - 3. Rated Velocity on Coated Air Side for Air Erosion: 5,000 fpm, minimum.
- C. Adhesive: Waterproof, fire-retardant type, ASTM C916.
- D. Liner Fasteners: Galvanized steel, self-adhesive pad, impact applied, or welded with integral head.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Test ductwork for design pressure prior to 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. 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 airflow. Increase duct size to allow for insulation thickness.

3.03 SCHEDULES

- A. Refer to the drawings for the duct and insulation schedule.

END OF SECTION

This page intentionally left blank

SECTION 23 0719
HVAC PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping insulation.
- B. Flexible removable and reusable blanket insulation.
- C. Jacketing and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.

1.03 REFERENCE STANDARDS

- A. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2019).
- B. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2022a.
- C. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2023).
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- E. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.
- F. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - 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.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, UL 723, ASTM E84, or UL 723.

2.02 GLASS FIBER, RIGID

- A. Manufacturers:
 - 1. einsulation.com, Inc.: www.einsulation.com
 - 2. Owens Corning Corp: www.owenscorning.com.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.
- 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. Vapor Barrier Lap Adhesive: Compatible with insulation.
- E. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
- F. Indoor Vapor Barrier Finish:
 - 1. Cloth: Untreated; 9 oz/sq yd weight.
 - 2. Vinyl emulsion type acrylic, compatible with insulation, white color.

2.03 JACKETING AND ACCESSORIES

- 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, 0.010 inch.
 - e. Connections: Brush on welding adhesive.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- D. Insulated Pipes Conveying Fluids Below Ambient Temperature:
 - 1. Insulate entire system, including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, 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. 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.
- 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. At fire separations, see Section 07 8400.
- J. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with PVC jacket and fitting covers.

END OF SECTION

This page intentionally left blank

SECTION 23 0923
DIGITAL CONTROL EQUIPMENT - HVAC

PART 1 GENERAL

1.01 SCOPE

- A. This Contractor shall install equipment with local digital controllers and fully operating as stand-alone units, suitable for BMS integration by others.
- B. Owner will install Contractor provided temperature sensors.
- C. Owner will provide and install communication cabling between wall sensor(s) and equipment controller and between equipment controller and Owner's BMS equipment.
- D. Owner's Building Management System (BMS) Integrator (separate contract) shall integrate Temperature Control Contractor installed equipment into existing Owner's BMS via TCC provided equipment BACNet IP communication ports.

1.02 REFERENCES

- A. NFPA 70 - National Electrical Code; National Fire Protection Association; 2002.

1.03 SUBMITTALS

- A. See Section 01 3000-Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data on all products proposed to be used.
- C. Provide the Engineer and Owner, any additional information or data which is deemed necessary to determine compliance with these specifications or which is deemed valuable in documenting the system to be installed.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Use new products the manufacturer is currently manufacturing and selling for use in new installations. Do not use this installation as a product test site unless explicitly approved in writing by Owner. Spare parts shall be available for at least five years after completion of this contract.

2.02 COMMUNICATION

- A. Control products, communication media, connectors, repeaters, hubs, and routers shall comprise a BACnet internetwork. Controller and operator interface communication shall conform to ANSI/ASHRAE Standard 135, BACnet.
- B. Install new wiring and network devices as required to provide a complete and workable control network. Use existing Ethernet backbone for network segments marked "existing" on project drawings.
- C. Each controller shall have a communication port for temporary connection to a laptop computer or other operator interface. Connection shall support memory downloads and other commissioning and troubleshooting operations.
- D. Internetwork operator interface and value passing shall be transparent to internetwork architecture.

2.03 WIRING AND RACEWAYS

- A. General. Provide copper wiring, plenum cable, and raceways as specified in applicable sections of Division 26.
- B. Insulated wire shall use copper conductors and shall be UL listed for 90°C (200°F) minimum service.
- C. Communication cabling shall be ethernet Cat 5e cabling with white jacket.

PART 3 EXECUTION

3.01 COORDINATION

- A. Site.
 - 1. Assist in coordinating space conditions to accommodate the work of each trade where work will be installed near or will interfere with work of other trades. If installation without coordination causes interference with work of other trades, Contractor shall correct conditions without extra charge.
 - 2. Coordinate and schedule work with other work in the same area and with work dependent upon other work to facilitate mutual progress.
- B. Test and Balance.
 - 1. Provide Test and Balance Contractor a single set of necessary tools to interface to control system for testing and balancing.
 - 2. Train Test and Balance Contractor to use control system interface tools.
 - 3. Provide a qualified technician to assist with testing and balancing the first 20 terminal units.
 - 4. Test and Balance Contractor shall return tools undamaged and in working condition at completion of testing and balancing.
- C. Life Safety.
 - 1. Owner's BMS shall monitor fire alarm system and shut down air handling systems upon fire alarm system activation.

3.02 GENERAL WORKMANSHIP

- A. Install equipment, piping, and wiring or raceway horizontally, vertically, and parallel to walls wherever possible.
- B. Provide sufficient slack and flexible connections to allow for piping and equipment vibration isolation.
- C. Install equipment in readily accessible locations as defined by National Electrical Code (NEC) Chapter 1 Article 100 Part A.
- D. Verify wiring integrity to ensure continuity and freedom from shorts and ground faults.
- E. Equipment, installation, and wiring shall comply with industry specifications and standards and local codes for performance, reliability, and compatibility.

3.03 FIELD QUALITY CONTROL

- A. Work, materials, and equipment shall comply with rules and regulations of applicable local, state, and federal codes and ordinances.
- B. Continually monitor field installation for code compliance and workmanship quality.
- C. Contractor shall arrange for work inspection by local or state authorities having jurisdiction over the work.

3.04 WIRING

- A. Control and interlock wiring and installation shall comply with national and local electrical codes, Division 26, and manufacturer's recommendations.
- B. NEC Class 1 (line voltage) wiring shall be UL listed in approved raceway as specified by NEC and Division 16.
- C. Low-voltage wiring shall meet NEC Class 2 requirements. Subfuse low-voltage power circuits as required to meet Class 2 current limit.
- D. NEC Class 2 (current-limited) wires not in raceway but in concealed and accessible locations such as return air plenums shall be UL listed for the intended application.
- E. Install wiring in raceway where subject to mechanical damage and at levels below 3 m (10ft) in mechanical, electrical, or service rooms.
- F. Install Class 1 and Class 2 wiring in separate raceways. Boxes and panels containing high-voltage wiring and equipment shall not be used for low-voltage wiring except for the purpose of interfacing the two through relays and transformers.
- G. Do not install wiring in raceway containing tubing.
- H. Run exposed Class 2 wiring parallel to a surface or perpendicular to it and tie neatly at 3 m (10 ft) intervals.
- I. Use structural members to support or anchor plenum cables without raceway. Do not use ductwork, electrical raceways, piping, or ceiling suspension systems to support or anchor cables.
- J. Secure raceways with raceway clamps fastened to structure and spaced according to code requirements. Raceways and pull boxes shall not be hung on or attached to ductwork, electrical raceways, piping, or ceiling suspension systems.
- K. Use color-coded conductors throughout.
- L. Adhere to requirements in Division 26 where raceway crosses building expansion joints.
- M. Install insulated bushings on raceway ends and enclosure openings. Seal top ends of vertical raceways.
- N. Install raceway rigidly, support adequately, ream at both ends, and leave clean and free of obstructions. Join raceway sections with couplings and according to code. Make terminations in boxes with fittings. Make terminations not in boxes with bushings.

3.05 COMMUNICATION WIRING

- A. Communication wiring shall be low-voltage Class 2 wiring and shall comply with Article 3.7 (Wiring).
- B. Install communication wiring in separate raceways and enclosures from other Class 2 wiring.
- C. During installation do not exceed maximum cable pulling, tension, or bend radius specified by the cable manufacturer.
- D. Verify entire network's integrity following cable installation using appropriate tests for each cable.
- E. Each run of communication wiring shall be a continuous length without splices when that length is commercially available. Runs longer than commercially available lengths shall have as few splices as possible using commercially available lengths.
- F. Label communication wiring to indicate origination and destination.
- G. Ground coaxial cable according to NEC regulations article on "Communications Circuits, Cable, and Protector Grounding."

3.06 INSTALLATION OF SENSORS

- A. Install sensors according to manufacturer's recommendations.
- B. Mount sensors rigidly and adequately for operating environment.
- C. Install room temperature sensors on concealed junction boxes properly supported by wall framing.
- D. Air seal wires attached to sensors in their raceways or in the wall to prevent sensor readings from being affected by air transmitted from other areas.

3.07 IDENTIFICATION OF HARDWARE AND WIRING

- A. Label wiring and cabling, including that within factory-fabricated panels, with control system address or termination number at each end within 5 cm (2 in.) of termination.
- B. Permanently label or code each point of field terminal strips to show instrument or item served.
- C. Label control panels with minimum 1 cm (½ in.) letters on laminated plastic nameplates.
- D. Label each control component with a permanent label. Label plug-in components such that label remains stationary during component replacement.
- E. Label room sensors related to terminal boxes or valves with nameplates.
- F. Manufacturers' nameplates and UL or CSA labels shall be visible and legible after equipment is installed.
- G. Label identifiers shall match record documents.

3.08 CLEANING

- A. Each day clean up debris resulting from work. Remove packaging material as soon as its contents have been removed. Collect waste and place in designated location.
- B. On completion of work in each area, clean work debris and equipment. Keep areas free from dust, dirt, and debris.

- C. On completion of work, check equipment furnished under this section for paint damage. Repair damaged factory-finished paint to match adjacent areas. Replace deformed cabinets and enclosures with new material and repaint to match adjacent areas.

END OF SECTION

This page intentionally left blank

SECTION 23 2113
HYDRONIC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hydronic system requirements.
- B. Heating water and glycol piping, above grade.
- C. Pipe and pipe fittings for:
 - 1. Heating water piping system.
 - 2. Chilled water piping system.
 - 3. Equipment drains and overflows.
- D. Pipe hangers and supports.
- E. Unions, flanges, mechanical couplings, and dielectric connections.
- F. Valves:
 - 1. Ball valves.
- G. Flow controls.

1.02 RELATED REQUIREMENTS

- A. Section 08 3100 - Access Doors and Panels.
- B. Section 23 2500 - HVAC Water Treatment: Pipe cleaning.

1.03 REFERENCE STANDARDS

- A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.
- B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.
- C. ASME B31.9 - Building Services Piping; 2020.
- D. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2001 (R2005).
- E. ASME B31.9 - Building Services Piping; The American Society of Mechanical Engineers; 2008 (ANSI/ASME B31.9).
- F. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.
- G. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2023a.
- H. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2022.
- I. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2020.
- J. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers; 2024.
- K. ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications; 2007 (Reapproved 2019).
- L. ASTM F877 - Standard Specification for Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems; 2007.
- M. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

- N. AWWA C606 - Grooved and Shouldered Joints; 2022.
- O. AWWA C606 - Standard Specification for Grooved and Shouldered Joints; American Water Works Association; 2006.
- P. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).

1.04 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. Use unions, flanges, and couplings downstream of valves and at equipment or apparatus connections. Do not use direct welded or threaded connections to valves, equipment or other apparatus.
- C. Use non-conducting dielectric connections whenever jointing dissimilar metals in open systems.
- D. Provide pipe hangers and supports in accordance with ASME B31.9 unless indicated otherwise.
- E. Use ball or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- F. Use globe valves for throttling, bypass, or manual flow control services.
- G. Use butterfly valves in heating water systems interchangeably with gate and globe valves.
- H. Use lug end butterfly valves to isolate equipment.
- I. Use 3/4 inch ball valves with cap for drains at main shut-off valves, low points of piping, bases of vertical risers, and at equipment. Pipe to nearest floor drain.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Include data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalogue information. Indicate valve data and ratings.
- C. Project Record Documents: Record actual locations of valves.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.

1.07 REGULATORY REQUIREMENTS

- A. Conform to ASME B31.9 code for installation of piping system.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

- C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 HYDRONIC SYSTEM REQUIREMENTS

- A. Comply with ASME B31.9 and applicable federal, state, and local regulations.
- B. Piping: Provide piping, fittings, hangers, and supports as required, as indicated, and as follows:
 - 1. Where more than one piping system material is specified, provide joining fittings that are compatible with piping materials and ensure that the integrity of the system is not jeopardized.
 - 2. Use non-conducting dielectric connections whenever joining dissimilar metals.
 - 3. Grooved mechanical joints may be used in accessible locations only.
 - a. Accessible locations include those exposed on interior of building, in pipe chases, and in mechanical rooms, aboveground outdoors, and as approved by Architect/Engineer.
 - b. Use rigid joints unless otherwise indicated.
 - 4. Provide pipe hangers and supports in accordance with ASME B31.9 or MSS SP-58 unless indicated otherwise.
 - 5. Provide pipe hangers and supports in accordance with ASME B31.9 unless indicated otherwise.
- C. Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges, unions, or grooved couplings to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.
- D. Valves: Provide valves where indicated:

2.02 HEATING WATER AND GLYCOL PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53/A53M, Schedule 40, black, using one of the following joint types:
 - 1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings; AWS D1.1/D1.1M welded.
 - 2. Fittings: ASTM B 16.3, malleable iron or ASTM A 234/A 234M, wrought steel welding type fittings.
 - 3. Joints: Threaded, AWS D1.1 welded, or grooved and shouldered pipe end couplings.
- B. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), drawn, using one of the following joint types:
 - 1. Grooved Joints: AWWA C606 grooved tube, fittings of same material, and copper-tube-dimension mechanical couplings.
 - 2. Joints: Solder, lead free, 95-5 tin-antimony, or tin and silver.

2.03 EQUIPMENT DRAINS AND OVERFLOWS

- A. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), drawn; using one of the following joint types:

1. Joints: Solder, lead free, ASTM B 32, HB alloy (95-5 tin-antimony), or tin and silver.

2.04 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.
- B. Conform to ASME B31.9.
- C. Hangers for Pipe Sizes 1/2 to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
- D. Hangers for Cold Pipe Sizes 2 Inches and Greater: Carbon steel, adjustable, clevis.
- E. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- F. Wall Support for Pipe Sizes 4 Inches and Greater: Welded steel bracket and wrought steel clamp.
- G. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- H. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
- I. In grooved installations, use rigid couplings with offsetting angle-pattern bolt pads or with wedge-shaped grooves in header piping to permit support and hanging in accordance with ASME B31.9.

2.05 UNIONS, FLANGES, MECHANICAL COUPLINGS, AND DIELECTRIC CONNECTIONS

- A. Unions for Pipe of 2 Inches and Less:
 1. Ferrous Piping: 150 psi brass or malleable iron, threaded.
 2. Copper Pipe: Bronze, soldered joints.
- B. Flanges for Pipe 2 Inches and Greater:
 1. Ferrous Piping: 150 psig forged steel, slip-on.
 2. Copper Piping: Bronze.
 3. Gaskets: 1/16 inch thick, preformed neoprene.
- C. 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. Mechanical Couplings: Comply with ASTM F1476.
 3. Housing Material: Malleable iron or ductile iron, galvanized.
 4. Housing Clamps: Malleable iron galvanized to engage and lock, designed to permit some angular deflection, contraction, and expansion.
 5. Gasket Material: EPDM suitable for operating temperature range from minus 30 degrees F to 230 degrees F.
 6. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
 7. When pipe is field grooved, provide coupling manufacturer's grooving tools.
- D. Dielectric Connections: Union or waterway fitting with water impervious isolation barrier and one galvanized or plated steel end and one copper tube end, end types to match pipe joint

types used.

2.06 BALL VALVES

A. Manufacturers:

1. Apollo Valves: www.apollovalves.com/#sle.
2. Grinnell Products: www.grinnell.com/#sle.
3. Victaulic Company: www.victaulic.com/#sle.
4. Milwaukee Valve Company: www.milwaukeevalve.com.
5. Substitutions: See Section 01 6000 - Product Requirements.

B. Up To and Including 2 Inches:

1. Bronze one piece body, chrome plated brass ball, teflon seats and stuffing box ring, lever handle with balancing stops, solder ends with union.

2.07 FLOW CONTROLS

A. Manufacturers:

1. Bell & Gossett, a brand of Xylem, Inc: www.bellgossett.com/#sle.
2. Griswold Controls: www.griswoldcontrols.com/#sle.
3. Hays Fluid Controls: www.haysfluidcontrols.com/#sle.
4. ITT Bell & Gossett: www.bellgossett.com/#sle.
5. Taco, Inc: www.taco-hvac.com/#sle.
6. Substitutions: See Section 01 6000 - Product Requirements.

B. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.

C. Calibration: Control flow within 10 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, minimum pressure 2 psi.

D. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi psi.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Prepare pipe for grooved mechanical joints as required by coupling manufacturer.
- C. Remove scale and dirt on inside and outside before assembly.
- D. Prepare piping connections to equipment using jointing system specified.
- E. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.
- F. After completion, fill, clean, and treat systems. See Section 23 2500 for additional requirements.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

- B. Install heating water to ASME B31.9 requirements. Install chilled water piping to ASME B31.5 requirements.
- C. Route piping in orderly manner, parallel to building structure, and maintain gradient.
- D. Install piping to conserve building space and to avoid interference with use of space.
- E. Group piping whenever practical at common elevations.
- F. Slope piping and arrange to drain at low points.
- G. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9, ASTM F708, or MSS SP-58.
 - 2. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 - 3. Provide copper plated hangers and supports for copper piping.
- H. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Section 08 3100 .
- I. Install valves with stems upright or horizontal, not inverted.

3.03 SCHEDULES

- A. Hanger Spacing for Copper Tubing.
 - 1. 1/2 Inch and 3/4 inch: Maximum span, 5 feet; minimum rod size, 1/4 inch.
 - 2. 1 Inch: Maximum span, 6 feet; minimum rod size, 1/4 inch.
 - 3. 1-1/2 Inches and 2 Inches: Maximum span, 8 feet; minimum rod size, 3/8 inch.
 - 4. 2-1/2 Inches: Maximum span, 9 feet; minimum rod size, 3/8 inch.
 - 5. 3 Inches: Maximum span, 10 feet; minimum rod size, 3/8 inch.
- B. Hanger Spacing for Steel Piping.
 - 1. 1/2 Inch, 3/4 Inch, and 1 Inch: Maximum span, 7 feet; minimum rod size, 1/4 inch.
 - 2. 1-1/4 Inches: Maximum span, 8 feet; minimum rod size, 3/8 inch.
 - 3. 1-1/2 Inches: Maximum span, 9 feet; minimum rod size, 3/8 inch.
 - 4. 2 Inches: Maximum span, 10 feet; minimum rod size, 3/8 inch.
 - 5. 2-1/2 Inches: Maximum span, 11 feet; minimum rod size, 3/8 inch.
 - 6. 3 Inches: Maximum span, 12 feet; minimum rod size, 3/8 inch.

END OF SECTION

SECTION 23 3100
HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal ducts.

