**This project manual provides for liquid**ated damages in the amount of $500.00 per calendar day for the contractor's delay in completion of the work. See Bid Form, Agreement for Construction, Article 10 of the General Conditions for details.

# PROJECT MANUAL

# Surgical Technology Renovation
# Lake Area Technical College
# Watertown, SD

## CO-OP PROJECT NO. 2411

CO
Arch
OP

# LIQUIDATED DAMAGES

The anticipated construction schedule is as follows:

Commencement of Contract: **On or near October 21, 2024**
Commencement of Construction: **January 6, 2025**
Certificate of Substantial Completion: **June 27, 2025**
Final Completion: **July 7, 2025**

FOR EACH DAY PAST THE SUBSTANTIAL COMPLETION DATE, THE DELINQUENT PRIME CONTRACTOR SHALL PAY TO THE OWNER AS A PENALTY BY REASON OF FAILURE OF THE PRIME CONTRACT TO COMPLETE THE WORK REQUIRED OF HIM/HER WITHIN THE AGREED UPON PROGRESS SCHEDULE, A DAILY SUM BASED UPON THE FOLLOWING SCHEDULE:
General Contractor:

**$500 per calendar day from June 27, 2025 thru SUBSTANTIAL COMPLETION.**

THE PENALTY ASSESSED HEREUNDER NEITHER SHALL BE IN LIEU OF, NOR SHALL AFFECT ANY OTHER REMEDIES AVAILABLE TO THE OWNER AS A RESULT OF THE FAILURE TO COMPLETE THE WORK WITHIN THE AGREED UPON PROGRESS SCHEDULE. TIME IS OF THE ESSENCE IN CONSTRUING THE TERMS OF THE CONTRACT AND A MATERIAL CONSIDERATION THEREOF. THE PARTIES AGREE THAT DAMAGES IN THE EVENT OF CONTRACTORS BREACH WOULD BE DIFFICULT TO CALCULATE, AND THAT THE FOREGOING IS A FAIR AND REASONABLE ESTIMATE OF THE DAMAGES SUFFERED BY THE OWNER IN THE EVENT OF SUCH BREACH.

THE TIME FOR COMPLETION OF ALL ARCHITECT/ENGINEER/OWNER PUNCHLIST ITEMS SHALL NOT BE LATER THAN:

**10 calendar days beyond SUBSTANTIAL COMPLETION.**

FOR EACH DAY PAST THE ABOVE DATE, THE DELIQUENT PRIME CONTRACTOR SHALL PAY TO THE OWNER THE FOLLOWING SUM:

**$250 PER DAY**

THE PENALTY ASSESSED HEREUNDER NEITHER SHALL BE IN LIEU OF, NOR SHALL AFFECT ANY OTHER REMEDIES AVAILABLE TO THE OWNER AS A RESULT OF THE FAILURE TO COMPLETE THE WORK WITHIN THE AGREED UPON PROGRESS SCHEDULE. TIME IS OF THE ESSENCE IN CONSTRUING THE TERMS OF THE CONRACT AND A AMTERIAL CONSIDERATION THEREOF. THE PARTIES AGREE THAT DAMAGES IN THE EVENT OF CONTRACTORS BREACH WOULD BE DIFFICULT TO CALCULATE, AND THAT THE FOREGOING IS FAIR AND REASONABLE ESTIMATE OF THE DAMAGES SUFFERED BY THE OWNER IN THE EVENT OF SUCH BREACH.

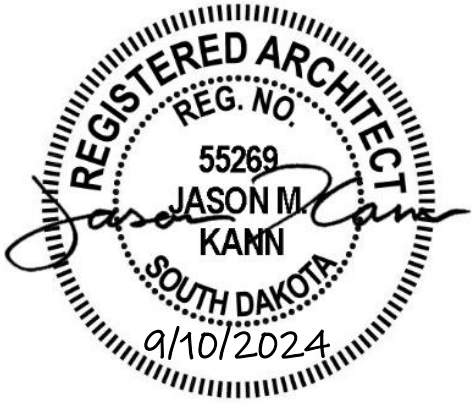
**SURGICAL TECHNOLOGY RENOVATION**
**LAKE AREA TECHNICAL COLLEGE**
**WATERTOWN, SD**

CO-OP Architecture Project No. 2411
September 10, 2024

Project Contacts:

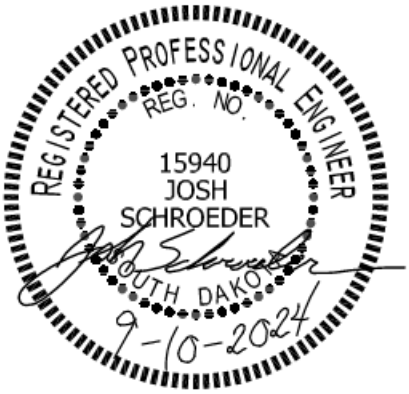
**Owner:** Lake Area Technical College
Contact: Mr. Shane Ortmeier
Director of Support Operations
Watertown, SD 57201
Ph: 605-882-5284 #318

**Architect:** CO-OP Architecture
Mr. Jason Kann, AIA
440 East 8th St. #221
Sioux Falls, SD 57103
Ph: 605-334-9999




**Mechanical Engineer:** Sichmeller Engineering
Mr. Travis Sichmeller, P.E.
801 Railroad Ave. SE
Aberdeen, SD 57401
Ph: 605-225-4344


**Electrical Engineer:** Schroeder Engineering
Mr. Josh Schroeder, P.E.
West Fargo, ND
Ph: 701-951-9177



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**NOTICE TO BIDDERS**

Sealed bids will be received by the School Board of the Watertown School District No. 14-4 of Codington County, South Dakota for the proposed construction related to the **LATC – Surgical Technology Renovation** on the campus of Lake Area Technical College until **2:00 p.m., local time on Thursday, October 3, 2024.** The bid letting will be held at the Lake Area Technical College Student Center Administrative Offices (Room TBD), 1201 Arrow Avenue, Watertown, South Dakota. A pre-bid meeting will be held on site at 2:00 p.m., local time on Thursday, September 19th, 2024.