1.02 RELATED REQUIREMENTS

- A. Section 23 0713 - Duct Insulation: External insulation and duct liner.
- B. Section 23 3300 - Air Duct Accessories.
- C. Section 23 3319 - Duct Silencers.
- D. Section 23 3600 - Air Terminal Units.
- E. Section 23 3700 - Air Outlets and Inlets: Fabric air distribution devices.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- C. 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; 2023.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- E. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
- F. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

1.04 PERFORMANCE REQUIREMENTS

- A. No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data for duct materials.
- C. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

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. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum three years of documented experience.

1.07 REGULATORY REQUIREMENTS

- A. Construct ductwork to NFPA 90A standards.

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 metal duct unless otherwise indicated. Fibrous glass duct can be substituted at the Contractor's option.
- C. Acoustical Treatment: Provide sound-absorbing liners and sectional silencers for metal-based ducts in compliance with Section 23 3319.
- D. Duct Shape and Material in accordance with Allowed Static Pressure Range:
- E. Duct Sealing and Leakage in accordance with Static Pressure Class:
- F. 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. Provide turning vanes of perforated metal with glass fiber insulation when an acoustical lining is required.
 - 7. 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 DUCT MANUFACTURERS

- A. Metal-Fab, Inc: www.mtlfab.com.
- B. SEMCO Incorporated: www.semcoinc.com.
- C. United McGill Corporation: www.unitedmcgill.com.

2.03 METAL DUCTS

- A. Material Requirements:
 - 1. Galvanized Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.

- B. Manufacture in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. Install products following the manufacturer's instructions.
- C. Duct sizes indicated are precise inside dimensions. For lined ducts, maintain sizes inside lining.
- D. Install and seal metal and flexible ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- E. Provide openings in ductwork as indicated to accommodate thermometers and controllers. Provide pilot tube openings as indicated for testing of systems, complete with metal can with spring device or screw to insure against air leakage. For openings, insulate ductwork and install insulation material inside a metal ring.
- F. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- G. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with a crimp in the direction of airflow.
- H. Use double nuts and lock washers on threaded rod supports.
- 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. Connect flexible ducts to metal ducts with draw bands.
- K. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- L. At exterior wall louvers, seal duct to louver frame and install blank-out panels.

END OF SECTION

This page intentionally left blank

SECTION 23 3300
AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Combination fire and smoke dampers.
- B. Duct access doors.
- C. Duct test holes.
- D. Flexible duct connectors.
- E. Volume control dampers.

1.02 RELATED REQUIREMENTS

- A. Section 23 3100 - HVAC Ducts and Casings.
- B. Section 23 3600 - Air Terminal Units: Pressure regulating damper assemblies.

1.03 REFERENCE STANDARDS

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
- B. NFPA 92 - Standard for Smoke Control Systems; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
- D. UL 555 - Standard for Fire Dampers; Current Edition, Including All Revisions.
- E. UL 555S - Standard for Smoke Dampers; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide for shop-fabricated assemblies including volume control dampers, duct access doors, duct test holes, and hardware used. Include electrical characteristics and connection requirements.
- C. Manufacturer's Installation Instructions: Provide instructions for fire dampers and combination fire and smoke dampers.

1.05 PROJECT RECORD DOCUMENTS

- A. Record actual locations of access doors and test holes.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect dampers from damage to operating linkages and blades.

1.07 EXTRA MATERIALS

- A. See Section 01 6000 - Product Requirements, for additional provisions.

PART 2 PRODUCTS

2.01 COMBINATION FIRE AND SMOKE DAMPERS

- A. Manufacturers:
 - 1. Louvers & Dampers, Inc, a brand of Mestek, Inc: www.louvers-dampers.com/#sle.
 - 2. Nailor Industries, Inc: www.nailor.com/#sle.
 - 3. Pottorff: www.pottorff-hvac.com

4. Ruskin Manufacturing: www.ruskin.com
 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Fabricate in accordance with NFPA 90A, UL 555, UL 555S, and as indicated.
 - C. Provide factory sleeve and collar for each damper.
 - D. Multiple Blade Dampers: Fabricate with 16 gage galvanized steel frame and 14 gage galvanized steel blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, stainless steel jamb seals, 1/8 x 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock, and 1/2 inch actuator shaft.
 - E. Operators: UL listed and labeled; spring-return, electric-type suitable for 120 volts, single phase, 60 Hz. Provide end switches to indicate damper position. Locate damper operator on interior of duct and link to damper operating shaft.
 - F. Electro Thermal Link: Fusible link melting at 165 degrees F; 120 volts, single phase, 60 Hz; UL listed and labeled.

2.02 DUCT ACCESS DOORS

- A. Manufacturers:
 1. Nailor Industries, Inc: www.nailor.com/#sle.
 2. Ruskin Company: www.ruskin.com/#sle.
 3. SEMCO LLC: www.semcohvac.com/#sle.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Fabricate in accordance with SMACNA (DCS) and as indicated.
- C. Access doors with sheet metal screw fasteners are not acceptable.

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 FLEXIBLE DUCT CONNECTORS

- 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/sq yd.

2.05 VOLUME CONTROL DAMPERS

- A. Manufacturers:
 1. Louvers & Dampers, Inc, a brand of Mestek, Inc: www.louvers-dampers.com/#sle.
 2. Nailor Industries, Inc: www.nailor.com/#sle.
 3. Pottorff: www.pottorff-hvac.com
 4. Ruskin Company: www.ruskin.com/#sle.
- B. Fabricate in accordance with SMACNA (DCS) and as indicated.
- C. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch.

- D. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 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.
- F. Quadrants:
 - 1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
 - 2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify that electric power is available and of the correct characteristics.

3.02 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). See Section 23 3100 for duct construction and pressure class.
- B. 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 minimum 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, and as indicated. Provide 4 x 4 inch for balancing dampers only. Review locations prior to fabrication.
- C. Provide duct test holes where indicated and required for testing and balancing purposes.
- D. 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.
- E. Install smoke dampers and combination smoke and fire dampers in accordance with NFPA 92.
- F. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.
- G. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
- H. 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 two duct widths from duct take-off.
- I. Provide balancing dampers on high velocity systems where indicated. See Section 23 3600.
- J. 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.

END OF SECTION

This page intentionally left blank

SECTION 23 3700
AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Diffusers:
- B. Registers/grilles:
 - 1. Ceiling-mounted, egg crate exhaust and return register/grilles.
- C. Fabric air distribution devices.

1.02 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- 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; 2024.
- D. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.
- E. UL 2518 - Standard for Safety Air Dispersion Systems; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Section 01 3000 - 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.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Anemostat: www.anemostat-hvac.com.
- B. Carnes, a division of Carnes Company Inc: www.carnes.com/#sle.
- C. Nailor Industries: www.nailor.com.
- D. Price Industries: www.price-hvac.com/#sle.
- E. Donco Air Products: www.doncoair.com
- F. Titus, a brand of Air Distribution Technologies: www.titus-hvac.com/#sle.
- G. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ARCHITECTURAL SQUARE PLAQUE CEILING DIFFUSERS

- A. Type: Square, stamped, single plaque diffuser to discharge air in 360 degree pattern.
- B. Frame: Inverted T-bar type. In plaster ceilings, provide plaster frame and ceiling frame.
- C. Fabrication: 22 gauge steel housing, double thickness faceplate with 20 gauge subplate. Faceplate shall be removeable without tools and have a safety cable. Exposed surface of faceplate shall be smooth, flat, and free of visible fasteners.
- D. Duct Connection: Extra deep 2-1/2" beaded duct connection collar.

- E. Finish: Powder coat white finish, minimum pencil hardness of HB to H. Finish must pass 250 hr ASTM D-870 Water Immersion Test and ASTM D-2794 Reverse Impact Cracking Test with a 50 inch-pound force applied.
- F. The diffuser shall be tested in accordance with ANSI/ASHRAE Standard 70-1991.

2.03 CEILING EGG CRATE EXHAUST AND RETURN GRILLES

- A. Type: Egg crate style face consisting of 1/2 by 1/2 by 1 inch grid core.
- B. Fabrication: Grid core consists of aluminum with mill aluminum finish.
- C. Color: To be selected by Architect/Engineer from manufacturer's standard range.
- D. Frame: Channel lay-in frame for suspended grid ceilings.
- E. Accessories: Provide 1" filter frame and thumbscrew for hinged face access.

2.04 FABRIC AIR DISTRIBUTION DEVICES

- A. General Requirements:
 - 1. Diffuser material to comply with ASTM E84, UL 723, UL 2518, NFPA 90A, and NFPA 90B.
 - 2. Air Dispersion Method:
 - 3. Hanger Supports:

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 comply with architectural features, symmetry, and lighting arrangement.
- C. Install diffusers to ductwork with air tight connection.
- D. Provide balancing dampers on duct take-off to diffusers and grilles and registers, despite whether dampers are specified as part of diffuser, or grille and register assembly.

END OF SECTION

SECTION 23 4000
HVAC AIR CLEANING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Disposable panel filters.

1.02 REFERENCE STANDARDS

- A. UL 900 - Standard for Air Filter Units; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on filter media, emitter size & configuration, filter performance data, filter assembly and filter frames, dimensions, motor locations and electrical characteristics and connection requirements.

PART 2 PRODUCTS

2.01 FILTER MANUFACTURERS

- A. AAF International/American Air Filter: www.aafintl.com/#sle.
- B. The Camfil Group: www.camfilfarr.com/#sle.
- C. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DISPOSABLE PANEL FILTERS

- A. Media: UL 900 Class 2, fiber blanket, factory sprayed with flameproof, non-drip, non-volatile adhesive.
 - 1. Thickness: 2 inch.
- B. Performance Rating:
 - 1. Face Velocity: 500 fpm.
 - 2. Initial Resistance: 0.15 in-wc.
 - 3. Recommended Final Resistance: 0.50 in-wc.
- C. Casing: Cardboard frame.
- D. Holding Frames: 20 gauge, 0.0359 inch minimum galvanized steel frame with expanded metal grid on outlet side and steel rod grid on inlet side, hinged with pull and retaining handles.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install air cleaning devices in accordance with manufacturer's instructions.
- B. Prevent passage of unfiltered air around filters with felt, rubber, or neoprene gaskets.
- C. Install filter gauge static pressure taps upstream and downstream of filters. Mount filter gauges on outside of filter housing or filter plenum, in accessible position. Adjust and level.
- D. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing, with clean set.

- E. Provide filter gauges on filter banks, installed with separate static pressure tips upstream and downstream of filters.

END OF SECTION

SECTION 23 8149
GROUND-SOURCE UNITARY HEAT PUMPS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. High-efficiency, dual-stage, horizontal/vertical GCHP.

1.02 RELATED REQUIREMENTS

- A. Section 23 0529 - Hangers and Supports for HVAC Piping and Equipment.
- B. Section 23 0593 - Testing, Adjusting, and Balancing for HVAC.
- C. Section 23 2113 - Hydronic Piping: Load-side piping.
- D. Section 23 2113.33 - Ground-Loop Heat-Pump Piping.
- E. Section 23 2114 - Hydronic Specialties: Valves, strainers, PT test plugs, and other fittings.
- F. Section 23 3100 - HVAC Ducts and Casings.
- G. Section 23 3300 - Air Duct Accessories.
- H. Section 25 1500 - Integrated Automation Software.
- I. Section 26 0583 - Wiring Connections.

1.03 ABBREVIATIONS AND ACRONYMS

- A. BACnet IP: BACnet communications over internet protocol.
- B. BAS: Building Automation System; controls.
- C. BMS: Building Management System; controls.
- D. COP: Coefficient of Performance; applicable when heating.
- E. EAT: Entering Air Temperature.
- F. EER: Energy Efficiency Ratio; applicable when cooling.
- G. EWT: Entering Water Temperature; coil or heat exchanger.
- H. GSHP: Ground-Source Heat Pump; uses refrigerant-filled, buried pipe-loop as heat sink.

1.04 REFERENCE STANDARDS

- A. ASHRAE Std 135 - A Data Communication Protocol for Building Automation and Control Networks; 2020, with Errata and Amendments (2022).
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- C. UL 94 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances; Current Edition, Including All Revisions.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's data sheets for each product furnished, including:
 - 1. Electrical and performance data showing compliance with specifications.
 - 2. Required water flow rates and temperatures for inflow and outflow.
 - 3. Detailed electrical wiring diagrams.
 - 4. Storage and handling requirements and recommendations.

5. Installation instructions.
 6. Start-up, troubleshooting, and TAB instructions.
 7. Specimen warranty.
- C. Shop Drawings: Indicate piping connections and interface to supply and return ductwork, source-side water piping to buried loop, circulator pumps, and condensate drains. Include control wiring diagrams prepared specifically for this project including unit controls interface.
 - D. Operation and Maintenance Data: Include replaceable parts lists, parts sources, and troubleshooting guide.
 - E. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

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.
- B. Installer Qualifications: Company specializing in performing the work of the type this section and approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Verify upon delivery that equipment nameplate data, including electrical data, matches specified and ordered equipment. Verify that refrigerant charge has been retained during shipping.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Store products under cover and elevated above grade.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.
- B. Provide five year manufacturer warranty for compressors and motors, expansion devices, heat exchangers, and reversing valves.

PART 2 PRODUCTS

2.01 UNITARY HEAT PUMP PERFORMANCE REQUIREMENTS

- A. High-efficiency, Dual-stage, Horizontal/Vertical Heat Pump:
 1. Ground or Surface-Water Conditions:
 - a. Heating Mode: 23 degrees F.
 - b. Cooling Mode: 104 degrees F.
 2. Single-Point Power Feed: 208-230VAC single or three phase as scheduled at 60 Hz.

2.02 GENERAL UNITARY HEAT PUMP FABRICATION REQUIREMENTS

- A. Energy Efficiency: ASHRAE Std 90.1 I-P EER and COP ratings, minimum.
- B. Factory assemble internal components, safety controls, accessories, filters, piping, cable, and wires, then charge with R-410A refrigerant prior to testing.
- C. Include factory mounted and programmed digital controller and zone sensor with over-ride and local temperature adjustment. Controller shall have BACNet IP interface.

- D. Comply with UL 1995, place service and caution labels on unit.
- E. Equipment of sizes larger than indicated, requiring additional electrical service, larger sized piping or pumps, or other modifications, may be accepted provided necessary modifications are accomplished as part of work of this section at no additional cost.
- F. Cabinet Assembly:
 - 1. Construct of zinc-coated, heavy-gauge, galvanized steel with exposed edges rounded.
 - 2. Finish: Factory apply electrostatic powder paint or baked enamel finish. Coordinate with Architect/Engineer for specific color finish requirements of console units or other units installed within occupied spaces.
 - 3. Provide access panels for inspection, cleaning, and servicing of refrigerant, controls, condensate drain pan, coil, and blower.
 - 4. Furnish 1-inch or 3-inch duct flange on open-discharge selections.
 - 5. Interior Insulation: Minimum 1/2 inch thick, dual-density, bonded glass fiber.
 - 6. Provide flame spread of less than 25, and smoke developed classification of less than 50 in accordance with ASTM E84 and UL 723.
 - 7. Sound and Noise Suppression:
 - a. Mechanical Rooms: 18 gauge, 0.05 inch, minimum.
 - b. Occupied Spaces: 16 gauge, 0.06 inch, minimum.
 - c. Compressor enclosure lined with 1/2 inch thick insulation.
 - d. Include vibration isolation between compressor and heat exchanger.
 - e. Include length-wise unit base stiffeners.
 - f. Foam gasket sealant around compressor and end panel perimeter.
- G. Blower Section:
 - 1. Draw-through, forward-curved fan, constructed of corrosion-resistant, galvanized material and designed for efficient, quiet operation.
 - 2. Factory program for both soft start and constant flow output over static pressure range.
 - 3. Provide preinstalled neutral-wire protection when required to support specified fan type.
 - 4. Motor to include thermal overload protection, quick-disconnect plug, and permanently lubricated bearings.
 - 5. Belt-Driven Motor Requirements: Provide adjustable blower-motor/sheave combination device based on indicated flow performance requirements.
 - 6. Variable Speed Control: Configure controller to maintain adjustable flow setpoint for modulating or speed-switched units.
 - 7. Fan Turndown: Design control features to allow fan-speed reduction to adjustable 50 percent of its capacity when zone set point temperature is satisfied or when unit runs in fan-only mode.
- H. Evaporator Section:

1. Internally finned, aluminum or copper tubes mechanically bonded to configured aluminum plate fin, corrosion-inhibitor coated as indicated.
 2. Refrigerant Coil Distributor Assembly: Orifice style with round copper distributor tubes.
 3. Thermostatic Expansion Valve: Factory select and install for wide control range.
 4. Factory leak test to minimum 450 psi and pressure test to minimum 600 psi.
 5. Tubes: Size tubes consistent with coil capacity. Fabricate suction header from rounded copper pipe.
 6. Completely evacuate air and charge with proper column of refrigerant prior to shipment.
- I. Compressor Section:
1. Provide rubber mounting devices located underneath compressor mounting base.
 2. Safety Interlocked Devices:
 - a. Thermal overload protection.
 - b. High-pressure switch for protection against excessive discharge pressure.
 - c. Low-pressure safety for protection against loss of refrigerant charge.
- J. Refrigerant Tubing Lines:
1. Tubing made of copper with service pressure ports on high- and low-pressure sides.
 2. Free from contaminants and conditions such as drilling fragments, dirt, and oil.
 3. Include drier, thermal expansion valve, and other related components.
 4. Freeze Protection: 30 degrees F, thermistor based.
 5. Insulation: Air and heat exchanger sides; minimum 3/8 inch thick elastomeric insulation.
- K. Refrigerant Load Control:
1. Hot-Gas Bypass: Provide to increase heat transfer efficiency at low temperatures.
 2. Hot-Gas Reheat Coil:
 - a. Humidity Control: Upgrade thermostat to include humidity sensor tied to unit controller for integral dehumidification control.
 - b. Coil Assembly: Aluminum or copper tubes mechanically expanded into evenly spaced aluminum fins.
 - c. Coil Testing: Proof test at minimum of 1.5 times maximum operating pressure, then leak test at maximum operating pressure.
- L. Water-to-Refrigerant Heat Exchanger:
1. Coaxial Type: Provide aluminum or copper tube and fins.
 2. Brazed-Plate Type: Stainless steel, with bidirectional liquid line filter drier.
 3. Insulate heat exchanger, water lines, and refrigerant suction lines for prevention of condensation at temperatures below 60 degrees F.
 4. Provide rubber isolation to heat exchanging device for enhanced sound attenuation.
 5. Freeze Protection: 35 degrees F by thermistor sensing.
 6. Minimum Working Pressure: 400 psi waterside, 600 psi DX side.
 7. End Connections: Copper NPT. Provide flow shut-off ball valves.