Copies of the Plans and Specifications will be made available electronically (pdf format). Technical questions shall be directed to Jason Kann, Sioux Falls, South Dakota at 605-334-9999, or jason@co-oparch.com.

Bidding documents may also be examined at the following locations:

Sioux Falls Builders Exchange, Sioux Falls, SD
Plains Builders Exchange, Sioux Falls, SD
Aberdeen Builders Exchange, Aberdeen, SD
Fargo-Moorhead Builders Exchange, Fargo, ND
Minneapolis Builders Exchange, Minneapolis, MN

Bids shall be submitted to the Watertown School District in a sealed envelope with the name and address of the bidder clearly identified on the envelope and the words "Bid for LATC Surgical Technology Renovation". All bidders shall take note of the AIA Document A701 "Instructions to Bidders", and the AIA Document A201 "General Conditions of the Contract for Construction". Faxed bids will not be accepted; nor will faxed bid adjustments be accepted. One combined bid will be accepted for complete construction (all general, structural, mechanical, electrical, material and labor) as required to provide a complete project.

No bidder may withdraw a bid for 30 days following the bid opening without a written request explaining the cause of the withdrawal and without written consent of the Owner after reviewing the cause.

Liquidated damages shall be in effect for this project. See Bid Form, Agreement for Construction, and the General Conditions for details.

Each bid shall be accompanied by a certified check, a cashier's check or draft certified or issued by a state or national bank, in the amount of at least five percent (5%) of the total amount of the bid, payable to Watertown Public Schools; or in lieu thereof, bidder may furnish a bid bond in the amount of not less than ten percent (10%) of the amount of the bid, such bond to be issued by a surety authorized to do business in the State of South Dakota and payable to Watertown Public Schools as a guarantee that such bidder will enter into a contract with the Owner for the work described in the bid and as specified.

The Watertown School Board reserves the right to reject any part of, or all bids, and to waive any informalities or irregularities therein.

By virtue of statuary authority preference will be given to contracts, labor, materials, products, and supplies found or produced with the State of South Dakota in a manner provided by law.

WATERTOWN SCHOOL DISTRICT NO. 14-4
of Codington County, South Dakota

By: Heidi Clausen
Business Manager

Please Publish: Saturday, September 14th, 2024
Saturday, September 21st, 2024

# AIA® Document A201® – 2017

## *General Conditions of the Contract for Construction*

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

LATC Surgical Technology Renovation
Watertown, South Dakota 57201

**THE OWNER:**
*(Name, legal status and address)*

Lake Area Technical College
1201 Arrow Avenue NE
Watertown, South Dakota 57201
Telephone: (605) 882-5284

**THE ARCHITECT:**
*(Name, legal status and address)*

Collaborative Operandi Architecture, LLC
D.B.A. CO-OP Architecture
440 East 8th Street, Suite 221
Sioux Falls, South Dakota 57103
Telephone: (605) 334-9999

**ADDITIONS AND DELETIONS:**
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

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

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

**TABLE OF ARTICLES**

**INDEX**
(Topics and numbers in bold are Section headings.)

## ARTICLE 1 GENERAL PROVISIONS

### § 1.1 Basic Definitions

#### § 1.1.1 The Contract Documents

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

#### § 1.1.2 The Contract

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

#### § 1.1.3 The Work

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

#### § 1.1.4 The Project

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

#### § 1.1.5 The Drawings

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

#### § 1.1.6 The Specifications

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

#### § 1.1.7 Instruments of Service

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

#### § 1.1.8 Initial Decision Maker

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

### § 1.2 Correlation and Intent of the Contract Documents

**§ 1.2.1** The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

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

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

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

### § 1.3 Capitalization

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

### § 1.4 Interpretation

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

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

**§ 1.5.1** The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

**§ 1.5.2** The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

### § 1.6 Notice

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

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

### § 1.7 Digital Data Use and Transmission

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

### § 1.8 Building Information Models Use and Reliance

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

## ARTICLE 2 OWNER

### § 2.1 General

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

**§ 2.1.2** The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

### § 2.2 Evidence of the Owner's Financial Arrangements

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

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

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

**§ 2.2.4** Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

### § 2.3 Information and Services Required of the Owner

**§ 2.3.1** Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

**§ 2.3.2** The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

**§ 2.3.3** If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

**§ 2.3.4** The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

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

**§ 2.3.6** Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

### § 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

### § 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

## ARTICLE 3 CONTRACTOR

### § 3.1 General

**§ 3.1.1** The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

**§ 3.1.2** The Contractor shall perform the Work in accordance with the Contract Documents.

**§ 3.1.3** The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

### § 3.2 Review of Contract Documents and Field Conditions by Contractor

**§ 3.2.1** Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

**§ 3.2.2** Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These

obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

**§ 3.2.3** The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

**§ 3.2.4** If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

### § 3.3 Supervision and Construction Procedures

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

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

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

### § 3.4 Labor and Materials

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

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

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

### § 3.5 Warranty

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

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

### § 3.6 Taxes

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

### § 3.7 Permits, Fees, Notices and Compliance with Laws

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

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

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

### § 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

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

### § 3.8 Allowances

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

**§ 3.8.2** Unless otherwise provided in the Contract Documents,

**.1** allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

**.2** Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and

**.3** whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

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

### § 3.9 Superintendent

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

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

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

### § 3.10 Contractor's Construction and Submittal Schedules

**§ 3.10.1** The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

**§ 3.10.2** The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

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

### § 3.11 Documents and Samples at the Site

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

### § 3.12 Shop Drawings, Product Data and Samples

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

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

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

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

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

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

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

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

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

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

**§ 3.12.10.1** If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional,

whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

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

### § 3.13 Use of Site

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

### § 3.14 Cutting and Patching

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

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

### § 3.15 Cleaning Up

**§ 3.15.1** The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

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

### § 3.16 Access to Work

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

### § 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

### § 3.18 Indemnification

**§ 3.18.1** To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work,

provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

**§ 3.18.2** In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

## ARTICLE 4 ARCHITECT

### § 4.1 General

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

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

### § 4.2 Administration of the Contract

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

**§ 4.2.2** The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

**§ 4.2.3** On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

### § 4.2.4 Communications

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

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

**§ 4.2.6** The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the

Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

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

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

**§ 4.2.9** The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

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

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

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

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

**§ 4.2.14** The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

## ARTICLE 5 SUBCONTRACTORS

### § 5.1 Definitions

**§ 5.1.1** A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

**§ 5.1.2** A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

**§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work**

**§ 5.2.1** Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

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

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

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

**§ 5.3 Subcontractual Relations**

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

**§ 5.4 Contingent Assignment of Subcontracts**

**§ 5.4.1** Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- **.1** assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
- **.2** assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