8. Accessories:
 - a. Strainer, PT test plug, and flow regulator.
 - b. Unit-controlled, return-waterside solenoid valve.
- M. Filter Section:
 1. ASHRAE Std 52.2, minimum efficiency reported value or MERV listing.
 2. Filter Box: Provide field-installed, return-duct-mounted filter housing with side access.
- N. Electrical:
 1. Provide factory-installed phase loss safety device for 3-phase units.
 2. Configure unit for single-point connection, include terminal for field-installed components.
 3. Include separate holes and knockouts with plastic ferrules for respective electrical and controls wiring.
- O. Unit Controls:
 1. DDC:
 - a. Tested to monitor and handle sequencing functions and other operational modes using field-mounted thermostat and other sensors.
 - b. Coordination and Sequencing:
 - 1) Internal Devices: Include compressors, blower, sensors, switches, valves, safeties, other components.
 - 2) Field-Installed Devices: Solenoid valves, thermostat, EWT sensors, LWT sensors, load-pump contact, source-pump contact, and other devices required for operation.
 - 3) Safeties: At minimum include anti-short-cycle compressor protection, condensate overflow, refrigerant high pressure, refrigerant low pressure, loss-of-charge, refrigerant freeze protection, and freezestat.
 2. Thermostat:
 - a. Field mounted and wired, tied into prewired control-interface terminals.
 - b. Thermostat: Single-gang-box-mounted platinum or thermistor.
 - 1) Local Interface to Include:
 - (a) Setpoint adjustment control.
 - (b) Status indicating manual override.
 - (c) Dial, knob, lever, or slider interface.

2.03 HIGH-EFFICIENCY, DUAL-STAGE, HORIZONTAL/VERTICAL, GROUND-COUPLED HEAT PUMP

- A. Manufacturers:
 1. AAON Inc: www.aaon.com.
 2. Carrier Corporation: www.carrier.com/#sle.
 3. ClimateMaster, Inc: www.climatemaster.com.
 4. Daikin Industries, Ltd: www.daikin.com.

- 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Cabinet Air Discharge Configuration: As indicated on drawings.
- C. Compressors: High-efficiency, hermetically sealed, dual-stage scroll type.
- D. Water-to-Refrigerant Heat Exchanger: Coaxial type with factory-supplied water economizer.
- E. Refrigerant Load Control: Provide hot-gas bypass and hot-gas reheat coil.
- F. Blower Section: Provide static or flow-controlled, variable-speed, belt-driven fan motor.
- G. Filter Section: Include MERV 13 rated air filter.
- H. Electrical: 208-230 Volt, single or three phase, 60 Hz with field-installed disconnect switch.
- I. Accessories: Provide flexible-pipe connectors and return-air hinged acoustical door.
- J. Unit Controls: Factory-supplied DDC with blind-face thermostat.
 - 1. BAS, SCADA, or other Integrated Automation Link: BACnet IP in accordance with ASHRAE Std 135.
 - 2. Control Valve: Return-installed, modulating, pressure-independent ball type; manufacturer provided.

2.04 WATERSIDE ACCESSORIES

- A. Ground-Source-Loop Circulating Pumps:
 - 1. Hose Kits: Automatic flow control valve with pressure/temperature ports, lever handle, stainless steel braided hoses and isolation ball valve. Hose lengths as required.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that available power supply complies with equipment specifications.

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. Operate units in "stand alone" mode temporarily without BAS connection.
- B. Install equipment in accordance with manufacturer's written installation instructions.
- C. Unit Mounting:
 - 1. Above Finished Floor: Include hangers and supports; see Section 23 0529.
 - 2. Do not obstruct maintenance access to equipment by any type of piping, electrical conduit, or other utility.
- D. Ductwork:
 - 1. Provide as indicated on drawings; see Sections 23 3100 and 23 3300.
- E. Ground-Water Source:
 - 1. Connections to Existing Systems: Obtain approval before interrupting service; notify Architect/Engineer in writing at least 10 business days prior to start pending connections.

2. Connect waterside piping to buried piping source loop; see Section 23 2113 and 23 2114 for related piping and hydronic specialties.
 3. Fit-in and install externally interconnected equipment, devices, and components such as pumps and heat exchanger as applicable to specific selections.
 4. Flush and clean piping before placing in operation; take precautions to prevent introduction of debris into piping systems.
- F. Electrical: Provide equipment raceway, wiring, and cables; see Section 26 0583.
- G. Controls: Provide and install Cat 5e control wiring from unit sensor/room controllers to each unit and from each unit controller to Owner's control cabinets in IT Closet 012, coiling 10 ft of cable for final connection by others.
- H. Start system and adjust controls and equipment so as to give satisfactory operation.
- I. Adjust water temperature control system and place in operation so that water quantities circulated are as required.

3.04 FIELD QUALITY CONTROL

- A. Upon completion and before final acceptance of work, test each system to demonstrate compliance with the contract requirements.
1. Adjust controls and balance systems prior to final acceptance of completed systems.
 2. Test controls through every cycle of operation.
 3. Test safety controls to demonstrate performance of required function.
 4. Furnish water, electricity, instruments, connecting devices, and personnel for tests.
 5. Clean equipment, piping, strainers, ducts, and filters.
 6. Coordinate testing with testing of related piping, specified elsewhere.
 7. Correct defects in work and repeat tests.
- B. Coordinate BAS, BMS, or Integrated Automation linking between unit controllers and remote front-end interface; see Section 25 1500.
- C. Operational Testing: After demonstration of satisfactory operation perform operational testing:
1. Notify Architect/Engineer in writing at least 15 calendar days prior to the testing.
 2. Test each item of equipment in operation for continuous period of not less than 24 hours under every condition of operation in accordance with equipment manufacturer's recommendations.
 3. Verify that each item of equipment operating parameters are within limits recommended by the manufacturer.
 4. Manufacturer's Recommended Test: Conduct the manufacturer's recommended field testing; furnish a factory trained field representative authorized by and to represent the equipment manufacturer during the complete execution of the field testing.
- D. Additional requirements for testing, adjusting, and balancing (TAB) of piping, equipment, and controls are specified in Section 23 0593.

- E. Within 30 calendar days after acceptable completion of testing, submit each test report for review and approval; include:
 - 1. Unit nameplate data, and actual voltage and ampere consumption.
 - 2. Load-side supply and return water flow and temperatures, and measurement equipment.
 - 3. Source-side supply and return water flow and temperatures, and measurement equipment.
 - 4. Ambient air temperature at heat pump unit.
 - 5. Date and name and signature of person testing and reporting.

3.05 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

SECTION 26 0500
BASIC ELECTRICAL REQUIREMENTS

GENERAL

1.01 SECTION INCLUDES

- A. Basic Electrical Requirements specifically applicable to Division 26 Sections, in addition to Division I - General Requirements.

1.02 SCOPE OF WORK

- A. This Specification and the accompanying drawings govern the work involved in furnishing, installing, testing and placing into satisfactory operation the Electrical Systems as shown on the drawings and specified herein.
- B. Each Contractor shall provide all new materials as indicated in the schedules on the drawings, and/or in these specifications, and all items required to make his portion of the Electrical System a finished and working system.

1.03 WORK SEQUENCE

- A. All construction work that will produce excessive noise levels and interference with normal building operations, as determined by the Owner, shall be scheduled with the Owner. It may be necessary to schedule such work during non-occupied hours. The Owner shall reserve the right to set policy as to when restricted construction hours will be required.

1.04 DIVISION OF WORK BETWEEN MECHANICAL, ELECTRICAL & CONTROL CONTRACTORS

- A. Definitions:
 - 1. "Mechanical Contractors" as referred to herein refers to the Contractors listed in the 210000,220000,230000 and 250000 series of this Specification.
 - a. Plumbing Contractor.
 - b. HVAC Contractor.
 - c. Temperature Control Contractor.
 - 2. Motor Power Wiring. The single phase or 3 phase wiring extending from the power source (transformer, panelboard, feeder circuits, etc.) through disconnect switches and motor controllers to, and including the connections to the terminals of the motor.
 - 3. Motor Control Circuit Wiring. The wiring associated with the remote operation of the magnetic coil of a magnetic motor starter or relay, or the wiring which permits the direct cycling of the motor by means of a device in series with the motor power wiring. In the latter case the devices are usually single phase, have "Manual -Off -Auto" provisions, and are usually (but not always) connected into the motor power wiring through a manual motor starter.
 - 4. Control devices such as start-stop push buttons, thermostats, pressure switches, flow switches, other relays, etc., generally represent the type of equipment associated with motor control circuit wiring.

5. Motor control circuit wiring is single phase and usually will be 120 volts. In some instances, the voltage will be the same as the motor power wiring. Generally, where the motor power wiring exceeds 120 volts, a control transformer is provided to give a control voltage of 120 volts.
6. Temperature Control Wiring: The wiring associated with the operation of a motorized damper, solenoid valve or motorized valve, etc., either modulating or two (2) position, as opposed to wiring which directly powers or controls a motor used to drive equipment such as fans, pumps, etc.
7. This wiring will be from a 120 volt source and may continue as 120 volt if applicable or be reduced in voltage (24 volt) in which case a control transformer shall be furnished as part of the temperature and comfort control wiring.
8. Control Motor: Where the term "Control Motor" is used without other clarification, it means an electrical device used to operate dampers, valves, etc. It may be of such a design to produce two position or modulating operation of the operated device. Conventional characteristics of such a motor are 24 volts, 60 cycles, 1 phase, although other voltages at times may be encountered.

B. General:

1. The purpose of these Specifications is to outline the Electrical and Mechanical Contractor's work responsibilities as related to control wiring, starters, disconnects and other electrical work required for items such as temperature controls, mechanical equipment, fans, chillers, compressors, etc. The exact wiring requirements for much of the equipment cannot be determined until the systems have been purchased and submittals approved. Therefore, only known wiring, as related to such items, is shown on the electrical drawings as being by the Electrical Contractor. Other wiring not shown on the electrical drawings but required for the mechanical equipment and systems shall be the responsibility of the Mechanical Contractor.
2. Where the drawings require the Electrical Contractor to wire between various pieces of equipment furnished by the Mechanical Contractor, such wiring shall be terminated at terminals provided in the equipment. It is the Mechanical Contractor's responsibility to provide complete wiring diagrams and supervision to the Electrical Contractor and to designate the terminal numbers for the correct wiring of the equipment.

C. Mechanical Contractor's Responsibility:

1. Assumes all responsibility for the internal wiring of all equipment provided by the Mechanical Contractor, for example:
 - a. Burners
 - b. Gas Trains
 - c. Package Air Handling Units
 - d. Condensing Units

- e. Water Chillers
- 2. Assumes all responsibility for miscellaneous items provided by the Mechanical Contractor that require wiring but are not shown on the electrical drawings or specified in the Electrical Specification. If items such as relays, flow switches, or interlocks are required to make the mechanical system function correctly or are required by the manufacturer, they are the responsibility of the Mechanical Contractor. Assumes all responsibility for the Temperature Control wiring, if the Temperature Control Contractor is a Subcontractor to the Mechanical Contractor.
- D. Temperature Control Contractor's or Subcontractor's Responsibility:
 - 1. Assumes all responsibility for the complete wiring of any devices necessary to make the Temperature Control System functional.
 - 2. Assumes the responsibility for verifying any control wiring shown on the electrical drawings as being by the Electrical Contractor. If any wiring is required for the Control System, but not shown or scheduled on the electrical drawings, it shall be the responsibility of the Temperature Control Subcontractor.
 - 3. Assumes the responsibility of coordinating equipment locations (such as PE's, EP's, relays, transformer and etc.) with the Electrical Contractor where the wiring of the equipment is shown to be by the Electrical Contractor.
- E. Electrical Contractor's Responsibility:
 - 1. Furnishes and installs all combination starters as shown on the Materials List of the Electrical Drawings or as indicated to be by the Electrical Contractor on the Mechanical Equipment Schedule of the Mechanical Drawings.
 - 2. Furnishes and installs all manual starters and disconnect devices as shown on the Materials List of the Electrical Drawings or as indicated to be by the Electrical Contractor on the Mechanical Equipment Schedule of the Mechanical Drawings.
 - 3. Installs and wires to all remote control devices furnished by the Mechanical Contractor or Temperature Control Subcontractor when such items are noted on the Electrical Drawings.
 - 4. Provides motor control wiring where so noted on the drawings.
 - 5. Provides temperature control wiring where so noted on the drawings.
 - 6. Electrical Contractor shall furnish, install and connect all relays, etc., for automatic shutdown of certain mechanical equipment (i.e. supply fans, exhaust fans, etc.) upon actuation of the Fire Alarm System.

1.05 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Only products of reputable manufacturers as determined by the Engineer will be acceptable.

2. Each Contractor and his subcontractors shall employ only workmen who are skilled in their respective trades. At all times, the number of apprentices at the job site shall be less than or equal to the number of journeymen at the job site.
- B. Compliance with Codes, Laws, Ordinances:
1. This Contractor shall conform to all requirements of local and State of Iowa, Laws, Ordinances and other regulations having jurisdiction over this installation.
 2. In the event there are no local codes having jurisdiction over this job, the current issue of the National Electrical Code shall be followed.
 3. If there is a discrepancy between the codes and regulations having Jurisdiction over this installation, and these specifications, the codes and regulations shall determine the method or equipment used.
 4. If the Contractor notes, at the time of bidding, any parts of the drawings and specifications which are not in accord with the applicable codes or regulations, he shall inform the Architect/Engineer in writing, requesting a clarification. If there is insufficient time to follow this procedure, he shall submit with his proposal a separate price required to make the system shown on the drawings comply with the codes and regulations.
 5. All changes to the system made after the letting of the contract, in order to comply with the applicable codes or the requirements of the Inspector, shall be made by the Contractor without cost to the Owner.
- C. Permits, Fees, Taxes, Inspections:
1. Procure all applicable permits and licenses.
 2. Abide by all applicable laws, regulations, ordinances, and other rules of the State or Political Subdivision wherein the work is done, or as required by any duly constituted public authority.
 3. Pay all applicable charges for such permits or licenses that may be required.
 4. Pay all applicable fees and taxes imposed by the State, Municipal and/or other regulatory bodies.
 5. Pay all charges arising out of required inspections due to codes, permits, licenses or as otherwise may be required by an authorized body.
 6. Pay any charges by the telephone company related to the service or change in service to the project.
 7. All fixtures, equipment and materials shall be as approved or listed by the following:
(Unless approval or listing is not applicable to an item by all acceptable manufacturers.)
 8. Underwriters' Laboratories, Inc.
- D. Utility Company Requirements:
1. Secure from Utility Company all applicable guidelines that must be followed to make the job comply with their requirements.
 2. Make the installation comply with the Utility Company requirements.

3. Make application for and pay for new electrical service equipment and installation.
 4. Make application for and pay for meters and metering equipment as required by the Utility Company.
 5. Make application and pay for any changes and/or removal of existing electrical service by the Utility Company.
 6. It shall be the Contractor's responsibility to verify compliance of meter used with the Utility Company's standards.
- E. Examination of Drawings:
1. The drawings for the electrical work are completely diagrammatic, intended to convey the scope of the work and to indicate the general arrangements and locations of equipment, outlets, etc. , and the approximate sizes of equipment.
 2. Contractor shall determine the exact locations of equipment and rough-ins, and the exact routing of electrical raceways so as to best fit the layout of the job.
 3. Scaling of the drawings will not be sufficient or accurate for determining these locations.
 4. Where job conditions require reasonable changes in indicated arrangements and locations, such changes shall be made by the Contractor at no additional cost to the Owner.
 5. Because of the scale of the drawings, certain basic items, such as junction boxes, pull boxes, conduit fittings, etc., may not be shown, but where such items are required by other sections of the specifications or where they are required for proper installation of the work, such items shall be furnished and installed.
 6. If an item is either shown on the drawings or called for in the specifications, it shall be considered sufficient for including same in this contract.
 7. The determination of quantities of material and equipment required shall be made by the Contractor from the drawings. Schedules on the drawings and in the specifications are completed as an aid to the Contractor but where discrepancies arise, the greater number shall govern.
 8. Where words "provide", "install", or "furnish" are used on the drawings or in the specifications, it shall be taken to mean, to furnish, install and connect up complete and ready for operation, the items mentioned.
- F. Field Measurements:
1. Before ordering any conduit, conductors, wireways, bus duct, fittings, etc., This Contractor shall verify all pertinent dimensions at the job site and be responsible for their accuracy.

1.06 SUBMITTALS

- A. In addition to the provisions of Division 1, the following is required:
1. Submittals shall include all fabrication, erection layout, and setting drawings; manufacturers' standard drawings; schedules; descriptive literature, catalogs and brochures; performance and test data; wiring and control diagrams; and all other drawings

and descriptive data of materials of construction as may be required to show that the materials, equipment or systems and the location thereof conform to the requirements of the contract documents.

2. The Contractor shall submit seven (7) copies of each shop drawing for review by the Architect/Engineer BEFORE releasing any equipment for manufacture or shipment.
3. The Contractor shall thoroughly review and approve all shop drawings before submitting them to the Architect/Engineer. APPROVAL WILL INDICATE THE CONTRACTOR'S REVIEW of all material and a COMPLETE UNDERSTANDING OF EXACTLY WHAT IS TO BE FURNISHED. Contractor shall clearly mark all deviations from the contract documents on all submittals. IF DEVIATIONS ARE NOT MARKED BY THE CONTRACTOR, THEN THE ITEM SHALL BE REQUIRED TO MEET ALL DRAWING AND SPECIFICATION REQUIREMENTS.
4. The Contractor shall clearly mark each item with the same nomenclature applied on the drawings or in the specifications.
5. The Contractor shall clearly indicate the size, finish, material, etc.
6. All submittals shall be assembled in sets such as light fixtures, power distribution, fire alarm, generators, wiring devices, etc. All sets shall be identical.
7. Each set shall be bound in a manufacturer's folder or inside of a manila file folder.
8. Each set shall contain an index of the items enclosed with a general topic description on the cover.
9. Where more than one model is shown on a manufacturer's sheet, the Contractor shall clearly indicate exactly which item and which data is relevant to the work.
10. Failure to comply with the above shall be reason to resubmit all shop drawing submittals.
11. The Engineer's responsibility shall be to review one set of shop drawing submittals for each product. If the first submittal is incomplete or does not comply with the drawings and/or specifications, the Contractor shall be responsible to bear the cost for the Engineer to recheck and handle the additional shop drawing submittals.
12. Submittals shall be required for the following items, unless additional items are required elsewhere in this specification or on the drawings:
 - a. All light fixtures including emergency and exit.
 - b. All panelboards, switchboards, switchgear, fuses, breakers, disconnect switches, motor control centers, manual motor starters, motor starters, ground bars, termination bushings, transformers, pushbuttons and other switches (when part of motor control), pilot lights, and miscellaneous motor control and distribution equipment.
 - c. All cables, wires, conduit, junction boxes, miscellaneous clamps, miscellaneous supports, connectors, raceway, cable tray, splicing kits, lugs, and other miscellaneous items if specified or shown in the contract documents.