**§ 5.4.2** Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

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

## ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

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

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

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

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

### § 6.2 Mutual Responsibility

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

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

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

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

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

### § 6.3 Owner's Right to Clean Up

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

## ARTICLE 7 CHANGES IN THE WORK

### § 7.1 General

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

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

**§ 7.1.3** Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

### § 7.2 Change Orders

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

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

### § 7.3 Construction Change Directives

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

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

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

- **.1** Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- **.2** Unit prices stated in the Contract Documents or subsequently agreed upon;
- **.3** Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- **.4** As provided in Section 7.3.4.

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

- **.1** Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- **.2** Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;

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

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

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

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

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

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

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

**§ 7.3.9** Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

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

### § 7.4 Minor Changes in the Work

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

## ARTICLE 8 TIME

### § 8.1 Definitions

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

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

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

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

### § 8.2 Progress and Completion

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

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

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

### § 8.3 Delays and Extensions of Time

**§ 8.3.1** If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

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

**§ 8.3.3** This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

## ARTICLE 9 PAYMENTS AND COMPLETION

### § 9.1 Contract Sum

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

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

### § 9.2 Schedule of Values

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

### § 9.3 Applications for Payment

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

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

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

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

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

### § 9.4 Certificates for Payment

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

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

### § 9.5 Decisions to Withhold Certification

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

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- **.4** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

.5 damage to the Owner or a Separate Contractor;
.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
.7 repeated failure to carry out the Work in accordance with the Contract Documents.

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

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

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

### § 9.6 Progress Payments

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

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

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

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

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

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

**§ 9.6.7** Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

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

### § 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

### § 9.8 Substantial Completion

**§ 9.8.1** Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

**§ 9.8.2** When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

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

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

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

### § 9.9 Partial Occupancy or Use

**§ 9.9.1** The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

**§ 9.9.2** Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

**§ 9.9.3** Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

### § 9.10 Final Completion and Final Payment

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

**§ 9.10.2** Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

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

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

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

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

## ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

### § 10.1 Safety Precautions and Programs

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

### § 10.2 Safety of Persons and Property

**§ 10.2.1** The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- **.1** employees on the Work and other persons who may be affected thereby;

.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

**§ 10.2.2** The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

**§ 10.2.3** The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

**§ 10.2.4** When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

**§ 10.2.5** The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

**§ 10.2.6** The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

**§ 10.2.7** The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

**§ 10.2.8 Injury or Damage to Person or Property**

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

**§ 10.3 Hazardous Materials and Substances**

**§ 10.3.1** The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

**§ 10.3.2** Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities

proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

**§ 10.3.3** To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

**§ 10.3.4** The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

**§ 10.3.5** The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

**§ 10.3.6** If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

### § 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

## ARTICLE 11 INSURANCE AND BONDS

### § 11.1 Contractor's Insurance and Bonds

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

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

**§ 11.1.3** Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

**§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance.** Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the

procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

**§ 11.2 Owner's Insurance**

**§ 11.2.1** The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

**§ 11.2.2 Failure to Purchase Required Property Insurance.** If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

**§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance.** Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

**§ 11.3 Waivers of Subrogation**

**§ 11.3.1** The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

**§ 11.3.2** If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

**§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance**

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

**§11.5 Adjustment and Settlement of Insured Loss**

**§ 11.5.1** A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

**§ 11.5.2** Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

## ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

**§ 12.1 Uncovering of Work**

**§ 12.1.1** If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

**§ 12.1.2** If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

**§ 12.2 Correction of Work**

**§ 12.2.1 Before Substantial Completion**

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

**§ 12.2.2 After Substantial Completion**

**§ 12.2.2.1** In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

**§ 12.2.2.2** The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

**§ 12.2.2.3** The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

**§ 12.2.3** The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

**§ 12.2.4** The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

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

### § 12.3 Acceptance of Nonconforming Work

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

## ARTICLE 13 MISCELLANEOUS PROVISIONS

### § 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

### § 13.2 Successors and Assigns

**§ 13.2.1** The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

**§ 13.2.2** The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

### § 13.3 Rights and Remedies

**§ 13.3.1** Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

**§ 13.3.2** No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

### § 13.4 Tests and Inspections

**§ 13.4.1** Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and

approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

**§ 13.4.2** If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

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

**§ 13.4.4** Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

**§ 13.4.5** If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

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

### § 13.5 Interest

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

## ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

### § 14.1 Termination by the Contractor

**§ 14.1.1** The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- **.1** Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- **.2** An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- **.3** Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- **.4** The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

**§ 14.1.2** The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

**§ 14.1.3** If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

**§ 14.1.4** If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

**§ 14.2 Termination by the Owner for Cause**

**§ 14.2.1** The Owner may terminate the Contract if the Contractor

- **.1** repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- **.2** fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- **.3** repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- **.4** otherwise is guilty of substantial breach of a provision of the Contract Documents.

**§ 14.2.2** When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- **.1** Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- **.2** Accept assignment of subcontracts pursuant to Section 5.4; and
- **.3** Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

**§ 14.2.3** When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

**§ 14.2.4** If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

**§ 14.3 Suspension by the Owner for Convenience**

**§ 14.3.1** The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

**§ 14.3.2** The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- **.1** that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- **.2** that an equitable adjustment is made or denied under another provision of the Contract.

**§ 14.4 Termination by the Owner for Convenience**

**§ 14.4.1** The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

**§ 14.4.2** Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- **.1** cease operations as directed by the Owner in the notice;
- **.2** take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- **.3** except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

**§ 14.4.3** In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

## ARTICLE 15 CLAIMS AND DISPUTES

### § 15.1 Claims

#### § 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

#### § 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

#### § 15.1.3 Notice of Claims

**§ 15.1.3.1** Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

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

#### § 15.1.4 Continuing Contract Performance

**§ 15.1.4.1** Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

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

#### § 15.1.5 Claims for Additional Cost

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

#### § 15.1.6 Claims for Additional Time

**§ 15.1.6.1** If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

**§ 15.1.6.2** If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

**§ 15.1.7 Waiver of Claims for Consequential Damages**

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

**.1** damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

**.2** damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

**§ 15.2 Initial Decision**

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

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

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

**§ 15.2.4** If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

**§ 15.2.5** The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

**§ 15.2.6** Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

**§ 15.2.6.1** Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

**§ 15.2.7** In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

**§ 15.2.8** If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

### § 15.3 Mediation

**§ 15.3.1** Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

**§ 15.3.2** The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

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

**§ 15.3.4** The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

### § 15.4 Arbitration

**§ 15.4.1** If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

**§ 15.4.1.1** A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

**§ 15.4.2** The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

**§ 15.4.3** The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

**§ 15.4.4 Consolidation or Joinder**

**§ 15.4.4.1** Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

**§ 15.4.4.2** Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

**§ 15.4.4.3** The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

# *Additions and Deletions Report for*

## *AIA® Document A201® – 2017*

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 14:44:06 ET on 09/09/2024.

**PAGE 1**

LATC Surgical Technology Renovation
Watertown, South Dakota 57201

...

Lake Area Technical College
1201 Arrow Avenue NE
Watertown, South Dakota 57201
Telephone: (605) 882-5284

...

Collaborative Operandi Architecture, LLC
D.B.A. CO-OP Architecture
440 East 8th Street, Suite 221
Sioux Falls, South Dakota 57103
Telephone: (605) 334-9999

# *Certification of Document's Authenticity*

*AIA® Document D401™ – 2003*

I, Kyle Raph, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 14:44:06 ET on 09/09/2024 under Order No. 4104244145 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A201™ – 2017, General Conditions of the Contract for Construction, other than those additions and deletions shown in the associated Additions and Deletions Report.

_____

*(Signed)*

_____

*(Title)*

_____

*(Dated)*

## Supplements to Instructions to Bidders

AIA Document A-701 "Instructions to Bidders" latest Edition shall pertain to this contract. The following information and supplements shall modify, change, delete or add to this document. Where any part of the Instructions to Bidders is modified or voided by the following articles, the unaltered provisions of that part shall remain in effect.

3.1.1 Copies of the Plans and Specifications will be made available electronically (pdf format). Technical questions shall be directed to CO-OP Architecture, LLC, Sioux Falls, South Dakota at 605-334-9999.

4.1.1.1 Bids will be received for one prime contract:

4.2.1 Bid Security will be required on this project as specified in Advertisement for Bids.

4.3.1. Bids shall be submitted in sealed envelope plainly marked on face as follows:

Bidders Name

Bidders Address

Proposal For: General, Mechanical & Electrical Construction

Project: LATC Surgical Technology Renovation

Location: Watertown, SD

4.3.2. Bids will be received as follows:

Date: **October 3, 2024**

Time: **2:00 p.m.**

Location:

**Lake Area Technical College Student Center Admin. Offices (Room TBD)**

**1201 Arrow Avenue**

**Watertown, South Dakota**

4.4.1. Bids may not be modified, withdrawn or cancelled for thirty (30) days following date for receipt of bids.

5.1. Bids will be publicly opened and read aloud.

6.1. Contractors Qualification Statement, AIA Document A305 will not be required prior to bidding but may be required prior to award of contract. If same is requested, it shall be submitted within ten days from date of request.

6.3.1. Forms for submittals of items 6.3.1.1., 6.3.1.2. and 6.3.1.3 will be supplied by the architect. Forms to be submitted in two copies.

7.1.1. Performance Bond and Payment Bond will be required of successful prime contractor and cost of same to be included in the bid. Bond shall be executed on AIA Standard Form A312, with amount shown on each part equal to 100 percent of the total amount payable by terms of the contract. Surety shall be company licensed to do business in South Dakota and acceptable to architect and owner. Two copies of each are required. Bonds to be issued to owner, same as Bid Security listed in Advertisement for Bids.

8.1. A copy of this agreement may be examined by bidders at the office of the architect.

# AIA® Document A701® – 2018

## *Instructions to Bidders*

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

LATC Surgical Technology Renovation
Watertown, South Dakota 57201

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

Lake Area Technical College
1201 Arrow Avenue NE
Watertown, South Dakota 57201
Telephone: (605) 882-5284

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

Collaborative Operandi Architecture, LLC
D.B.A. CO-OP Architecture
440 East 8th Street, Suite 221
Sioux Falls, South Dakota 57103
Telephone: (605) 334-9999

**TABLE OF ARTICLES**



**ADDITIONS AND DELETIONS:**
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

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

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

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

## ARTICLE 1 DEFINITIONS

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

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

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

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

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

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

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

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

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

## ARTICLE 2 BIDDER'S REPRESENTATIONS

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

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

## ARTICLE 3 BIDDING DOCUMENTS

### § 3.1 Distribution

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

Bidding Documents will be distributed via email.

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

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

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

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

**§ 3.2 Modification or Interpretation of Bidding Documents**

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

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

Clarifications, interpretations, and substitutions requests shall be made via email.

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

**§ 3.3 Substitutions**

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

**§ 3.3.2 Substitution Process**

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

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

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

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

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

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

**§ 3.4 Addenda**

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

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

Addenda will be distributed to planholders via email.