- d. All receptacles, toggle switches, coverplates, dimmers, relays, photocells and other lighting control (when not part of a light fixture) , timers, telephone jacks, computer jacks, television jacks and miscellaneous switches and outlets.
 - e. All lightning protection components.
 - f. All intercommunication and miscellaneous systems components: Nurse Call.
 - g. Other items as dictated elsewhere in the contract documents.
- B. PRODUCT DELIVERY, STORAGE, HANDLING & MAINTENANCE
- 1. Exercise care in transporting and handling to prevent damage to fixtures, equipment and materials.
 - 2. Store materials on the site so as to prevent damage.
 - 3. Keep fixtures, equipment and materials clean, dry and free from deleterious conditions.

1.07 WARRANTY

- A. Provide one (1) year warranty for all fixtures, equipment, materials and workmanship.
- B. The warranty period for the entire installation described in this Division of the specifications shall commence on the date of final written acceptance unless a whole or partial system or any separate piece of equipment or component is put into use for the benefit of any party other than the installing contractor with prior written authorization. In this instance, the warranty period shall commence on the date when such whole system, partial system or separate piece of equipment or component is placed in operation and accepted in writing by the Owner or his representative.
- C. Warranty requirements shall extend to correction, without cost to the final user, of all Work and/or equipment found to be defective or nonconforming to the contract documents.
- D. THE CONTRACTOR SHALL BEAR THE COST OF CORRECTING ALL DAMAGE RESULTING FROM SUCH DEFECTS OR NONCONFORMANCE WITH CONTRACT DOCUMENTS EXCLUSIVE OF REPAIRS REQUIRED AS A RESULT OF IMPROPER MAINTENANCE OR OPERATION, OR OF NORMAL WEAR AS DETERMINED BY THE ARCHITECT/ENGINEER.
- E. INCANDESCENT LAMPS USED DURING CONSTRUCTION SHALL BE REPLACED WITH NEW LAMPS AT THE TIME THE WARRANTY PERIOD STARTS. REPLACEMENT OF INCANDESCENT AND OTHER LAMP BURNOUTS AFTER THE WARRANTY PERIOD STARTS SHALL BE THE RESPONSIBILITY OF THE FINAL USER.

1.08 INSURANCE

- A. This Contractor shall maintain insurance coverage as set forth in Division 1 of these specifications.

1.09 MATERIAL SUBSTITUTIONS

- A. Where several manufacturer's names are given, the first named manufacturer constitutes the basis for job design and establishes the equipment quality required to be used in this contract.

- B. Any material, article or equipment of other unnamed manufacturers which will adequately perform the services and duties imposed by the design and is of a quality equal to or better than the material, article or equipment identified by the drawings and specifications may be used if approval is secured in writing from the Architect/Engineer not later than ten (10) days prior to the bid opening date. The Contractor bears full responsibility for the unnamed manufacturers equipment adequately meeting the intent of design. The Architect/ Engineer may reject manufacturer at time of shop drawing submittal.
- C. This Contractor may list voluntary add or deduct prices for alternate materials on the bid form. These items will not be used in determining the low bidder. Should a voluntary alternate material be accepted, This Contractor shall assume all costs that may be incurred as a result of using the offered material, article or equipment necessitating extra expense on his part or on the part of other Contractors whose work is affected.
- D. All material substitutions requested later than ten (10) days prior to bid opening will not be considered.

1.10 MANUFACTURERS AND MODEL NUMBERS

- A. Where drawing schedules call out specific manufacturer's model numbers, the numbers are listed solely for the convenience of the contractor.
- B. Where specific manufacturer's model numbers are called out, the Contractor and Material Supplier are responsible for verifying the correct model number. Where scheduled capacities, options, or accessories conflict with model numbers specified, the greater capacity, options, or accessories shall be bid upon and supplied unless addressed by the Engineer prior to Bid date.
- C. Incorrect model numbers shall be brought to the attention of the Engineer when discovered.

1.11 RESOLUTION OF DISCREPANCIES

- A. If discrepancies are found to exist between the project drawings and project specifications, the more restrictive and obligatory document shall prevail as the project requirement.
- B. If discrepancies are found to exist between the requirements of the; Electrical Specifications, the Mechanical Specifications, the Architectural Specifications, and/or the Specification Front End Documents (Bidding Requirements-Agreement, Bonds, and Closeout Documents-Project Forms-Conditions of the Contract), the more restrictive and obligatory document/section(s) shall prevail as the project requirement.

PRODUCTS

2.01 GENERAL

- A. All items of material having a similar function (i.e. safety switches, panelboards, switchboards, contactors, motor starters, dry type transformers), shall be of the same manufacturer. This shall be adhered to unless specifically stated otherwise on drawings or elsewhere in specifications.

EXECUTION

3.01 EXCAVATION, FILL, BACKFILL, COMPACTION

- A. General:

1. The Contractor shall do all necessary excavating, securing, filling, backfilling, compacting, and restoration in connection with his work.

B. Excavation:

1. Excavations for structures, manholes, pits and trenches shall be excavated to accurate, solid, undisturbed foundation beds required for foundations, slabs on grade, etc., and to proper dimensions to permit installation and inspection of forms and other work.
2. Where excavations are carried in error below indicated levels, concrete of same strength as specified for the foundations or thoroughly compacted sand-gravel fill, as determined by the Architect/Engineer shall be placed in such excess excavations under the foundation. Thoroughly compacted, clean, stable soil fill shall be placed in excess excavations under slabs on grade, all at the Contractor's expense.
3. Bottom and sides of excavations shall be trimmed to required grade and lines to receive foundations.
4. Excavations shall be protected against frost action and freezing.
5. Care shall be exercised in excavating so as to not damage surrounding structures, equipment, and buried utilities. In no case shall any major structural footing or foundation be undermined.
6. All trenching shall be performed in a manner to prevent cave-ins and risk to workmen.
7. Where original surface is pavement or concrete, the surface shall be saw cut to provide clean edges and assist in the surface restoration.
8. Excavation shall be performed in all ground characteristics, including rock, if encountered. Each bidder shall visit the premises and determine for himself, by actual observations, borings, or other means, the nature of the soil conditions. The cost of all such inspections, borings, etc. , shall be borne by the bidder.
9. In the case where the trench is excavated in rock, a compacted bed with a depth of 3 inches (minimum) of sand and gravel shall be used to support the conduit unless masonry cradles or encasements are used.
10. Where satisfactory bearing soil is not found at the indicated levels, the Architect/Engineer or their representative shall be notified immediately and no further work shall be done until further instructions are given.
11. Mechanical excavation of the trench to line and grade of the conduit or to the bottom level of masonry cradles or encasements shall be permitted, unless otherwise indicated on the electrical drawings.
12. Mechanical excavation of the trench to line and grade where direct burial cables are to be installed shall be permitted provided the excavation is made to a depth to permit installation of the cable on a fine sand bed having a minimum depth of 3 inches.

C. Dewatering:

1. The Contractor shall be responsible for the furnishing, installation, operation and removal of all dewatering pumps and lines necessary to keep the excavation free of water at all times.
- D. Underground Obstructions:
1. Known underground piping, conduit, feeders, foundations, or other underground obstructions in the vicinity of construction are noted on the drawings. The Contractor is responsible for reviewing all Bid Documents for all trades on the project to determine obstructions indicated. The Contractor shall use great care in making his installation in the vicinity of underground obstruction.
 2. If objects not shown on the drawings are encountered in area of new construction, remove, relocate, or perform extra work as directed by the Architect/Engineer.
- E. Fill and Backfilling:
1. No rubbish or waste material shall be permitted in excavations for trench fill and backfill.
 2. The Contractor shall provide the necessary sand for backfilling.
 3. Dispose of the excess excavated earth as directed.
 4. Soils for backfill shall be suitable for required stability and compaction, clean and free from perishable materials and free from stones greater than 4 inches in diameter. Under no circumstances shall water be permitted to rise in unbackfilled trenches after installation has been placed. No material shall be used for backfilling which contains stones having any dimension greater than 4 inches, frozen earth, debris or earth with an exceptionally high void content.
 5. All trenches and excavations shall be backfilled immediately after installation of conduit, or removal of forms, unless other protection is directed.
 6. Around piers and isolated foundations and structures, backfill and fill shall be placed and consolidated simultaneously on all sides to prevent wedge action and displacement. Fill and backfill materials shall be spread in 6 inch thick uniform horizontal layers with each layer being compacted separately to required density.
 7. All conduit shall be laid on a compacted bed of sand at least 3 inches deep. Backfilling around the conduit with sand, spread in 6 inch layers and compact each layer.
 8. Use sand for backfill up to grade for all conduit located under building slabs or paved areas. All other conduit shall have sand backfill to 6 inches above the top of the conduit.
 9. The backfilling above the sand shall be placed in uniform layers not exceeding 6 inches in depth. Each layer shall be placed, then carefully and uniformly tamped, so as to eliminate the possibility of lateral or vertical displacement.
 10. Where the fill and backfilling will ultimately be under a building, floor or paving, each layer of fill shall be compacted to 95% of the maximum density as determined by AASHTO Designation T-99 or ASTM Designation D-698. Moisture content of soil at time of compaction shall not exceed plus or minus 2% of optimum moisture content as

determined by AASHTO T-99 or ASTM D-698 test.

11. After backfilling of trenches, no superficial loads shall be placed on the exposed surface of the backfill until a period of 48 hours has elapsed.

F. Surface Restoration:

1. Where trenches are cut through graded, planted or landscaped areas, the areas shall be restored to the original condition at completion of the work. All planting and landscaping features removed or damaged during the course of the work shall be replaced to its original condition. A minimum of 6 inches of topsoil shall be applied where disturbed areas are to be seeded or sodded. All lawn areas shall be sodded unless seeding is called out on the drawings or in the specifications.
2. Concrete or asphalt type pavement, seal coat, rock, gravel or earth surfaces removed or damaged during the course of the work shall be replaced with comparable materials and restored to original condition. Broken edges shall be saw cut and repaired as directed by Architect/Engineer.

3.02 FIELD QUALITY CONTROL

A. General:

1. The Contractor shall conduct all tests required and applicable to the work both during and after construction of the work.
2. The necessary instruments, meters, etc., required to conduct or make the tests shall be supplied by the Contractor who shall also supply a competent technician for making the tests who has been schooled in the proper testing techniques.
3. All cables and wires shall be tested for shorts and grounds following installation and connection to devices. Shorted or grounded wires and cables shall be removed and replaced.
4. Each circuit installed by Contractor over 100 feet in length shall have the most distant outlet or load tested for voltage drop under full load conditions. Full load for outlet(s) shall be determined by multiplying the upstream overcurrent device by 80 percent and applying the calculated load to the most distant location of the circuit. Full load for equipment shall be equipment operating at full output. The Contractor shall increase wire size of circuit until voltage drop is below 3% of rated voltage. The Contractor shall provide a load bank to perform tests.
5. Any wiring device, electrical apparatus or lighting fixture furnished under this contract, if grounded or shorted on any integral "live" part, shall be removed and the trouble rectified by replacing all defective parts or materials as directed.
6. Cable insulation shall be tested for proper insulation values. Such tests shall include the cable, all splices, and all terminations. Each conductor shall be tested and shall test free from short circuits and grounds and have an insulation value not less than the National Electrical Code Standards. Readings shall be taken between conductors and between

conductors and ground.

7. A record of readings taken shall be supplied to the Architect/Engineer in a neat and understandable form and in triplicate. The record shall include: circuit designation, ampere loading, voltage at circuit overcurrent device, and voltage at circuits extremity under full load as calculated in previous paragraph.
 8. In the event the results obtained in the tests are not satisfactory, This Contractor shall make such adjustments, replacements and changes as are necessary and shall then repeat the test or tests which disclose faulty or defective work or equipment, and shall make such additional tests as the Architect/ Engineer or code enforcing agency deems necessary.
- B. Low Voltage Cable (600 volts and below):
1. Test shall be made by means of an insulation testing device such as a "Megger" using not less than 500 volts D.C. test potential.
- C. Ground Resistance:
1. Service ground resistance tests shall be conducted using an approved manufactured ground resistance measuring meter. The Contractor shall submit to the Architect /Engineer for approval a test procedure he proposes to use including type of equipment to be used. (Note that the conventional ohmmeter is not an acceptable device.)
 2. Ground resistance measurements shall be made during normal dry weather and not less than 48 hours after a rain. Ground resistance values shall be verified by the Architect /Engineer at the time the readings are taken.
- D. Other Equipment:
1. other equipment furnished and installed by the Contractor shall be given all standard tests normally made to assure that the equipment is electrically sound, all connections properly made, phase rotation correct, fuses and thermal elements suitable for protection against overloads, etc., voltage complies with equipment nameplate rating and full load amperes are within equipment rating.
 2. In the event the results obtained in the tests are not satisfactory, the Contractor shall make such adjustments, replacements and changes as are necessary and shall then repeat the test or tests which disclose faulty or defective work or equipment, and shall make such additional tests as the Architect/Engineer or code enforcing agency deems necessary.

3.03 PROJECT CLOSEOUT

- A. Refer to the Division 1 Section: PROJECT CLOSEOUT for requirements. The following paragraphs supplement the requirements of Division 1.
- B. Before final payment will be authorized, This Contractor must have completed the following:
 1. Submitted operation and maintenance manuals to the Architect/Engineer for review.
 2. Submitted bound copies of approved shop drawings.

3. Submitted a report stating the instructions given to the Owner's representative complete with the number of hours spent in the instruction. The report shall bear the signature of an authorized agent of This Contractor and shall be signed by the Owner's representative as having received the instructions.
4. Submitted inspection and testing report by the fire alarm system manufacturer.
5. Submitted start-up reports on all equipment requiring a factory installation inspection and/or start.

3.04 OPERATION AND MAINTENANCE MANUAL

- A. As part of instructing the Owner, This Contractor shall assemble, organize, and bind operation and maintenance manuals on the electrical systems installed.
- B. Submit three (3) properly indexed and bound copies of the manual to the Architect/Engineer for approval. Make all corrections or additions required.
- C. Operation and Maintenance Manuals shall consist of the following:
 1. Title page with project title, Architect, Engineer, and Contractor, with addresses, telephone numbers, and contacts.
 2. Table of Contents describing index.
 3. Listing of all Subcontractors and major equipment suppliers with addresses, telephone numbers, and contacts.
 4. Index tabs dividing information by specification section, major equipment, or systems.
- D. Operation and Maintenance Data on Equipment or Systems shall include:
 1. Schematic wiring diagrams of the equipment which have been updated for field conditions. Field wiring shall have label numbers to match drawings.
 2. Dimensional drawings of equipment.
 3. Detailed parts list with list of suppliers.
 4. Operating procedures for each system.
 5. Maintenance schedule and procedures. Include maintenance chart that lists routine maintenance requirements and frequency over one year time period.
 6. Repair procedures for major components.
 7. Replacement parts and service material requirements for each system and the frequency of service required.
 8. Instruction books, cards, and manuals furnished with the equipment.

3.05 INSTRUCTING THE OWNER'S REPRESENTATIVE

- A. Adequately instruct the Owner's designated representative or representatives in the maintenance, care, and operation of the complete systems installed under this contract.
- B. Provide verbal and written instructions to the Owner's representative or representatives by FACTORY PERSONNEL in the care, maintenance, and operation of the equipment and systems.

- C. The Owner has the option to video tape the instructions to the Owner. Coordinate schedule of instructions to facilitate this recording.
- D. The Architect/Engineer shall be notified of the time and place for the verbal instructions to be given to the Owner's representative so that either he or his representative can be present if desirable.
- E. Minimum manhours of instruction time for each item and/or system shall be as follows:
 - 1. Distribution System - 1/2 Hour.
 - 2. Lighting Systems - 1 Hour.
 - 3. Balance of Project - 1/2 Hour.
- F. The Contractor is responsible for all instructions to the owner and/or his operating staff on the electrical and specialized systems. If the Contractor does not have Engineers and/or Technicians on staff that can adequately provide the required instructions on system operation, performance, troubleshooting, care and maintenance, he shall include in his bid an adequate amount to hire the Engineer to perform these instructions.

3.06 SYSTEM COMMISSIONING

- A. The electrical systems included in the construction documents are to be complete and operating systems. The Architect /Engineer will make periodic job site observations during the construction period. The system start-up, testing, balancing, and satisfactory system performance is the responsibility of the Contractor. This shall include all calibration and adjustments of electrical equipment controls, balancing of loads, trouble shooting and verification of software, and final adjustments that may be required.
- B. All operating conditions and control sequences shall be simulated and tested during the start-up period. Testing shall also include all interlocks, safety shut-downs, system operations, and alarms.
- C. The Contractor, subcontractors, and equipment suppliers are expected to have skilled technicians to insure that the system performs as designed. If the Architect /Engineer is requested to visit the job site for the purpose of trouble shooting, assisting in the satisfactory start-up, obtaining satisfactory equipment operation, resolving installation and/or workmanship problems, equipment substitution issues or unsatisfactory system performance, including call backs during the warranty period through no fault of the design; the Contractor shall reimburse the Architect/Engineer on a time and material basis for services rendered at the Architect /Engineer's standard hourly rates in effect at the time the services are requested. The Contractor shall be responsible for making payment to the Architect /Engineer for services required that are product, installation or workmanship related. Payment is due within 30 days after services are rendered.

3.07 RECORD DOCUMENTS

- A. Refer to the Division 1 Section: PROJECT CLOSEOUT for requirements. The following paragraphs supplement the requirements of Division 1.

- B. Mark specifications to indicate approved substitutions; Change Orders, actual equipment and materials used.
- C. This Electrical Contractor shall maintain at the job site a separate and complete set of electrical drawings upon which he shall clearly and permanently mark and note in complete detail any changes made to the location and arrangement of the electrical apparatus or made in the electrical system and wiring as a result of building construction conditions or as a result of instructions from the Architect or Engineer.
- D. Such record of changes shall be made daily by This Contractor and the marked drawings shall be available for the Architect and Engineer's examination at any normal work time.
- E. Upon completion of the job, and before final payment is made, This Contractor shall provide as built drawings prepared in AutoCAD release 2002 or higher to the Architect/Engineer.

3.08 PAINTING

- A. This Contractor shall paint any equipment which is marred or damaged prior to the Owner's acceptance and occupancy. Paint and color shall match original equipment paint and shall be obtained from the equipment supplier when available. All equipment shall have a finished coat of paint applied unless specifically allowed to be provided with a prime coat only.
- B. Equipment located in finished areas and which will be painted to match the room decor will be painted by others. Should This Contractor install equipment in a finished area after the area has been painted by others, he shall be responsible for having the equipment and all of its supports, hangers, etc., painted to match the room decor at the Contractor's expense. Painting shall be performed as described in project specifications.
- C. Equipment cabinets, casings, covers, metal jackets, etc., located in equipment rooms or concealed spaces, shall be furnished in standard finish free from scratches, abrasions, chippings, etc.
- D. Equipment located in occupied spaces, or if standard to the unit, shall have a baked primer with baked enamel finish coat free from scratches, abrasions, chipping, etc. if color option is specified or color option given as standard to the unit, This Contractor shall, before ordering, verify with the Architect /Engineer his color preference and shall furnish this color.
- E. This Contractor shall paint equipment located in unfinished areas such as boiler room, mechanical spaces, storage room, etc., furnished by him. If certain equipment is furnished with a factory coat of paint and enamel, it need not be painted, providing the factory applied finish is in no way marred or spattered and meets color requirements specified. If damaged, the item or piece of equipment shall be refinished with the same paint or enamel that was factory applied.
- F. All electrical conduit and equipment, fittings, hangers, structural supports, etc., in unfinished areas, such as equipment and storage room area, shall be painted two (2) coats of oil paint of colors selected by the Architect/Engineer.
- G. Electric conduits shall NOT be painted in crawl spaces, tunnels, or spaces above suspended ceilings except that where conduit is in a damp location exposed threads at joints shall be given

two coats of sealer after joint is made up.

- H. After surfaces have been thoroughly cleaned and are free of oil, dirt or other foreign matter, the raceway or equipment shall be painted with the following paint materials:
- I. Bare Metal Surfaces -- Apply one coat of metal primer suitable for use on metal being painted. Finish with two coats of Alkyd base enamel paint.
- J. Plastic Surfaces -- Paint plastic surfaces with two coats of semi-gloss acrylic latex paint.
- K. Color of paint shall be as specified by Room Finish Schedule found on the architectural drawings, or as directed by the Architect.

3.09 ADJUST AND CLEAN

- A. Contractor shall thoroughly clean all equipment and systems prior to the Owner's final acceptance of the project.
- B. Contractor shall clean all foreign paint, grease, oil, dirt, labels, stickers, and other foreign material from equipment and fixtures.
- C. Contractor shall remove all rubbish, debris, etc., accumulated during the Contractor's operations from the premises.

END OF SECTION

SECTION 26 0519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single conductor building wire.
- B. Wire and cable for 600 volts and less.
- C. Wiring connectors.
- D. Electrical tape.
- E. Wire pulling lubricant.
- F. Cable ties.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 28 4600 - Fire Detection and Alarm: Fire alarm system conductors and cables.

1.03 REFERENCE STANDARDS

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013 (Reapproved 2018).
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011 (Reapproved 2017).
- C. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2020).
- D. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2017.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- F. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2021.
- G. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems; 2021.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.
- J. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.
- K. UL 267 - Outline of Investigation for Wire-Pulling Compounds; Most Recent Edition, Including All Revisions.
- L. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.
- M. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.

- N. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.
- O. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
 - 3. Notify Architect/Engineer of any conflicts with or deviations from Contract Documents.
Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 260500 - Basic Electrical Requirements, for submittal procedures.
- B. Product Data: Provide for each cable assembly type.
- C. Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors. Include proposed modifications to raceways, boxes, wiring gutters, enclosures, etc. to accommodate substituted conductors.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect/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. Concealed Dry Interior Locations: Use only building wire in raceway.
- D. Exposed Dry Interior Locations: Use only building wire in raceway.
- E. Above Accessible Ceilings: Use only building wire in raceway.
- F. Wet or Damp Interior Locations: Use only building wire in raceway.

- G. Exterior Locations: Use only building wire in raceway.
- H. Underground Installations: Use only building wire with Type THWN-2 insulation in raceway.
- I. Use solid conductor for feeders and branch circuits 10 AWG and smaller.
- J. Use stranded conductors for control circuits.
- K. Use conductor not smaller than 12 AWG for power and lighting circuits.
- L. Use conductor not smaller than 16 AWG for control circuits.
- M. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.
- N. Use 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet.

2.02 CONDUCTOR AND CABLE MANUFACTURERS

- A. Cerro Wire LLC: www.cerrowire.com.
- B. Industrial Wire & Cable, Inc: www.iewc.com.
- C. Southwire Company: www.southwire.com.
- D. Substitutions: See Section 01 6000 - Product Requirements.

2.03 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. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- D. Comply with NEMA WC 70.
- E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- G. Conductors for Grounding and Bonding: Also comply with Section 26 0526.
- H. 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.
- I. 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.
 - 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. Isolated Ground, All Systems: Green with yellow stripe.
- d. Travelers for 3-Way and 4-Way Switching: Pink.
- e. For control circuits, comply with manufacturer's recommended color code.
- J. Substitutions: See Section 260500 - Basic Electrical Requirements for substitutions.

2.04 SINGLE CONDUCTOR BUILDING WIRE

- A. Description: Single conductor insulated wire.
- B. Conductor Stranding:
 - 1. Feeders and Branch Circuits:
 - a. Size 12 AWG and Smaller: Solid.
 - b. Size 10 AWG and Larger: Stranded.
- C. Insulation Voltage Rating: 600 V.
- D. Insulation:
 - 1. Copper Building Wire: Type THHN/THWN, except as indicated below.
- E. Conductor: Copper.
- F. Insulation Voltage Rating: 600 volts.
- G. Insulation: NFPA 70 , Type THHN/THWN.

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 0526.
- 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 compression connectors.
- D. Wiring Connectors for Terminations:
 - 1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
 - 2. 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.
- 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.
 - 1. Manufacturers:

- a. 3M: www.3m.com/#sle.
 - b. Ideal Industries, Inc: www.idealindustries.com/#sle.
 - c. NSI Industries LLC: www.nsiindustries.com/#sle.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- H. Compression Connectors: Provide circumferential type or hex type crimp configuration.
 - 1. Manufacturers:
 - a. IlSCO: www.ilsco.com/#sle.
 - b. Thomas & Betts Corporation: www.tnb.com/#sle.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

2.06 ACCESSORIES

- A. Electrical Tape:
 - 1. Manufacturers:
 - a. 3M: www.3m.com/#sle.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
 - 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.
- B. Wire Pulling Lubricant:
 - 1. Listed and labeled as complying with UL 267.
 - 2. Suitable for use with conductors/cables and associated insulation/jackets to be installed.
 - 3. Suitable for use at installation temperature.
- C. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that work likely to damage wire and cable has been completed.
- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- D. Verify that raceway installation is complete and supported.
- E. Verify that field measurements are as indicated.
- F. 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 wiring for emergency systems in accordance with NFPA 70.
 6. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three 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. 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.
- E. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- F. 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.
- G. Install conductors with a minimum of 12 inches of slack at each outlet.
- H. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- I. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- J. 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.
- K. 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.
- L. Insulate ends of spare conductors using vinyl insulating electrical tape.
- M. Identify conductors and cables in accordance with Section 26 0553.
- N. Color Code Legend: Provide identification label identifying color code for ungrounded conductors 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.
- O. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- P. 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.
- Q. Install wire and cable securely, in a neat and workmanlike manner, as specified in NECA 1.
- R. Route wire and cable as required to meet project conditions.
1. Wire and cable routing indicated is approximate unless dimensioned.
 2. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.
 3. Include wire and cable of lengths required to install connected devices within 10 ft of location shown.
- S. Use wiring methods indicated.
- T. Pull all conductors into raceway at same time.
- U. Use suitable wire pulling lubricant for building wire 4 AWG and larger.
- V. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- W. Clean conductor surfaces before installing lugs and connectors.
- X. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- Y. Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.
- Z. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.

AA. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

BB. Identify and color code wire and cable under provisions of Section 26 0553. Identify each conductor with its circuit number or other designation indicated.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Perform field inspection and testing in accordance with Section 01 4000.

C. Inspect and test in accordance with NETA ATS, except Section 4.

D. 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.

E. Correct deficiencies and replace damaged or defective conductors and cables.

F. Perform inspections and tests listed in NETA STD ATS, Section 7.3.2.

END OF SECTION

SECTION 26 0526

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.
- D. Ground bars.
- E. Ground rod electrodes.
- F. Grounding and bonding components.
- G. Provide all components necessary to complete the grounding system(s) consisting of:
 - 1. Metal underground water pipe.
 - 2. Metal frame of the building.
 - 3. Concrete-encased electrode.
 - 4. Rod electrodes.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
- B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System; 2012.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- C. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2017.
- D. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems; 2021.
- E. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2007.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Verify exact locations of underground metal water service pipe entrances to building.
 - 2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.

3. Notify Architect/Engineer of any conflicts with or deviations from Contract Documents.
Obtain direction before proceeding with work.
- B. Sequencing:
 1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.05 PERFORMANCE REQUIREMENTS

- A. Grounding System Resistance: 5 ohms.

1.06 SUBMITTALS

- A. See Section 260500 - Basic Electrical Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.
- C. Project Record Documents: Record actual locations of components and grounding electrodes.

1.07 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience .
- C. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

- A. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- B. 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.
- C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- D. Grounding System Resistance:
 1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect/Engineer. Precipitation within the previous 48 hours does not constitute normally dry conditions.
 2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
 3. Between Grounding Electrode System and Major Electrical Equipment Frames, System Neutral, and Derived Neutral Points: Not greater than 0.5 ohms, when tested using "point-to-point" methods.
- E. Grounding Electrode System:

1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
 - a. Provide continuous grounding electrode conductors without splice or joint.
 - b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
 2. Metal Underground Water Pipe(s):
 - a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet at an accessible location not more than 5 feet from the point of entrance to the building.
 - b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
 - c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
 3. Metal In-Ground Support Structure:
 - a. Provide connection to metal in-ground support structure that is in direct contact with earth in accordance with NFPA 70.
 4. Concrete-Encased Electrode:
 - a. Provide connection to concrete-encased electrode consisting of not less than 20 feet of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
 5. Ground Rod Electrode(s):
 - a. Provide two electrodes unless otherwise indicated or required.
 - b. Space electrodes not less than 10 feet from each other and any other ground electrode.
 - c. Where location is not indicated, locate electrode(s) at least 5 feet outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
 6. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
- F. 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.
- G. Isolated Ground System:
1. Where isolated ground receptacles or other isolated ground connections are indicated, provide separate isolated/insulated equipment grounding conductors.
 2. Connect isolated/insulated equipment grounding conductors only to separate isolated/insulated equipment ground busses.
 3. Connect the isolated/insulated equipment grounding conductors to the solidly bonded equipment ground bus only at the service disconnect or separately derived system disconnect. Do not make any other connections between isolated ground system and normal equipment ground system on the load side of this connection.
- H. Communications Systems Grounding and Bonding:
1. Provide intersystem bonding termination at service equipment or metering equipment enclosure and at disconnecting means for any additional buildings or structures in accordance with NFPA 70.
 2. Provide bonding jumper in raceway from intersystem bonding termination to each communications room or backboard and provide ground bar for termination.
 - a. Bonding Jumper Size: 6 AWG, unless otherwise indicated or required.
 - b. Raceway Size: 3/4 inch trade size unless otherwise indicated or required.
 - c. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.

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 0526:
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).
- 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.
 3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
- D. Ground Bars:
1. Description: Copper rectangular ground bars with mounting brackets and insulators.
 2. Size: As indicated.
 3. Holes for Connections: As indicated or as required for connections to be made.
- E. Ground Rod Electrodes:
1. Comply with NEMA GR 1.
 2. Material: Copper-bonded (copper-clad) steel.
 3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.

2.03 MANUFACTURERS

- A. Cooper Power Systems: www.cooperpower.com.
- B. Framatome Connectors International: www.fciconnect.com.
- C. Lightning Master Corporation: www.lightningmaster.com.
- D. Substitutions: See Section 260500 - Basic Electrical Requirements, for submittals.

2.04 ELECTRODES

- A. Rod Electrodes: Copper.
1. Diameter: 3/4 inch.
 2. Length: 10 feet.

2.05 CONNECTORS AND ACCESSORIES

- A. Mechanical Connectors: Bronze.
- B. Exothermic Connections:
- C. Wire: Stranded copper.
- D. Grounding Electrode Conductor: Size to meet NFPA 70 requirements.

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.
- D. Verify existing conditions prior to beginning work.

- E. Verify that final backfill and compaction has been completed before driving rod electrodes.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70.
- D. 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.
- E. Identify grounding and bonding system components in accordance with Section 26 0553.
- F. Install ground electrodes at locations indicated. Install additional rod electrodes as required to achieve specified resistance to ground.
- G. Provide grounding electrode conductor and connect to reinforcing steel in foundation footing . Bond steel together.
- H. Provide bonding to meet requirements per Quality Assurance.
- I. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Perform inspection in accordance with Section 01 4000.
- C. Inspect and test in accordance with NETA ATS except Section 4.
- D. Perform inspections and tests listed in NETA ATS, Section 7.13.
- E. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.

- F. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

END OF SECTION

This page intentionally left blank

SECTION 26 0529

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.02 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- 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.

1.03 SUBMITTALS

- A. See Section 260500 - Basic Electrical Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's catalog data for fastening systems.

1.04 QUALITY ASSURANCE

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 - 1. Comply with the following. Where requirements differ, comply with most stringent.
 - a. NFPA 70.
 - b. Requirements of authorities having jurisdiction.
 - 2. Provide required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for complete installation of electrical work.
 - 3. Provide products listed, classified, and labeled as suitable for purpose intended, where applicable.
 - 4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
 - 5. Steel Components: Use corrosion-resistant materials suitable for environment where installed.
 - a. 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. 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.
- C. Outlet Box Supports: Hangers and brackets suitable for boxes to be supported.
- D. Metal Channel/Strut Framing Systems:
 - 1. Description: Factory-fabricated, continuous-slot, metal channel/strut and associated fittings, accessories, and hardware required for field assembly of supports.
 - 2. Comply with MFMA-4.
- E. Hanger Rods: Threaded, zinc-plated steel unless otherwise indicated.
- F. Anchors and Fasteners:
 - 1. Unless otherwise indicated and where not otherwise restricted, use anchor and fastener types indicated for specified applications.

2.02 MANUFACTURERS

- A. Thomas & Betts Corporation: www.tnb.com.
- B. Threaded Rod Company: www.threadedrod.com.
- C. Substitutions: See Section 260500 - Basic Electrical Requirements, for substitutions.

2.03 MATERIALS

- A. Hangers, Supports, Anchors, and Fasteners - General: Corrosion-resistant materials of size and type adequate to carry the loads of equipment and conduit, including weight of wire in conduit.
- B. Supports: Fabricated of structural steel or formed steel members; galvanized.
- C. Anchors and Fasteners:
 - 1. Do not use powder-actuated anchors.
 - 2. Concrete Structural Elements: Use precast inserts, expansion anchors, or preset inserts.
 - 3. Steel Structural Elements: Use beam clamps.
 - 4. Concrete Surfaces: Use expansion anchors.
 - 5. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts or hollow wall fasteners.
 - 6. Solid Masonry Walls: Use expansion anchors or preset inserts.
 - 7. Sheet Metal: Use sheet metal screws.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install hangers and supports in accordance with NECA 1.
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- D. Unless specifically indicated or approved by Architect/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. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- H. Secure fasteners in accordance with manufacturer's recommended torque settings.
- I. Remove temporary supports.

END OF SECTION

This page intentionally left blank

SECTION 26 0533.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Galvanized steel rigid metal conduit (RMC).
- B. Stainless steel rigid metal conduit (RMC).
- C. Galvanized steel intermediate metal conduit (IMC).
- D. Stainless steel intermediate metal conduit (IMC).
- E. Flexible metal conduit (FMC).
- F. Liquidtight flexible metal conduit (LFMC).
- G. Galvanized steel electrical metallic tubing (EMT).
- H. Stainless steel electrical metallic tubing (EMT).
- I. Rigid polyvinyl chloride (PVC) conduit.
- J. Reinforced thermosetting resin conduit (RTRC).
- K. Conduit, fittings and conduit bodies.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete encasement of conduits.
- B. Section 07 8400 - Firestopping.
- C. Section 26 0526 - Grounding and Bonding for Electrical Systems.
 - 1. Includes additional requirements for fittings for grounding and bonding.
- D. Section 26 0529 - Hangers and Supports for Electrical Systems.
- E. Section 26 0533.23 - Surface Raceways for Electrical Systems.
- F. Section 26 0553 - Identification for Electrical Systems.
- G. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- H. Section 26 2100 - Low-Voltage Electrical Service Entrance: Additional requirements for electrical service conduits.
- I. Section 26 2701 - Electrical Service Entrance: Additional requirements for electrical service conduits.
- J. Section 27 0533.13 - Conduit for Communications Systems.
- K. Section 31 2316 - Excavation.
- L. Section 31 2323 - Fill: Bedding and backfilling.

1.03 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2020.
- B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S); 2020.
- C. ANSI C80.5 - American National Standard for Electrical Rigid Metal Conduit -- Aluminum (ERMC-A); 2020.
- D. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit; 2018.

- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- F. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2020.
- G. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); 2017.
- H. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
- I. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2020.
- J. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2021.
- K. NEMA TC 14 (SERIES) - Reinforced Thermosetting Resin Conduit and Fittings Series; 2015.
- L. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- M. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.
- N. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
- O. UL 6A - Electrical Rigid Metal Conduit-Aluminum, Red Brass, and Stainless Steel; Current Edition, Including All Revisions.
- P. UL 360 - Liquid-Tight Flexible Metal Conduit; Current Edition, Including All Revisions.
- Q. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
- R. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.
- S. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.
- T. UL 797A - Electrical Metallic Tubing - Aluminum and Stainless Steel; Current Edition, Including All Revisions.
- U. UL 1242 - Electrical Intermediate Metal Conduit-Steel; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate minimum sizes of conduits with actual type and quantity of conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate arrangement of conduits with structural members, ductwork, piping, equipment, and other potential conflicts.
 - 3. Verify exact conduit termination locations required for boxes, enclosures, and equipment.
 - 4. Coordinate work to provide roof penetrations that preserve integrity of roofing system and do not void roof warranty.
 - 5. Notify Architect/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.

1.05 SUBMITTALS

- A. See Section 260500 - Basic Electrical Requirements for submittals procedures.
- B. Product Data: Provide for metallic conduit, flexible metal conduit, liquidtight flexible metal conduit, metallic tubing, nonmetallic conduit, fittings, and conduit bodies.

1.06 QUALITY ASSURANCE

- A. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and shown.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.
- B. Accept conduit on site. Inspect for damage.
- C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- D. Protect PVC conduit from sunlight.

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), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit (RMC), galvanized steel electrical metallic tubing (EMT), stainless steel electrical metallic tubing (EMT), rigid PVC conduit, or reinforced thermosetting resin conduit (RTRC).
 - 2. Exterior, Direct-Buried: Use galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit, galvanized steel electrical metallic tubing (EMT), stainless steel electrical metallic tubing (EMT), rigid PVC conduit, or reinforced thermosetting resin conduit (RTRC).
 - 3. Exterior, Embedded Within Concrete: Use galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit (RMC), galvanized steel electrical metallic tubing (EMT), stainless steel electrical metallic tubing (EMT), rigid PVC conduit, or reinforced thermosetting resin

conduit (RTRC).

4. Where rigid polyvinyl chloride (PVC) conduit is provided, transition to galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), or schedule 80 rigid PVC conduit where emerging from underground.