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

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

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

**ARTICLE 4 BIDDING PROCEDURES**

**§ 4.1 Preparation of Bids**

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

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

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

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

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

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

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

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

**§ 4.2 Bid Security**

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

*(Insert the form and amount of bid security.)*

See Notice to Bidders.

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

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

**§ 4.2.4** The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until (a) the Contract has been executed and bonds, if required, have been furnished; (b) the specified time has elapsed so that Bids may be withdrawn; or (c) all Bids have been rejected. However, if no Contract has been awarded or a Bidder has not been notified of the acceptance of its Bid, a Bidder may, beginning thirty (30) days after the opening of Bids, withdraw its Bid and request the return of its bid security.

**§ 4.3 Submission of Bids**

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

By paper copy via mail or in person.

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

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

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

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

**§ 4.4 Modification or Withdrawal of Bid**

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

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

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

Bid security will be returned.

## ARTICLE 5 CONSIDERATION OF BIDS

**§ 5.1 Opening of Bids**

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

**§ 5.2 Rejection of Bids**
Unless otherwise prohibited by law, the Owner shall have the right to reject any or all Bids.

**§ 5.3 Acceptance of Bid (Award)**
**§ 5.3.1** It is the intent of the Owner to award a Contract to the lowest responsive and responsible Bidder, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents. Unless otherwise prohibited by law, the Owner shall have the right to waive informalities and irregularities in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's best interests.

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

## ARTICLE 6 POST-BID INFORMATION

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

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

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

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

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

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

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

## ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

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

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

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

**§ 7.1.4** Unless otherwise indicated below, the Penal Sum of the Payment and Performance Bonds shall be the amount of the Contract Sum.
*(Paragraphs deleted)*

**§ 7.2 Time of Delivery and Form of Bonds**

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

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

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

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

## ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

**§ 8.1** If applicable, copies of the following Contract Documents can be made available to the Bidder upon request:

**.1** AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor.
*(Paragraph deleted)*

**.2** AIA Document A101™–2017, Exhibit A, Insurance and Bonds.
*(Paragraphs deleted)*

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

**.4** Building Information Modeling Exhibit, if completed.

**.5** Drawings

| Number | Title | Date |
|---|---|---|

**.6** Specifications

| Section | Title | Date | Pages |
|---|---|---|---|

**.7** Addenda:

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

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

[ ] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
*(Insert the date of the E204-2017.)*

[ ] The Sustainability Plan:

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

[ ] Supplementary and other Conditions of the Contract:

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

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

N/A

# *Additions and Deletions Report for*

## *AIA® Document A701® – 2018*

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 14:43:54 ET on 09/09/2024.

**PAGE 1**

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Watertown, South Dakota 57201

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1201 Arrow Avenue NE
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Collaborative Operandi Architecture, LLC
D.B.A. CO-OP Architecture
440 East 8th Street, Suite 221
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**PAGE 2**

Bidding Documents will be distributed via email.
**PAGE 3**

Clarifications, interpretations, and substitutions requests shall be made via email.
**PAGE 4**

Addenda will be distributed to planholders via email.

...

See Notice to Bidders.
**PAGE 5**

**§ 4.2.4** The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until (a) the Contract has been executed and bonds, if required, have been furnished; (b) the specified time has elapsed so that Bids may be withdrawn; or (c) all Bids have been rejected. However, if no Contract has been awarded or a Bidder has not been notified of the acceptance of its Bid, a Bidder may, beginning thirty (30) days after the opening of Bids, withdraw its Bid and request the return of its bid security.

...

By paper copy via mail or in person.

...

Bid security will be returned.

**PAGE 7**

~~*(If Payment or Performance Bonds are to be in an amount other than 100% of the Contract Sum, indicate the dollar amount or percentage of the Contract Sum.)*~~

...

**§ 8.1** ~~Copies~~ If applicable, copies of the ~~proposed~~ following Contract Documents ~~have been~~ can be made available to the Bidder ~~and consist of the following documents:~~upon request:

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

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

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

**.4** Building Information Modeling Exhibit, if ~~completed:~~

completed.

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N/A

# *Certification of Document's Authenticity*

*AIA® Document D401™ – 2003*

I, Kyle Raph, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 14:43:54 ET on 09/09/2024 under Order No. 4104244145 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A701™ – 2018, Instructions to Bidders, other than those additions and deletions shown in the associated Additions and Deletions Report.

_____

*(Signed)*

_____

*(Title)*

_____

*(Dated)*

# SUPPLEMENTS TO GENERAL CONDITIONS

AIA Document A-207-2017 “General Conditions of the Contract for Construction”, shall pertain to this contract. The following information and supplements shall modify, change, delete or add to this document. Where any part of the General Conditions is modified or voided by the following articles, the unaltered provisions of that part shall remain in effect.

Article 3 – Contractor:

Add the following:

3.10.4. Progress Schedule shall be submitted by general contractor in six copies within ten days after date of Notice to Proceed. Architect will distribute to each other prime contractor and owner.

3.12.5.1 Procedures for shop drawing submittals will be as follows:

1. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF) format and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.

3.12.9.1 Each room, door, window and other items having numbers on the contract drawings shall be referred to by those numbers only and are not to be changed on shop drawings.

3.15.3 All glass shall be fully protected from damage of any kind. Do not allow mortar or any other substance to remain on glass. Just prior to final inspection, the general contractor shall replace any broken glass; clean all glass; remove stains, spots, marks or other dirt from his work; clean all walks and drives by washing and/or sweeping; remove all construction equipment and excess materials from site; clean hardware; remove all paint spots; clean all walls if necessary and clean all floors in accordance with the instructions of flooring sub-contractor.

Article 7 – Changes in the Work

Add the following:

7.2.1.4. Change orders will be prepared in three copies. Likewise, change order proposals shall be prepared in three copies and shall contain a complete breakdown of all costs and substantiating proposals from subcontractors if involved, shall be attached, Subcontractor proposals also to contain a complete breakdown.

7.2.1.5. Maximum allowance for overhead and profit on add or deduct change orders shall be 5% for overhead and 5% for profit. The cost of the Bond, Builders Risk, basic construction plant, home office, general superintendent and the like, shall be considered part of the overhead cost. Add or deduct control orders will be computed on the same basis. For change orders of work where the prime contractor (Architectural Trades, Mechanical or Electrical) has awarded the work to a subcontractor, the prime contractor shall be allowed one fee only in an amount not to exceed 10% on add or deduct change orders.

Article 9 – Progress Payments:

9.6.1. Add the following:

Progress payment retainage: The contract shall be so conditioned that it will provide for retention of not less than the following percentages:

5% of the amount of the contract until the contract shall be fully executed and completed to the satisfaction and acceptance of the owner.

9.10.2. The requirements of this paragraph must be met prior to issuance of final certificate for payment. The contractor will submit AIA Documents G706, G706A, and G707 to architect to meet compliance.

Article 10 – Protection of Persons and Property:

Add the following:

10.2.7. All parts of the work shall be braced to resist wind or other loads. The contractor shall perform the work with the explicit understanding that the design of the project is based on all parts of the work having been completed and as such, the methods of performance of each part of the work shall be done accordingly.

10.2.8. Temporary items such as, but not limited to:

Scaffolding, staging, lifting, and hoisting devices, shoring, excavation, barricades, and safety and construction procedures necessary in completion of the project shall be the responsibility of the contractors and their subcontractors and shall comply with the applicable codes and regulations. OSHA Standards for the Construction Industry (29DFR Part 1926) shall be complied with in every respect. It shall not be the responsibility of the owner or the architect to determine if the contractors, subcontractors, their representatives are in compliance with the aforementioned regulations.

## Article 11 – Insurance and Bonds

11.1 Contractor's Insurance and Bonds

Add the following clauses to 11.1.1:

11.1.1.1 The Insurer shall have an A.M. Best rating of "A" or better.

11.1.1.2 Liability Insurance shall include all major division of coverage and be on comprehensive basis including:

1. Premises Operations (including X, C and U coverages as applicable).
2. Independent Contractor's Protective.
3. Personal Injury Liability with Employment Exclusion deleted.
4. Contractual, including specified provision for Contractor's obligation under Paragraph 3.18.
5. Broad Form Property Damage including Completed Operations.

11.1.1.3 If the General Liability coverages are provided by a Commercial General Liability Policy on a claims-made basis, the policy date or Retroactive Date shall predate the Contract; the termination date of the policy or applicable extended reporting period shall be no earlier than the termination date of coverages required to be maintained after final payment, certified in accordance with Subparagraph 9.10.2.

11.1.1.4 The insurance required by Subparagraph 11.1.1 shall be written for not less than the following limits, or greater if required by law:

1. Workers Compensation:
   a. State: South Dakota Statutory
   b. Applicable Federal (e.g. Longshoremen's): Statutory

c. Employer's Liability:

$100,000 per Accident
$500,000 Disease, Policy Limit
$100,000 Disease, Each Employee

2. Commercial General Liability (including Premises-Operations; Independent Contractor's Protective; Products and Completed Operations; Broad Form Property Damage Contractual, Personal Injury:

a. $1,000,000 Each Occurrence

b. Owner shall be included as an Additional Insured on the Contractor's General Liability coverage on a Primary Non Contribution basis including completed operations.

c. General Aggregate; $2,000,000

d. Products and Completed Operations to be maintained for two years after final payment.

e. Property Damage Liability Insurance shall provide X,C, and U coverage. Any exception to the above must be noted on Certificate.

f. Broad Form Property Damage Coverage shall include Completed Operations.

g. Personal Injury and Advertising, with Employment Exclusion deleted:

$1,000,000.

h. If the General Liability coverages are provided by a Commercial Liability policy, the:

General and Products and Completed Operations aggregate shall not to be less than $1,000,000 and it shall apply, in total, to this project only. If, under terms of a Commercial General Liability or for products and completed operations aggregate policy or Commercial Umbrella Liability policy or the general aggregate amount specified for this project only, is reduced up to 10% by the total of all claims, paid and pending, for which the Contractor is or may be liable, the Contractor shall notify the Owner within 10 days of such reduction or potential reduction. Contract shall

indicate in the notification separate totals for each category, paid and pending. If instructed by the Owner in writing, the Contractor shall, at its own expense, restore the general aggregate to their original amounts. Contractor shall, within 30 days receipt of such notice, submit a revised Certificate of Insurance indicating restoration of required general aggregates. The Contractor may, on its own, restore the general aggregate to the original amounts for this project only at any time during the progress of the work without relying on notification by Owner.

i. Fire Damage Limit shall be not less than $50,000 on any one fire.

j. Medical Expense Limit shall be not less than $5,000 on any one person.

3. Business Auto Liability (including owned, non-owned and hired vehicles):

   a. Bodily Injury:

      $500,000 Each Person OR for 3a), b) $1,000,000 CSL
      $1,000,000 Each Occurrence

   b. Property Damage:

      $500,000 Each Occurrence

4. Umbrella Excess Liability:

   $1,000,000 Each Occurrence
   $1,000,000 General Aggregate
   $1,000,000 Products & Completed Operations Aggregate
   $1,000,000 Retention for self-insured hazards each occurrence.

**SECTION 011000**
**SUMMARY**

## PART 1 GENERAL

### 1.01 PROJECT

A. Project Name: LATC Surgical Technology Renovation

B. Owner's Name: Lake Area Technical College.

C. Architect's Name: CO-OP Architecture.

### 1.02 DESCRIPTION OF ALTERATIONS WORK

A. Scope of demolition and removal work is indicated on drawings and specified in Section 024100.

B. Scope of alterations work is indicated on drawings.

C. Plumbing: Alter existing system and add new construction, keeping existing in operation.

D. HVAC: Alter existing system and add new construction, keeping existing in operation.

E. Electrical Power and Lighting: Alter existing system and add new construction, keeping existing in operation.

F. Fire Alarm: Alter existing system and add new construction, keeping existing in operation.

G. Telephone: Alter existing system and add new construction, keeping existing in operation.

H. Security System: Alter existing system and add new construction, keeping existing in operation.

### 1.03 OWNER OCCUPANCY

A. Owner intends to occupy the Project upon Substantial Completion.

B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

C. Schedule the Work to accommodate Owner occupancy.

### 1.04 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas noted on Drawings.

B. Arrange use of site and premises to allow:
   1. Work by Others.
   2. Work by Owner.
   3. Use of site and premises by the public.