2.02 CONDUIT - GENERAL REQUIREMENTS

- A. Comply with NFPA 70.
- B. Electrical Service Conduits: See Section 26 2100 for additional requirements.
- C. Fittings for Grounding and Bonding: See Section 26 0526 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. 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. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- B. Fittings:
 1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6.
 2. Material: Use steel or malleable iron.
 3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.04 STAINLESS STEEL RIGID METAL CONDUIT (RMC)

- A. Description: NFPA 70, Type RMC stainless steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6A.
- B. Fittings:
 1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6A.
 2. Material: Use stainless steel with corrosion resistance equivalent to conduit.
 3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.05 GALVANIZED STEEL INTERMEDIATE METAL CONDUIT (IMC)

- A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- B. Fittings:
 1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 1242.
 2. Material: Use steel or malleable iron.

3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.
- C. Conduit Size: Comply with NFPA 70.
 1. Minimum Size: 1/2 inch unless otherwise specified.
 2. Minimum Size: 1 inch for telecommunications conduits.
- D. Underground Installations:
 1. More than 5 Feet from Foundation Wall: Use rigid steel conduit or thickwall non-metallic conduit.
 2. Within 5 Feet from Foundation Wall: Use rigid steel conduit or thickwall nonmetallic conduit.
 3. In or Under Slab on Grade: Use rigid steel conduit or thickwall non-metallic conduit.
 4. Minimum Size: 3/4 inch.
- E. Outdoor Locations Above Grade: Use rigid steel conduit.
- F. Wet and Damp Locations: Use rigid steel conduit.
- G. Dry Locations:
 1. Concealed: Use electrical metallic tubing.
 2. Exposed: Use electrical metallic tubing.

2.06 STAINLESS STEEL INTERMEDIATE METAL CONDUIT (IMC)

- A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- B. Fittings:
 1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 1242.

2.07 MANUFACTURERS

- A. Essex Group, Inc: www.essexgroup.com.
- B. Hubbell Power Systems: www.hubbellpowersystems.com.
- C. HellermannTyton: www.hellermanntyton.com.
- D. Substitutions: See Section 260500 - Basic Electrical Requirements, for submittals.

2.08 METAL CONDUIT

- A. Rigid Steel Conduit: ANSI C80.1.
- B. Intermediate Metal Conduit (IMC): Rigid steel.
- C. Fittings and Conduit Bodies: NEMA FB 1; material to match conduit.

2.09 FLEXIBLE METAL CONDUIT (FMC)

- A. 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.
- B. Fittings:
 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.

- 2. Material: Use steel or malleable iron.
- C. Description: Interlocked steel construction.
- D. Fittings: NEMA FB 1.
- E. Maximum Length: 72 inches.

2.10 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.
- C. Description: Interlocked steel construction with PVC jacket.
- D. Fittings: NEMA FB 1.
- E. Maximum Length: 72 inches.

2.11 GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT)

- A. Description: NFPA 70, Type EMT galvanized steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.
 - 3. Connectors and Couplings: Use compression/gland or set-screw type.
 - a. Do not use indenter type connectors and couplings.
- C. Description: ANSI C80.3; galvanized tubing.
- D. Fittings and Conduit Bodies: NEMA FB 1; steel compression type.

2.12 STAINLESS STEEL ELECTRICAL METALLIC TUBING (EMT)

- A. Description: NFPA 70, Type EMT stainless steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797A.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Connectors and Couplings: Use compression/gland or set-screw type.

2.13 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

- A. 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.
- B. 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.
- C. Description: NEMA TC 2; Schedule 40 PVC.
- D. Fittings and Conduit Bodies: NEMA TC 3.

2.14 REINFORCED THERMOSETTING RESIN CONDUIT (RTRC)

- A. Description: NFPA 70, Type RTRC reinforced thermosetting resin conduit complying with NEMA TC 14 (SERIES).
- B. Supports: As recommended by manufacturer.
- C. Fittings: Same type and manufacturer as conduit to be connected.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.
- D. Verify routing and termination locations of conduit prior to rough-in.
- E. Conduit routing is shown on drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

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 intermediate metal conduit (IMC) in accordance with NECA 101.
- 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. 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.
 5. Conduits installed underground or embedded in concrete 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.

6. Arrange conduit to maintain adequate headroom, clearances, and access.
 7. Arrange conduit to provide no more than equivalent of four 90-degree bends between pull points.
 8. Route conduits above water and drain piping where possible.
 9. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
- 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 0529.
 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
 3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
- 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. Provide insulating bushings, insulated throats, or listed metal fittings with smooth, rounded edges at conduit terminations to protect conductors.
 7. 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. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
 6. 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.

7. Install firestopping to preserve fire resistance rating of partitions and other elements; see Section 07 8400.
- J. Underground Installation:
 1. Provide trenching and backfilling in accordance with Sections 31 2316 and 31 2323.
 2. Minimum Cover, Unless Otherwise Indicated or Required:
 - a. Underground, Exterior: 18 inches.
 3. Provide underground warning tape along entire conduit length for service entrance where not concrete-encased; see Section 26 0553.
- 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 calculated in accordance with NFPA 70 for reinforced thermosetting resin conduit (RTRC) conduit installed above ground to compensate for thermal expansion and contraction.
 4. Where conduits are subject to earth movement by settlement or frost.
- L. Conduit Sealing:
 1. Use foam conduit sealant to prevent entry of moisture and gases. This includes, but is not limited to:
 - a. Where conduits enter building from outside.
 - b. Where service conduits enter building from underground distribution system.
 - c. Where conduits enter building from underground.
 - d. Where conduits may transport moisture to contact live parts.
 2. Where conduits cross barriers between areas of potential substantial temperature differential, use foam conduit sealant at accessible point near penetration to prevent condensation. This includes, but is not limited to:
 - a. Where conduits pass from outdoors into conditioned interior spaces.
 - b. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
- M. Provide pull string in each empty conduit and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.
- N. Provide grounding and bonding; see Section 26 0526.
- O. Identify conduits; see Section 26 0553.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - 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 conductors.
- B. Install conduit securely, in a neat and workmanlike manner, as specified in NECA 1.
- C. Install steel conduit as specified in NECA 101.
- D. Install nonmetallic conduit in accordance with manufacturer's instructions.
- E. Arrange supports to prevent misalignment during wiring installation.
- F. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- G. Group related conduits; support using conduit rack. Construct rack using steel channel ; provide space on each for 25 percent additional conduits.
- H. Fasten conduit supports to building structure and surfaces under provisions of Section 26 0529.
- I. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.
- J. Do not attach conduit to ceiling support wires.
- K. Arrange conduit to maintain headroom and present neat appearance.
- L. Route exposed conduit parallel and perpendicular to walls.
- M. Route conduit installed above accessible ceilings parallel and perpendicular to walls.
- N. Route conduit in and under slab from point-to-point.
- O. Provide rigid steel elbows where conduit enters and exits the concrete slab.
- P. Maintain adequate clearance between conduit and piping.
- Q. Cut conduit square using saw or pipecutter; de-burr cut ends.
- R. Bring conduit to shoulder of fittings; fasten securely.
- S. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
- T. Use conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations.
- U. Install no more than equivalent of four 90 degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one shot bender to fabricate bends in metal conduit larger than 2 inch size.
- V. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

- W. Provide suitable fittings to accommodate expansion and deflection where conduit crosses control and expansion joints.
- X. Provide suitable pull string in each empty conduit except sleeves and nipples.
- Y. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- Z. Ground and bond conduit under provisions of Section 26 0526.
- AA. Identify conduit under provisions of Section 26 0553.
- BB. Architect shall have final approval on all conduit routing.

3.06 INTERFACE WITH OTHER PRODUCTS

- A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- B. Route conduit through roof openings for piping and ductwork wherever possible. Where separate roofing penetration is required, coordinate location and installation method with roofing installation specified in Section 07 1300.

END OF SECTION

This page intentionally left blank

SECTION 26 0533.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.
- C. Wall and ceiling outlet boxes.
- D. Floor boxes.
- E. Pull and junction boxes.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 2726 - Wiring Devices:
 - 1. Wall plates.
- E. Section 26 2716 - Electrical Cabinets and Enclosures.

1.03 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 FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
- D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013.
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 260500 - Basic Electrical Requirements, for submittal procedures.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

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 suitable concrete type boxes where flush-mounted in concrete.
 4. Use suitable masonry type boxes where flush-mounted in masonry walls.
 5. Use raised covers suitable for the type of wall construction and device configuration where required.
 6. Use shallow boxes where required by the type of wall construction.
 7. Do not use "through-wall" boxes designed for access from both sides of wall.
 8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
 9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
 10. 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.
 11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
 12. Wall Plates: Comply with Section 26 2726.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
1. Junction and Pull Boxes Larger Than 100 cubic inches:
 - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.

2.02 MANUFACTURERS

- A. Appleton Electric: www.appletonelec.com.
- B. Arc-Co./Division of Arcade Technology: www.arc-co.com.
- C. Unity Manufacturing: www.unitymfg.com.
- D. Substitutions: See Section 260500 - Basic Electrical Requirements, for submittals.

2.03 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.

1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch male fixture studs where required.
- B. Cast Boxes: NEMA FB 1, Type FD, aluminum. Provide gasketed cover by box manufacturer. Provide threaded hubs.

2.04 FLOOR BOXES

- A. Service Fittings: As specified in Section 26 2726.

2.05 PULL AND JUNCTION BOXES

- A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.
- B. Hinged Enclosures: As specified in Section 26 2716.
- C. Surface Mounted Cast Metal Box: NEMA 250, Type 4; flat-flanged, surface mounted junction box:
 1. Material: Cast aluminum.
 2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.
- D. Fiberglass Handholes: Die molded glass fiber hand holes:
 1. Cover: Glass fiber weatherproof cover with nonskid finish.

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.
- D. Verify locations of floor boxes and outlets in offices and work areas prior to rough-in.

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. Box Supports:
 1. Secure and support boxes in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
 2. 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.
- E. Install boxes plumb and level.
- F. 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.
- G. Install boxes as required to preserve insulation integrity.
- H. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- I. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- J. Close unused box openings.
- K. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- L. Provide grounding and bonding in accordance with Section 26 0526.
- M. Install boxes securely, in a neat and workmanlike manner, as specified in NECA 1.
- N. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and as required by NFPA 70.
- O. Coordinate installation of outlet boxes for equipment connected under Section 26 2717.
- P. Set wall mounted boxes at elevations to accommodate mounting heights indicated.
- Q. Electrical boxes are shown on Drawings in approximate locations unless dimensioned.
1. Adjust box locations up to 10 feet if required to accommodate intended purpose.
- R. Orient boxes to accommodate wiring devices oriented as specified in Section 26 2726.
- S. Maintain headroom and present neat mechanical appearance.
- T. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- U. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- V. Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- W. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- X. Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan.
- Y. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
- Z. Use flush mounting outlet box in finished areas.
- AA. Provide separate boxes for emergency power and normal power systems.
- BB. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.

- CC. Locate outlet boxes so that wall plates do not span different building finishes.
- DD. Do not install flush mounting box back-to-back in walls; provide minimum 6 inches separation.
 - 1. Provide minimum 24 inches separation in acoustic rated walls.
 - 2. Provide minimum 24 inches separation in fire rated walls.
- EE. Do not install flush mounting box back-to-back in walls; provide minimum 6 inches separation.
Provide minimum 24 inches separation in acoustic rated walls.
- FF. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- GG. Use stamped steel bridges to fasten flush mounting outlet box between studs.
- HH. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- II. Do not fasten boxes to ceiling support wires.
- JJ. Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits both supported within 12 inches of box.
- KK. Use gang box where more than one device is mounted together. Do not use sectional box.
- LL. Use gang box with plaster ring for single device outlets.
- MM. Use cast outlet box in exterior locations exposed to the weather and wet locations.
- NN. Use cast floor boxes for installations in slab on grade; formed steel boxes are acceptable for other installations.
- OO. Set floor boxes level.
- PP. Large Pull Boxes: Use hinged enclosure in interior dry locations, surface-mounted cast metal box in other locations.
- QQ. Identify boxes in accordance with Section 26 0553.

3.03 ADJUSTING

- A. Adjust floor boxes flush with finish flooring material.
- B. Adjust flush-mounting outlets to make front flush with finished wall material.
- C. Install knockout closures in unused box openings.

3.04 CLEANING

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

END OF SECTION

This page intentionally left blank

SECTION 26 0553
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Wire and cable markers.
- D. Underground warning tape.
- E. Warning signs and labels.
- F. Field-painted identification of conduit.

1.02 RELATED REQUIREMENTS

- A. Section 09 9113 - Exterior Painting.
- B. Section 09 9123 - Interior Painting.
- C. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.
- D. Section 26 2726 - Wiring Devices - Lutron: Device and wallplate finishes; factory pre-marked wallplates.
- E. Section 27 1000 - Structured Cabling: Identification for communications cabling and devices.

1.03 REFERENCE STANDARDS

- A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs; 2011 (Reaffirmed 2017).
- B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2011 (Reaffirmed 2017).
- 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.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.
- B. Sequencing:
 - 1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
 - 2. Do not install identification products until final surface finishes and painting are complete.

1.05 SUBMITTALS

- A. See Section 260500 - Basic Electrical Requirements for submittals procedures.
- B. Product Data: Provide catalog data for nameplates, labels, and markers.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

1.07 FIELD CONDITIONS

- A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and shown.

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. Do not 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.
3. Use voltage marker to identify highest voltage present for each piece of electrical equipment.
4. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.
5. 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.
- B. Identification for Conductors and Cables:
 1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 0519.
 2. Identification for Communications Conductors and Cables: Comply with Section 27 1000.
 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.
- C. Identification for Raceways:
- D. Identification for Boxes:
 1. Use voltage markers to identify highest voltage present.
 2. Use voltage markers or color coded boxes to identify systems other than normal power system.
 - a. Color-Coded Boxes: Field-painted in accordance with Section 09 9123 and 09 9113 per the same color code used for raceways.
 - 1) Fire Alarm System: Red.
- E. Identification for Devices:
 1. Identification for Communications Devices: Comply with Section 27 1000.
 2. Wiring Device and Wallplate Finishes: Comply with Section 26 2726.

2.02 MANUFACTURERS

- A. Brady Corporation: www.bradycorp.com.
- B. Seton Identification Products: www.seton.com/aec.
- C. HellermannTyton: www.hellermanntyton.com.
- D. Substitutions: See Section 260500 - Basic Electrical Requirements for substitution requirements.

2.03 IDENTIFICATION NAMEPLATES AND LABELS

- A. Identification Nameplates:
 - 1. Materials:
 - 2. 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. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
 - 2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.
- C. Nameplates: Engraved three-layer laminated plastic, black letters on white background.
- D. Labels: Embossed adhesive tape, with 3/16 inch white letters on black background. Use only for identification of individual wall switches and receptacles, and control device stations.

2.04 WIRE AND CABLE MARKERS

- A. 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.
- B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.
- C. Legend: Power source and circuit number or other designation indicated.
- D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
- E. Minimum Text Height: 1/8 inch.
- F. Color: Black text on white background unless otherwise indicated.
- G. Description: Vinyl cloth type self-adhesive wire markers.
- H. Description: Cloth type wire markers.
- I. Locations: Each conductor at panelboard gutters, pull boxes, outlet boxes, and junction boxes each load connection.

2.05 VOLTAGE MARKERS

- A. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.
- B. 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.
- C. Legend:
 - 1. Markers for Voltage Identification: Highest voltage present.
 - 2. Markers for System Identification:
- D. Color: Black text on orange background unless otherwise indicated.

2.06 UNDERGROUND WARNING TAPE

- A. Materials: Use foil-backed detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
- B. Foil-backed Detectable Type Tape: 3 inches wide, with minimum thickness of 5 mil, unless otherwise required for proper detection.
- C. Legend: Type of service, continuously repeated over full length of tape.
- D. Color:

2.07 WARNING SIGNS AND LABELS

- A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- B. Warning Signs:
 - 1. Materials:
 - 2. Minimum Size: 7 by 10 inches unless otherwise indicated.
- C. Warning Labels:
 - 1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
 - 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.
- D. Description: 4 inch wide polyethylene tape, detectable type colored red with suitable warning legend describing buried electrical lines.

PART 3 EXECUTION

3.01 PREPARATION

- A. Clean surfaces to receive adhesive products according to manufacturer's instructions.
- B. Degrease and clean surfaces to receive nameplates and labels.

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. Conduits: Legible from the floor.
 - 8. Boxes: Outside face of cover.

- 9. Conductors and Cables: Legible from the point of access.
- 10. 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. Mark all handwritten text, where permitted, to be neat and legible.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - 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 nameplates and labels parallel to equipment lines.
- D. Secure nameplates to equipment front using screws or adhesive.
- E. Secure nameplates to inside surface of door on panelboard that is recessed in finished locations.
- F. Identify conduit using field painting under provisions of Section 09 9000.
- G. Identify panel and circuit number serving each device with an adhesive label located on wall plate.
- H. Identify circuits contained in junction box on the cover.
- I. Paint junction box covers containing fire alarm system.
 - 1. Colors:
 - a. Fire Alarm System: Red.
- J. Identify underground conduits using underground warning tape. Install one tape per trench at 3 inches below finished grade.

END OF SECTION

SECTION 26 0583
WIRING CONNECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical connections to equipment.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables.
- B. Section 26 0533.13 - Conduit for Electrical Systems.
- C. Section 26 0533.16 - Boxes for Electrical Systems.
- D. Section 26 2726 - Wiring Devices.
- E. Section 26 2816.16 - Enclosed Switches.

1.03 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.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
 - 2. Determine connection locations and requirements.
- B. Sequencing:
 - 1. Install rough-in of electrical connections before installation of equipment is required.
 - 2. Make electrical connections before required start-up of equipment.

1.05 SUBMITTALS

- A. See Section 260500 - Basic Electrical Requirements, for submittal procedures.
- B. Product Data: Provide wiring device manufacturer's catalog information showing dimensions, configurations, and construction.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.07 COORDINATION

- A. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
- B. Determine connection locations and requirements.
- C. Sequence rough-in of electrical connections to coordinate with installation of equipment.
- D. Sequence electrical connections to coordinate with start-up of equipment.

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. Wiring Devices: As specified in Section 26 2726.
- C. Flexible Conduit: As specified in Section 26 0533.13.
- D. Wire and Cable: As specified in Section 26 0519.
- E. Boxes: As specified in Section 26 0533.16.

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 0923
LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Occupancy sensors.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables.
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- C. Section 26 0529 - Hangers and Supports for Electrical Systems
- D. Section 26 0533.16 - Boxes for Electrical Systems.
- E. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- F. Section 26 0918 - Remote Control Switching Devices: Remotely controlled devices for lighting control, including networked lighting controls, programmable relay panels, and remote control switching relays.
- G. Section 26 2716 - Electrical Cabinets and Enclosures.
- H. Section 26 2726 - Wiring Devices: Devices for manual control of lighting, including wall switches, wall dimmers, and fan speed controllers.
- I. Section 26 5100 - Interior Lighting.
- J. Section 26 5600 - Exterior Lighting.