C. Provide access to and from site as required by law and by Owner:
   1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
   2. Do not obstruct roadways, sidewalks, or other public ways without permit.

D. Utility Outages and Shutdown:
   1. Limit disruption of utility services to hours the building is unoccupied.
   2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
   3. Prevent accidental disruption of utility services to other facilities.

**END OF SECTION**

**SECTION 012000**
**PRICE AND PAYMENT PROCEDURES**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

### 1.02 SCHEDULE OF VALUES

A. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect for approval.

B. Forms filled out by hand will not be accepted.

C. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.

### 1.03 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.

B. Forms filled out by hand will not be accepted.

C. 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.

D. Execute certification by signature of authorized officer.

E. Submit one electronic and three hard-copies of each Application for Payment.

### 1.04 MODIFICATION PROCEDURES

A. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect will issue instructions directly to Contractor.

B. For other required changes, Architect will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
   1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
   2. Promptly execute the change.

C. 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 7 days.

D. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.

E. 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.

F. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

**1.05 APPLICATION FOR FINAL PAYMENT**

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

B. Application for Final Payment will not be considered until the following have been accomplished:
   1. All closeout procedures specified in Section 017000.

**END OF SECTION**

**SECTION 012500**
**SUBSTITUTION PROCEDURES**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Procedural requirements for proposed substitutions.

### 1.02 RELATED REQUIREMENTS

A. Section 002113 - Instructions to Bidders: Restrictions on timing of substitution requests.

B. Section 004325 - Substitution Request Form - During Procurement: Required form for substitution requests made prior to award of contract (During procurement).

C. Section 013000 - Administrative Requirements: Submittal procedures, coordination.

### 1.03 DEFINITIONS

A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
   1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
      a. Unavailability.
      b. Regulatory changes.
   2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.
      a. Substitution requests offering advantages solely to the Contractor will not be considered.

## PART 2 PRODUCTS - NOT USED

## PART 3 EXECUTION

### 3.01 GENERAL REQUIREMENTS

A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
   2. Agrees to provide the same warranty for the substitution as for the specified product.
   3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
   4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
   5. Waives claims for additional costs or time extension that may subsequently become apparent.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.

C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
   1. Forms indicated in the Project Manual are adequate for this purpose, and must be used.

D. Limit each request to a single proposed substitution item.
   1. Submit an electronic document, combining the request form with supporting data into single document.

### 3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT

A. Submittal Time Restrictions:
   1. Architect will consider requests for substitutions only if submitted at least 5 days prior to the date for receipt of bids.

B. Submittal Form (before award of contract):

1. Submit substitution requests by completing the form attached to this section. See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.

### 3.03 RESOLUTION

A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.

B. Architect will notify Contractor in writing of decision to accept or reject request via Addenda.

### 3.04 CLOSEOUT ACTIVITIES

A. See Section 017800 - Closeout Submittals, for closeout submittals.

B. Include completed Substitution Request Forms as part of the Project record. Include both approved and rejected Requests.

### 3.05 ATTACHMENTS

A. A facsimile of the Substitution Request Form that may be used on the Project is included after this section.

**END OF SECTION**

# PRIOR APPROVAL / SUBSTITUTION REQUEST FORM

**Date:** _____

**Company Submitting Request**: _____
(Name and Address)

**Contact Name:** _____ **Phone:** _____ **Fax:** _____

**E-Mail:** _____

**PROJECT NAME**: _____

**SPECIFIED ITEM**: _____
(Section) (Page) (Description)

The undersigned requests consideration of the following product substitution:

**PROPOSED SUBSTITUTION:** _____
Provide Product Name / Model /Manufacturer

1. Attached data includes: _____ Product Description _____ Performance and Test Data
   _____ Drawings _____ Specifications
   _____ Photographs

2. _____ Yes / No changes will be required to the Contract Documents for the proper installation of proposed product substitution. If yes, then attach data that includes description of changes.

**The undersigned states that the following paragraphs, unless modified by attachments, are correct:**

1. The proposed substitution does not affect dimensions shown on the drawings.

2. No changes to the building design, engineering design, or detailing are required by the proposed substitution.

3. The proposed substitution will have no adverse effect on other trades, the construction schedule, or **specified warranty requirements.**

4. No maintenance is required by the proposed substitution other than that required for originally specified product.

5. Other Information

**The undersigned further states that they have read the corresponding specification section in the project manual and confirms that the function, appearance and quality of the proposed substitution are equivalent or superior to the originally specified product.**_____initial.

Signature: _____ Printed Name: _____

Fax Number: _____

**For Architect's Use:**

____ Accepted ____ Accepted As Noted ____ Incomplete Information

____ Not Accepted ____ Received Too Late ____ No Substitutions Accepted For This Product

Reviewed By / Date:

Processed by Addendum No.

Comments: _____

**SECTION 013000**
**ADMINISTRATIVE REQUIREMENTS**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Electronic document submittal service.

B. Preconstruction meeting.

C. Progress meetings.

D. Submittals for review, information, and project closeout.

E. Number of copies of submittals.

F. Submittal procedures.

## PART 2 PRODUCTS - NOT USED

## PART 3 EXECUTION

### 3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF) format, as appropriate to the document, and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.
   1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Information (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
   2. Contractor and Architect are required to use this service.
   3. It is Contractor's responsibility to submit documents in allowable format.
   4. Subcontractors, suppliers, and Architect's consultants will be permitted to use the service at no extra charge.
   5. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
   6. Paper document transmittals will not be reviewed; emailed electronic documents will not be reviewed.
   7. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.