1.03 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 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate placement of lighting control devices with millwork, furniture, equipment and other potential conflicts.
 - 2. Coordinate placement of wall switch occupancy sensors with installed door swings.
 - 3. Coordinate placement of occupancy sensors with millwork, furniture, equipment and other potential obstructions to motion detection coverage.
 - 4. Coordinate placement of photo sensors for daylighting controls with windows, skylights, and luminaires to achieve optimum operation. Coordinate placement with ductwork, piping, equipment, or other potential obstructions to light level measurement.
 - 5. Coordinate lighting control device product selections with luminaire characteristics; see Section 26 5100 and lighting fixture schedule.

6. Notify Architect/Engineer of 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.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include ratings, operating modes or sequence of functions, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
 1. Occupancy Sensors: Include detailed motion detection coverage range diagrams.
- C. Shop Drawings:
 1. Occupancy Sensors: Provide lighting plan indicating location, model number, and orientation of each occupancy sensor and associated system component.
 2. Daylighting Controls: Provide lighting plan indicating location, model number, and orientation of each photo sensor and associated system component.
- D. Field quality control reports.
- E. Operation and Maintenance Data: Include detailed information on device programming and setup.
- F. Project Record Documents: Record actual installed locations and settings for lighting control devices.

1.06 QUALITY ASSURANCE

- A. Comply with NFPA 70.
- B. Maintain at project site one copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Store products in clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

1.08 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for purpose intended.

- B. Unless specifically indicated as excluded, provide components necessary for complete operating system including, but not limited to, conduit, wiring, connectors, hardware, and accessories.

2.02 OCCUPANCY SENSORS

A. Manufacturers:

1. Acuity Brands, Inc: www.acuitybrands.com/#sle.
2. Hubbell Incorporated: www.hubbell.com/#sle.
3. Legrand North America, Inc: www.legrand.us/#sle.
4. Substitutions: See Section 01 6000 - Product Requirements.
5. Source Limitations: Furnish products produced by single manufacturer and obtained from single supplier.

B. General Requirements:

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. Ultrasonic Occupancy Sensors: Designed to detect occupancy by sensing frequency shifts in emitted and reflected inaudible sound waves.
 - b. Passive Infrared/Ultrasonic Dual Technology Occupancy Sensors: Designed to detect occupancy using 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 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. Turn-Off Delay: Field adjustable, with time delay settings up to 30 minutes.
7. Sensitivity: Field adjustable.
8. 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.

C. Wall Switch Occupancy Sensors:

1. General Requirements:

- a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.
 - b. Occupancy sensor to be field selectable as either manual-on/automatic-off or automatic on/off.
 - c. 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 delayed-off time interval.
 - d. Finish: Match finishes specified for wiring devices in Section 26 2726, unless otherwise indicated.
- 2. Passive Infrared/Ultrasonic Dual Technology Wall Switch Occupancy Sensors: Capable of detecting motion within area of 900 square feet.
- D. Ceiling Mounted Occupancy Sensors:
 - 1. General Requirements:
 - a. Description: Low profile occupancy sensors designed for ceiling installation.
 - b. Unless otherwise indicated or required to control load indicated on drawings, provide low voltage units, for use with separate compatible accessory power packs.
 - c. Finish: White unless otherwise indicated.
 - 2. Passive Infrared/Ultrasonic Dual Technology Ceiling Mounted Occupancy Sensors:
 - a. Standard Range Sensors: Capable of detecting motion within area of 450 square feet at mounting height of 9 feet, with field of view of 360 degrees.
- E. 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 associated wiring and accessories as required to control load indicated on drawings.
 - 3. Input Supply Voltage: Dual rated for 120/277 V ac.

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 service voltage and ratings of lighting control devices are appropriate for service voltage and load requirements at 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 as required for installation of lighting control devices; see Section 26 0533.16.
 - 1. Orient outlet boxes for vertical installation of lighting control devices unless otherwise indicated.
 - 2. 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. Maintain separation of remote-control, signaling, and power-limited circuits.
 - 1. See manufacturer instructions and Section 26 0519 for control wiring conductors, wiring methods, and identification requirements.
- D. Install lighting control devices in accordance with manufacturer's instructions.
- E. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- F. Install lighting control devices plumb and level, and held securely in place.
- G. Where required and not furnished with lighting control device, provide wall plate; see Section 26 2726.
- H. Provide required supports; see Section 26 0529.
- I. 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.
- J. Identify lighting control devices; see Section 26 0553.
- K. Occupancy Sensor Locations:
 - 1. Location Adjustments: Within design intent, reasonably minor adjustments to locations may be made in order to optimize coverage and avoid conflicts or problems affecting coverage.
 - 2. Locate ultrasonic and dual technology passive infrared/ultrasonic occupancy sensors 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.

L. Daylighting Control Photo Sensor Locations:

1. Location Adjustments: Do not make adjustments to locations without obtaining approval from Architect/Engineer.
2. Unless otherwise indicated, locate photo sensors for closed loop systems to accurately measure light level controlled at designated task location, while minimizing measured amount of direct light from natural or artificial sources such as windows or pendant luminaires.
3. Unless otherwise indicated, locate photo sensors for open loop systems to accurately measure the level of daylight coming into space, while minimizing measured amount of lighting from artificial sources.

M. Unless otherwise indicated, install power packs for lighting control devices above accessible ceiling or above access panel in inaccessible ceiling near sensor location.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - 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. Test outdoor photo controls to verify proper operation, including time delays where applicable.
- E. Test daylighting controls to verify proper operation, including light level measurements and time delays where applicable. Record test results in written report to be included with submittals.
- F. Correct wiring deficiencies and replace damaged or defective conductors, cables, and 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.
- D. Adjust time switch settings to achieve desired operation schedule as indicated or as directed by Architect/Engineer. Record settings in written report to be included with submittals.
- E. Adjust daylighting controls under optimum lighting conditions after all room finishes, furniture, and window treatments have been installed to achieve desired operation as indicated or as directed by Architect. Record settings in written report to be included with submittals. Readjust controls calibrated prior to installation of final room finishes, furniture, and window treatments that do not function properly as determined by Architect/Engineer.

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. Demonstration: Demonstrate proper operation of lighting control devices to Architect/Engineer, and correct deficiencies or make adjustments as directed.
- B. Training: Train Owner's 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. Location: At project site.

END OF SECTION

This page intentionally left blank

SECTION 26 2726
WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall switches.
- B. Wall dimmers.
- C. Receptacles.
- D. Wall plates and covers.
- E. Floor box service fittings.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 0533.16 - Boxes for Electrical Systems.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 0923 - Lighting Control Devices: Devices for automatic control of lighting, including occupancy sensors, in-wall time switches, and in-wall interval timers.
- E. Section 27 1000 - Structured Cabling: Voice and data jacks.

1.03 REFERENCE STANDARDS

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for; 2014h, with Amendments (2017).
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification); 2014g, with Amendment (2017).
- 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 1449 - Standard for Surge Protective Devices; Current Edition, Including All Revisions.
- M. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:

1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
 2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
 3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
 4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
 5. Notify Architect/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.

1.05 SUBMITTALS

- A. See Section 260500 - Basic Electrical Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
- C. Certificates for Surge Protection Receptacles: Manufacturer's documentation of listing for compliance with UL 1449.
- D. Operation and Maintenance Data:
 1. Wall Dimmers: Include information on operation and setting of presets.
 2. GFCI Receptacles: Include information on status indicators.
 3. Surge Protection Receptacles: Include information on status indicators.

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. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.
- B. Products: Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 WIRING DEVICES - GENERAL REQUIREMENTS

- A. Provide wiring devices suitable for intended use with ratings adequate for load served.

2.02 MANUFACTURERS

- A. Cooper Wiring Devices: www.cooperwiringdevices.com.

2.03 ALL WIRING DEVICES

- A. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- B. Finishes:
 - 1. Wiring Devices Installed in Finished Spaces: Almond with Almond nylon wall plate unless otherwise indicated.
 - 2. Wiring Devices Installed in Unfinished Spaces: Almond with galvanized steel wall plate unless otherwise indicated.
 - 3. Wiring Devices Installed in Wet or Damp Locations: Almond with specified weatherproof cover unless otherwise indicated.
- C. Substitutions: See Section 16010 - Basic Electrical Requirements for substitutions.

2.04 WALL SWITCHES

- A. Manufacturers:
 - 1. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 - 2. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
- 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 20 and 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: Industrial 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.
- D. Wall Switches: Heavy Duty, AC only general-use snap switch, complying with NEMA WD 6 and WD 1.
 - 1. Body and Handle: Almond plastic with toggle handle.
 - 2. Ratings:
 - a. Voltage: 120 - 277 volts, AC.
 - b. Current: 20 amperes.
- E. Switch Types: Single pole, double pole, 3-way, and 4-way.

2.05 RECEPTACLES

- A. Manufacturers:
 - 1. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 - 2. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
- B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498 and 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.
 3. Hospital Grade Receptacles: Listed as complying with UL 498 Supplement SD, with green dot hospital grade mark on device face.
- C. Convenience Receptacles:
1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
- D. GFCI Receptacles:
1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
 - a. Provide test and reset buttons of same color as device.
 2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
- E. Surge Protection Receptacles:
1. Surge Protection Receptacles - General Requirements: Listed and labeled as complying with UL 1449, Type 2 or 3.
 - a. Energy Dissipation: Not less than 240 J per mode.
 - b. Protected Modes: L-N, L-G, N-G.
 - c. UL 1449 Voltage Protection Rating (VPR): Not more than 700 V for L-N, L-G modes and 1200 V for N-G mode.
 - d. Diagnostics:
 - 1) Visual Notification: Provide indicator light to report functional status of surge protection.
- F. Locking Receptacles: Industrial specification grade, configuration as indicated on the drawings.
- G. Receptacles: Hospital Grade Heavy duty, complying with NEMA WD 6 and WD 1.
1. Device Body: Almond plastic.
 2. Device Body: Red plastic for all Critical Circuit receptacles.
 3. Configuration: NEMA WD 6, type as specified and indicated.
- H. Single Convenience Receptacles.
- I. Duplex Convenience Receptacles.
- J. GFCI Receptacles: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.

2.06 WALL PLATES AND COVERS

- A. Manufacturers:
1. Hubbell Incorporated: www.hubbell-wiring.com/#sle.
 2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.

3. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
- 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 Cover Plates: In-Use cover.

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 0533.16 as required for installation of wiring devices provided under this section.
 1. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
 2. 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.
 3. 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.
 4. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.
- C. Install wiring devices in accordance with manufacturer's instructions.

- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. 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. For isolated ground receptacles, connect wiring device grounding terminal only to identified branch circuit isolated equipment grounding conductor. Do not connect grounding terminal to outlet box or normal branch circuit equipment grounding conductor.
- I. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
- J. Where split-wired duplex receptacles are indicated, remove tabs connecting top and bottom receptacles.
- K. Install securely, in a neat and workmanlike manner, as specified in NECA 1.
- L. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- M. Install wall switches with OFF position down.
- N. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.
- O. Do not share neutral conductor on branch circuits utilizing wall dimmers.
- P. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
- Q. 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.
- R. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.
- S. Identify wiring devices in accordance with Section 26 0553.
- T. Install receptacles with grounding pole on top.
- U. Connect wiring device grounding terminal to outlet box with bonding jumper.
- V. Install decorative plates on switch, receptacle, and blank outlets in finished areas.
- W. Connect wiring devices by wrapping conductor around screw terminal.
- X. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

3.04 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate locations of outlet boxes provided under Section 26 0537 to obtain mounting heights specified.
- B. Install wall switch 48 inches above finished floor.
- C. Install convenience receptacle 18 inches above finished floor.
- D. Install convenience receptacle 6 inches above counter.
- E. Install dimmer 48 inches above finished floor.
- F. Install telephone jack 18 inches above finished floor.
- G. Install telephone jack for side-reach wall telephone to position top of telephone at 54 inches above finished floor.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 4000 - 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. Operate each wall switch with circuit energized and verify proper operation.
- E. Verify that each receptacle device is energized.
- F. Test each receptacle to verify operation and proper polarity.
- G. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- H. Inspect each surge protection receptacle to verify surge protection is active.
- I. Correct wiring deficiencies and replace damaged or defective wiring devices.
- J. Verify that each telephone jack is properly connected and circuit is operational.
- K. Install adhesive label identifying panel and circuit feeding each receptacle on wall plate.

3.06 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.
- B. Adjust presets for wall dimmers according to manufacturer's instructions as directed by Architect/Engineer.

3.07 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION

This page intentionally left blank

SECTION 26 2816.16
ENCLOSED SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Enclosed safety switches.
- B. Fusible switches.
- C. Nonfusible switches.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 2813 - Fuses.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.
- C. NEMA FU 1 - Low Voltage Cartridge Fuses; National Electrical Manufacturers Association; 2002 (R2007).
- D. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); 2013.
- E. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems; 2021.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- I. UL 98 - Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.

4. Notify Architect/Engineer of any conflicts with or deviations from Contract Documents.
Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 260500 - Basic Electrical 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.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to enclosed switch internal components, enclosure, and finish.

1.08 FIELD CONDITIONS

- A. Maintain ambient temperature between -22 degrees F and 104 degrees F during and after installation of enclosed switches.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Eaton Corporation: www.eaton.com/#sle.
- B. Schneider Electric; Square D Products: www.schneider-electric.us/#sle.
- C. Siemens: www.siemens.com
- D. Substitutions: See Section 01 6000 - Product Requirements.
- E. Source Limitations: Furnish enclosed switches 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 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:
- G. Provide with switch blade contact position that is visible when the cover is open.
- H. Conductor Terminations: Suitable for use with the conductors to be installed.
- I. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.
- J. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
- K. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.
- L. Heavy Duty Switches:
 - 1. Comply with NEMA KS 1.
 - 2. Conductor Terminations:
 - a. Lug Material: Copper suitable for terminating copper conductors only.
 - 3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.
- M. Substitutions: See Section 16010 - Basic Electrical Requirements for submittals.

2.03 COMPONENTS

- A. Fusible Switch Assemblies: NEMA KS 1, Type HD enclosed load interrupter knife switch.
 - 1. Externally operable handle interlocked to prevent opening front cover with switch in ON position.
 - 2. Handle lockable in OFF position.
 - 3. Fuse clips: Designed to accommodate NEMA FU1, Class R fuses.
- B. Nonfusible Switch Assemblies: NEMA KS 1, Type HD enclosed load interrupter knife switch.
 - 1. Externally operable handle interlocked to prevent opening front cover with switch in ON position.
 - 2. Handle lockable in OFF position.
- C. Enclosures: NEMA KS 1.
 - 1. Interior Dry Locations: Type 1.
 - 2. Exterior Locations: Type 3R.

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 0529.
- 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 0526.
- H. Provide fuses complying with Section 26 2813 for fusible switches as indicated or as required by equipment manufacturer's recommendations.
- I. Identify enclosed switches in accordance with Section 26 0553.
- J. Provide identification nameplate for each enclosed switch in accordance with Section 26 0553.
- K. Provide identification label on inside door of each fused switch indicating NEMA fuse class and size installed in accordance with Section 26 0553.
- L. Provide arc flash warning labels in accordance with NFPA 70.
- M. Install fuses in fusible disconnect switches.
- N. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - 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 5100
INTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior luminaires.
- B. Emergency lighting units.
- C. Exit signs.
- D. Ballasts and drivers.
- E. Fluorescent dimming ballasts and controls.
- F. Lamps.

1.02 RELATED REQUIREMENTS

- A. Section 26 0529 - Hangers and Supports for Electrical Systems.
- B. Section 26 0533.16 - Boxes for Electrical Systems.
- C. Section 26 2726 - Wiring Devices: Manual wall switches and wall dimmers.
- D. Section 26 5600 - Exterior Lighting.

1.03 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. ANSI C82.4 - American National Standard for Lamp Ballasts - Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps; 2017, with Editorial Revision (2022).
- D. NECA/IESNA 500 - Standard for Installing Indoor Lighting Systems; 2006.
- E. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.
- F. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; 2023.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
- J. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- K. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.04 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.

1.05 SUBMITTALS

- A. See Section 260500 - Basic Electrical Requirements, for submittal procedures.
- B. 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.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Conform to requirements of NFPA 70 and NFPA 101.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 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.

1.08 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 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. 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.
- F. 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.
- G. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- H. Recessed Luminaires:
 - 1. Ceiling Compatibility: Comply with NEMA LE 4.
- I. Fluorescent Luminaires:
 - 1. Fluorescent Luminaires Controlled by Occupancy Sensors: Provide programmed start ballasts.
 - 2. Fluorescent Luminaires Controlled by Dual-Level Switching: Provide with two ballasts.
- J. LED Luminaire Components: UL 8750 recognized or listed as applicable.

2.02 LUMINAIRES

- A. Furnish products as indicated in Schedule included on the Drawings.
- B. Substitutions: See Section 01 6000 - Product Requirements.

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 0533.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).
- D. Provide required support and attachment in accordance with Section 26 0529.

- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. 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. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.
- G. Recessed Luminaires:
 - 1. Install trims tight to mounting surface with no visible light leakage.
- H. 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.
- I. Install fixtures securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting).
- J. Wall Mounted Fixtures: Install at height as indicated on the drawings.
- K. Install suspended luminaires and exit signs using pendants supported from swivel hangers. Provide pendant length required to suspend luminaire at indicated height.
- L. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.
- M. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.
- N. Exposed Grid Ceilings: Fasten surface mounted luminaires to ceiling grid members using bolts, screws, rivets, or suitable clips.
- O. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.
- P. Install clips to secure recessed grid-supported luminaires in place.
- Q. Install wall mounted luminaires, emergency lighting units, and exit signs at height as indicated on Drawings.
- R. Install accessories furnished with each luminaire.
- S. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within fixture; use flexible conduit.
- T. Connect luminaires, emergency lighting units, and exit signs to branch circuit outlets provided under Section 26 0537 as indicated.

- U. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
- V. Bond products and metal accessories to branch circuit equipment grounding conductor.
- W. Install specified lamps in each emergency lighting unit, exit sign, and luminaire.
- X. Fluorescent Luminaires Controlled by Dual-Level Switching: Connect such that each switch controls the same corresponding lamps in each luminaire.
- Y. 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.
- Z. Install lamps in each luminaire.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Operate each luminaire after installation and connection to verify proper operation.
- D. Test self-powered exit signs, emergency lighting units, and fluorescent emergency power supply units to verify proper operation upon loss of normal power supply.
- E. 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. Demonstration: Demonstrate proper operation of luminaires to Architect/Engineer, and correct deficiencies or make adjustments as directed.

3.08 PROTECTION

- A. Protect installed luminaires from subsequent construction operations.

3.09 PROTECTION

- A. Relamp luminaires that have failed lamps at Substantial Completion.

END OF SECTION

SECTION 26 5600
EXTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Exterior luminaires.
- B. Ballasts.
- C. Lamps.
- D. Poles and accessories.
- E. Luminaire accessories.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Materials and installation requirements for concrete bases for poles.
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- C. Section 26 0529 - Hangers and Supports for Electrical Systems.
- D. Section 26 0533.16 - Boxes for Electrical Systems.
- E. Section 26 5100 - Interior Lighting.

1.03 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. ANSI C82.4 - American National Standard for Lamp Ballasts - Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps; 2017, with Editorial Revision (2022).
- D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- E. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems; 2000 (Reaffirmed 2006).
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 1598 - Luminaires; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Notify Architect/Engineer of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

- A. See Section 260500 - Basic Electrical Requirements, for submittal procedures.
- B. 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, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with

- all proposed features.
- C. Test Reports: Indicate measured illumination levels.
- D. Project Record Documents: Record actual connections and locations of pole foundations, luminaires, and any pull or junction boxes.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

PART 2 PRODUCTS

2.01 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 listed, classified, and labeled as suitable for the purpose intended.
- D. 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.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. Provide luminaires listed and labeled as suitable for wet locations unless otherwise indicated.

2.02 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.

2.03 ACCESSORIES

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 0533.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires in accordance with NECA/IESNA 501.
- D. Provide required support and attachment in accordance with Section 26 0529.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Recessed Luminaires:
 - 1. Install trims tight to mounting surface with no visible light leakage.
- G. 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.
- H. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- I. Pole-Mounted Luminaires:
 - 1. Foundation-Mounted Poles:
 - a. Provide cast-in-place concrete foundations for poles as indicated, in accordance with Section 03 3000.
 - 1) Install anchor bolts plumb per template furnished by pole manufacturer.
 - 2) Position conduits to enter pole shaft.
 - b. Install foundations plumb.
 - c. Install poles plumb, using leveling nuts or shims as required to adjust to plumb.
 - d. Tighten anchor bolt nuts to manufacturer's recommended torque.
 - 2. Grounding:
 - a. Bond luminaires, metal accessories, metal poles, and foundation reinforcement to branch circuit equipment grounding conductor.

- 3. Install separate service conductors, 12 AWG copper, from each luminaire down to handhole for connection to branch circuit conductors.
- J. Install accessories furnished with each luminaire.
- K. Bond products and metal accessories to branch circuit equipment grounding conductor.
- L. Install lamps in each luminaire.
- M. Bond luminaires and metal accessories to branch circuit equipment grounding conductor.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Operate each luminaire after installation and connection to verify proper operation.
- D. 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 adjust luminaires to provide illumination levels and distribution indicated on Drawings.

3.06 CLEANING

- A. Clean surfaces according to NECA/IESNA 501 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 enclosure.
- D. Clean photometric control surfaces as recommended by manufacturer.
- E. Clean finishes and touch up damage.

3.07 CLOSEOUT ACTIVITIES

- A. Demonstration: Demonstrate proper operation of luminaires to Architect/Engineer, and correct deficiencies or make adjustments as directed.
- B. Just prior to Substantial Completion, replace all lamps that have failed.

3.08 PROTECTION

- A. Protect installed luminaires from subsequent construction operations.

END OF SECTION

SECTION 27 1000
STRUCTURED CABLING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Communications system design requirements.
- B. Copper cable and terminations.
- C. Communications identification.
- D. Cabling and pathways inside building(s).

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.

1.03 SYSTEM DESCRIPTION

1.04 REFERENCE STANDARDS

- A. CEA-310 - Cabinets, Racks, Panels, and Associated Equipment; Consumer Electronics Association; Revision E, 2005.
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. TIA-455-21 - FOTP-21 - Mating Durability of Fiber Optic Interconnecting Devices; 1988a (Reaffirmed 2012).
- D. TIA-568 (SET) - Commercial Building Telecommunications Cabling Standard Set; 2020.
- E. TIA-606 - Administration Standard for Telecommunications Infrastructure; 2021d.
- F. TIA-607 - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises; 2019d.
- G. ANSI/J-STD-607 - Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications; Rev A, 2002.
- H. UL 444 - Communications Cables; Current Edition, Including All Revisions.
- I. UL 1863 - Communications-Circuit Accessories; Current Edition, Including All Revisions.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.
 - 1. Storage and handling requirements and recommendations.
 - 2. Installation methods.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: A company having at least 3 years experience in the installation and testing of the type of system specified, and:
 - 1. Supervisors and installers factory certified by manufacturers of products to be installed.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Keep stored products clean and dry.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 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.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Copper Horizontal Cable: TIA/EIA-568 Category 5e solid conductor unshielded twisted pair (UTP), 24 AWG, 100 ohm; 4 individually twisted pairs; covered with white jacket and complying with all relevant parts of and addenda to latest edition of TIA/EIA-568 and UL 444.
 - 1. Provide NFPA 70 type CMP plenum-rated cable, in all areas.
- 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.

2.02 IDENTIFICATION PRODUCTS

- A. Comply with TIA-606.

2.03 SOURCE QUALITY CONTROL

- A. See Section 01 4000 - 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.

3.02 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.
 3. At Wall Entrance/Conduit: 10 foot service loop
- C. Copper Cabling:
1. For 4-pair cables in conduit, do not exceed 25 pounds pull tension.
 2. Use T568B wiring configuration.
 3. Copper Cabling Not in Conduit: Use only type CMP plenum-rated cable as specified.
- D. Identification:
1. Use wire and cable markers to identify cables at each end.
- E. Field-Installed Labels: Comply with TIA/EIA-606 using encoded identifiers.
1. Cables: Install color coded labels on both ends.
 2. Outlets: Label each jack on its face plate as to its type and function, with a unique numerical identifier assigned by owner.
 3. Patch Panels: Label each jack as to its type and function, with a unique numerical identifier, to match outlet label.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - 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.
- D. Testing - Copper Cabling and Associated Equipment:
1. Category 5e and Above Backbone: Perform near end cross talk (NEXT) and attenuation tests.
 2. To be certifiable by BISI, Engineering standards.

END OF SECTION

This page intentionally left blank

SECTION 28 4600
FIRE DETECTION AND ALARM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Transmitters for communication with supervising station.
- B. Replacement and removal of existing fire alarm system components, wiring, and conduit indicated.
- C. Maintenance of fire alarm system under contract for specified warranty period.

1.02 RELATED REQUIREMENTS

- A. Section 08 7100 - Door Hardware: Electrically operated locks and door holder devices to be monitored and released by fire alarm system.
- B. Section 21 1300 - Fire-Suppression Sprinkler Systems: Supervisory, alarm, and actuating devices installed in sprinkler system.
- C. Section 14 2010 - Passenger Elevators: Elevator systems monitored and controlled by fire alarm system.
- D. Section 23 3300 - Air Duct Accessories: Smoke dampers monitored and controlled by fire alarm system.

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. IEEE C62.41.2 - IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Corrigendum 2012).
- D. IEEE C62.41 - IEEE Recommended Practice on Surge Voltages in Low-Voltage Power Circuits; 1991 (R1995).
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. NFPA 72 - National Fire Alarm and Signaling Code; Most Recent Edition Cited by Referring Code or Reference Standard.
- G. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Drawings must be prepared as DXF-format CAD drawings.
 - 1. Owner will provide floor plan drawings for Contractor's use; verify all dimensions on Owner-provided drawings.
- C. Evidence of designer qualifications.

- D. Design Documents: Submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, riser diagrams, and description of operation:
1. Copy (if any) of list of data required by authority having jurisdiction.
 2. NFPA 72 "Record of Completion", filled out to the extent known at the time.
 3. Clear and concise description of operation, with input/output matrix similar to that shown in NFPA 72 Appendix A-7-5-2.2(9), and complete listing of software required.
 4. System zone boundaries and interfaces to fire safety systems.
 5. Location of all components, circuits, and raceways; mark components with identifiers used in control unit programming.
 6. Circuit layouts; number, size, and type of raceways and conductors; conduit fill calculations; spare capacity calculations; notification appliance circuit voltage drop calculations.
 7. List of all devices on each signaling line circuit, with spare capacity indicated.
 8. Manufacturer's detailed data sheet for each component, including wiring diagrams, installation instructions, and circuit length limitations.
 9. Description of power supplies; if secondary power is by battery include calculations demonstrating adequate battery power.
 10. Certification by either the manufacturer of the control unit or by the manufacturer of each other component that the components are compatible with the control unit.
 11. Certification by the manufacturer of the control unit that the system design complies with Contract Documents.
 12. Certification by Contractor that the system design complies with Contract Documents.
 13. Do not show existing components to be removed.
- E. Evidence of installer qualifications.
- F. Evidence of instructor qualifications; training lesson plan outline.
- G. Evidence of maintenance contractor qualifications, if different from installer.
- H. 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 Form," filled out.
- I. 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 authority having jurisdiction.
 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 to be taken by non-technical administrative personnel in the event of system trouble, when routine testing is being conducted, for fire drills, and when entering into contracts for remodeling.
- J. 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, updated input/output chart, and voice messages by event.
- K. Closeout Documents:
1. Certification by manufacturer that the 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 authority having jurisdiction.
 3. Certificate of Occupancy.
 4. Maintenance contract.

1.05 QUALITY ASSURANCE

- A. Designer Qualifications: NICET Level III or IV (3 or 4) certified fire alarm technician or registered fire protection engineer, employed by fire alarm control panel manufacturer, Contractor, or installer , with experience designing fire alarm systems in the jurisdictional area of the authorities having jurisdiction.
- B. Installer Qualifications: Firm with minimum 3 years documented experience installing fire alarm systems of the specified type and providing contract maintenance service as a regular part of their business.
1. Authorized representative of control unit manufacturer; submit manufacturer's certification that installer is authorized; include name and title of manufacturer's representative making certification.
 2. Installer Personnel: At least 2 years of experience installing fire alarm systems.
 3. Supervisor: NICET level III or IV (3 or 4) certified fire alarm technician; furnish name and address.
 4. Contract maintenance office located within 100 miles of project site.

- 5. Licensed in State of Iowa as fire alarm installer.
- C. Maintenance Contractor Qualifications: Same entity as installer.
- D. Instructor Qualifications: Experienced in technical instruction, understanding fire alarm theory, and able to provide the required training; trained by fire alarm control unit manufacturer.

1.06 WARRANTY

- A. Provide control panel manufacturer's warranty that system components other than wire and conduit are free from defects and will remain so for 5 years after date of Substantial Completion.
- B. Provide installer's warranty that the installation is free from defects and will remain so for 1 year after date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fire Alarm Control Units and Accessories:
 - 1. Honeywell Security & Fire Solutions/Notifier: www.notifier.com/#sle.
 - 2. Siemens Building Technologies, Inc: www.usa.siemens.com/#sle.
 - 3. Simplex, a brand of Johnson Controls: www.simplex-fire.com/#sle.
 - 4. Provide control units made by the same manufacturer.
- B. Initiating Devices and Notification Appliances:
 - 1. Provide initiating devices and notification appliances made by the same manufacturer, where possible.
- C. Substitutions: See Section 01 6000 - Product Requirements.
 - 1. For other acceptable manufacturers of control units specified, submit product data showing equivalent features and compliance with Contract Documents.
 - 2. For substitution of products by manufacturers not listed, submit product data showing features and certification by Contractor that the design will comply with Contract Documents.

2.02 FIRE ALARM SYSTEM

- A. Fire Alarm System: Provide modifications and extensions to the existing automatic fire detection and alarm system:
 - 1. Provide all components necessary, regardless of whether shown in Contract Documents or not.
 - 2. Protected Premises: Entire building shown on drawings.
 - 3. Comply with the following; where requirements conflict, order of precedence of requirements is as listed:
 - a. ADA Standards.
 - b. The requirements of the State Fire Marshal.
 - c. The requirements of the local authority having jurisdiction .
 - d. Applicable local codes.

- e. Contract Documents (drawings and specifications).
 - f. NFPA 101.
 - g. NFPA 72; where the word "should" is used consider that provision mandatory; where conflicts between requirements require deviation from NFPA 72, identify deviations clearly on design documents.
- 4. Evacuation Alarm: Multiple smoke zones; allow for evacuation notification of any individual zone or combination of zones, in addition to general evacuation of entire premises.
 - 5. Fire Command Center: Located in on-premises supervising station.
 - 6. Fire Alarm Control Unit: New, located at fire command center.
 - 7. Combined Systems: Do not combine fire alarm system with other non-fire systems.
- B. Supervising Stations and Fire Department Connections:
- 1. Public Fire Department Notification: By on-premises supervising station.
 - 2. On-Premises Supervising Station: Existing proprietary station operated by Owner, located at Jail Control Center.
 - 3. Means of Transmission to On-Premises Supervising Station: Directly connected noncoded system.
- C. Spare Capacity:
- 1. Initiating Device Circuits: Minimum 25 percent spare capacity.
 - 2. Notification Appliance Circuits: Minimum 25 percent spare capacity.
 - 3. Speaker Amplifiers: Minimum 25 percent spare capacity.
 - 4. Fire Alarm Control Units: Capable of handling all circuits utilized to capacity without requiring additional components other than plug-in control modules.
- D. Power Sources:
- 1. Primary: Dedicated branch circuits of the facility power distribution system.
 - 2. Secondary: Storage batteries.
 - 3. Capacity: Sufficient to operate entire system for period specified by NFPA 72.
 - 4. Each Computer System: Provide uninterruptible power supply (UPS).

2.03 EXISTING COMPONENTS

- A. Existing Fire Alarm System: Remove existing system completely after new system is fully operational and tested.
- B. Clearly label components that are "Not In Service."
- C. Remove unused existing components and materials from site and dispose of properly.

2.04 FIRE SAFETY SYSTEMS INTERFACES

- A. Supervision: Provide supervisory signals in accordance with NFPA 72 for the following:
 - 1. Sprinkler water control valves.
 - 2. Dry-pipe sprinkler system pressure.
 - 3. Dry-pipe sprinkler valve room low temperature.

4. Elevator shut-down control circuits.
- B. Alarm: Provide alarm initiation in accordance with NFPA 72 for the following:
 1. Sprinkler water flow.
 2. Kitchen hood suppression activation; also disconnect fuel source from cooking equipment.
 3. Elevator lobby, elevator hoistway, and elevator machine room smoke detectors.
 4. Duct smoke detectors.
- C. Elevators:
 1. Elevator lobby, hoistway, and machine room smoke detectors: Elevator recall for fire fighters' service.
 2. Elevator Machine Room Heat Detector: Shut down elevator power prior to hoistway sprinkler activation.
 3. Sprinkler pressure or waterflow: Shut down elevator power prior to hoistway sprinkler activation.
- D. HVAC:
 1. Duct Smoke Detectors: Close dampers indicated; shut down air handlers indicated.
- E. Doors:
 1. Smoke Barrier Door Magnetic Holders: Release upon activation of smoke detectors in smoke zone on either side of door, upon alarm from manual pull station on same floor, and upon sprinkler activation on same floor. Refer to Section 08 7100.
 2. Electromagnetic Door Locks on Egress Doors: Unlock upon activation of any alarm initiating device or suppression system in smoke zone that doors serve as egress from. Refer to Section 08 7100.

2.05 COMPONENTS

- A. General:
 1. Provide flush mounted units where installed in finish areas; in unfinished areas, surface mounted unit are acceptable.
 2. Provide legible, permanent labels for each control device, using identification used in operation and maintenance data.
- B. Fire Alarm Control Units: Analog, addressable type; listed, classified, and labeled as suitable for the purpose intended.
- C. Master Control Unit: _____.
- D. Initiating Devices:
 1. Addressable Systems:
 - a. Addressable Devices: Individually identifiable by addressable fire alarm control unit.
 - b. Provide suitable addressable interface modules as indicated or as required for connection to conventional (non-addressable) devices and other components that provide a dry closure output.
- E. Circuit Conductors: Copper or optical fiber; provide 200 feet extra; color code and label.

- F. Surge Protection: In accordance with IEEE C62.41.2 category B combination waveform and NFPA 70; except for optical fiber conductors.
- G. Locks and Keys: Deliver keys to Owner.
 - 1. Provide the same standard lock and key for each key operated switch and lockable panel and cabinet; provide 5 keys of each type
- H. Instruction Charts: Printed instruction chart for operators, showing steps to be taken when a signal is received (normal, alarm, supervisory, and trouble); easily readable from normal operator's station.
 - 1. Frame: Stainless steel or aluminum with polycarbonate or glass cover.
 - 2. Provide one for each control unit where operations are to be performed.
 - 3. Obtain approval of Owner prior to mounting; mount in location acceptable to Owner.
 - 4. Provide extra copy with operation and maintenance data submittal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with applicable codes, NFPA 72, NFPA 70, and Contract Documents.
- B. Conceal all wiring, conduit, boxes, and supports where installed in finished areas.
- C. Obtain Owner's approval of locations of devices, before installation.
- D. Install instruction cards and labels.

3.02 INSPECTION AND TESTING FOR COMPLETION

- A. Notify Owner 7 days prior to beginning completion inspections and tests.
- B. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.
- C. Provide the services of the installer's supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.
- D. Prepare for testing by ensuring that all work is complete and correct; perform preliminary tests as required.
- E. Provide all tools, software, and supplies required to accomplish inspection and testing.
- F. Perform inspection and testing in accordance with NFPA 72 and requirements of local authorities; document each inspection and test.
- G. Correct defective work, adjust for proper 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 any system or equipment malfunctions.
 - 1. Record all system operations and malfunctions.
 - 2. If a 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."

3.03 OWNER PERSONNEL INSTRUCTION

- A. Provide the following instruction to designated Owner personnel:
 1. Hands-On Instruction: On-site, using operational system.
- B. Detailed Operation: Two-hour sessions for engineering staff; assume NICET level I qualifications or equivalent; combination of classroom and hands-on:
 1. Initial Training: 1 session pre-closeout.
- C. Furnish the services of instructors and teaching aids; have copies of operation and maintenance data available during instruction.

3.04 CLOSEOUT

- A. Closeout Demonstration: Demonstrate proper operation of all functions to Owner.
 1. Be prepared to conduct any of the required tests.
 2. Have at least 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 control unit manufacturer present during demonstration.
 4. Demonstration may be combined with inspection and testing required by authority having jurisdiction; notify authority having jurisdiction in time to schedule demonstration.
 5. Repeat demonstration until successful.
- B. Substantial Completion of the project cannot be achieved until inspection and testing is successful and:
 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 the fire alarm system has been given by authorities having jurisdiction.
 5. Occupancy permit has been granted.
 6. Specified pre-closeout instruction is complete.

3.05 MAINTENANCE

- A. See Section 01 7000 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.
- B. Provide to Owner, at no extra cost, a written maintenance contract for entire manufacturer's warranty period, to include the 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 the control of the maintenance contractor.
 3. Record keeping required by NFPA 72 and authorities having jurisdiction.
- D. Provide trouble call-back service upon notification by Owner:
1. Provide on-site response within 2 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 an 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 a complete description of preventive maintenance, systematic examination, adjustment, cleaning, inspection, and testing, with a detailed schedule.
- F. Maintain a log at each fire alarm control unit, listing the date and time of each inspection and call-back visit, the condition of the system, nature of the 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