B. Submittal Service: Use one of the following:
   1. Submittal Exchange (tel: 1-800-714-0024): www.submittalexchange.com/#sle.
   2. Trimble Construction One: www.viewpoint.com

### 3.02 PRECONSTRUCTION MEETING

A. Architect will schedule a meeting after Notice of Award.

B. Attendance Required:
   1. Owner.
   2. Architect.
   3. Contractor.

C. Agenda:
   1. Execution of Owner-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 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. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

### 3.03 PROGRESS MEETINGS

A. Attendance Required:
1. Contractor.
2. Owner.
3. Architect.
4. Contractor's superintendent.
5. Major subcontractors.

B. 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. Maintenance of progress schedule.
7. Corrective measures to regain projected schedules.
8. Planned progress during succeeding work period.
9. Maintenance of quality and work standards.
10. Effect of proposed changes on progress schedule and coordination.
11. Other business relating to work.

C. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

### 3.04 CONSTRUCTION PROGRESS SCHEDULE - SEE SECTION 013216 - SEE SECTION 013216

A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of work, with a general outline for remainder of work.

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
1. Include written certification that major contractors have reviewed and accepted proposed schedule.

D. Submit updated schedule with each Application for Payment.

### 3.05 SUBMITTALS FOR REVIEW

A. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.

B. Samples will be reviewed for aesthetic, color, or finish selection.

C. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 017800 - 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 Owner. No action will be taken.

### 3.07 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.

### 3.08 SUBMITTAL PROCEDURES

A. General Requirements:
1. Transmit using approved form.
a. Use form generated by Electronic Document Submittal Service software.
2. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
3. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
4. 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.
5. 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.
6. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
7. Provide space for Contractor and Architect review stamps.
8. When revised for resubmission, identify all changes made since previous submission.
9. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
10. Submittals not requested will not be recognized or processed.

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

**END OF SECTION**

**SECTION 013216**
**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 10 days.

C. Within 10 days after joint review, submit complete schedule.

D. Submit updated schedule with each Application for Payment.

### 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. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

D. 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.

E. Indicate delivery dates for owner-furnished products.

F. Provide legend for symbols and abbreviations used.

### 3.03 BAR CHARTS

A. Include a separate bar for each major portion of Work or operation.

B. Identify the first work day of each week.

### 3.04 REVIEW AND EVALUATION OF SCHEDULE

A. Participate in joint review and evaluation of schedule with Architect at each submittal.

B. Evaluate project status to determine work behind schedule and work ahead of schedule.

C. After review, revise as necessary as result of review, and resubmit within 10 days.

### 3.05 UPDATING SCHEDULE

A. Maintain schedules to record actual start and finish dates of completed activities.

B. Indicate progress of each activity to date of revision, with projected completion date of each activity.

C. 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.

**3.06 DISTRIBUTION OF SCHEDULE**

A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Architect, Owner, and other concerned parties.

B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

**END OF SECTION**

**SECTION 014000**
**QUALITY REQUIREMENTS**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Submittals.

B. Testing and inspection agencies and services.

C. Control of installation.

D. Defect Assessment.

### 1.02 SUBMITTALS

A. See Section 013000 - 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. Compliance with Contract Documents.
    k. When requested by Architect, provide interpretation of results.

### 1.03 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Owner will 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.

## 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. 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-compliance of Work or products.
5. Perform additional tests and inspections required by Architect.
6. Submit reports of all tests/inspections specified.

B. Limits on Testing/Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not approve or accept any portion of the Work.
3. Agency may not assume any duties of Contractor.
4. Agency has no authority to stop the Work.

C. Contractor Responsibilities:
1. 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.
6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

D. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.

E. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

**3.03 DEFECT ASSESSMENT**

A. Replace Work or portions of the Work not complying with specified requirements.

**END OF SECTION**

**SECTION 01 45 23**

**QUALITY CONTROL – TESTING AND INSPECTING SERVICES**

## PART 1- GENERAL

### 1.1 WORK INCLUDED

A. Extent of work of this section includes all labor, materials, equipment and services necessary for the testing of specific contractor installed materials in the Construction Documents.

B. As the Testing Laboratory is not a Contractor; the normal services and agreements in the general conditions and bidding procedures do not apply. This section, governs the procedures.

1. Testing Laboratory performance is governed by the laws of the **State of South Dakota.**

C. Selection, payment and use of Testing Laboratory Services

1. By providing a cost for the services described below directly to the owner, on the date of other bids, the Testing Laboratory shall be retained and paid for by the Owner, except as noted. The Testing Laboratory shall act in all matters relating to testing.

a. Contractors will not control the means or the methods of testing or inspections. Contractors must however provide scheduling information to the Testing Laboratory.

b. Testing agency will contact the Architect and Engineer for instructions on scope of the work, if necessary.

D. It shall be the responsibility of the Testing Laboratory to familiarize themselves with all sections of the Contract Documents and the project schedule.

E. All testing required of this project shall be performed by a single testing laboratory.

F. The testing requirements shall remain in force for the full duration of the construction contract, including all delays or time extensions.

G. Provide to the Contractor, contact information, list of items to be inspected and other information to assist the Contractor in scheduling his work, while allowing for inspections and tests of this section.

H. Related Contract Documents.

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and remaining Division 00 and 01 Specification Sections as they apply to this section.

### 1.2 TESTING LABORATORY REQUIREMENTS OF COST AND ABILITY

A. All testing laboratories desiring to provide their services for this project must submit for approval to the Owner, at the time and date of bid, for review by the Architect the following:

1. Documentation that the Testing Laboratory meets requirements of the American Council of Independent Laboratories (ACIL).

2. Provide documentation that the Testing Laboratory has an in-house quality assurance program.

3. Proof that the Testing Laboratory is owned and directly managed by a Professional Engineer, licensed in the State where testing and inspections occur.

a. Principals of the Testing Laboratory and their project managers must be registered professional engineers with a minimum of five years experience in the types of testing required under this contract. Each person in charge of laboratory testing, field-testing and inspection must have not less than one's years experience in the duties performed under this contract and shall perform their duties only under the direct supervision of a registered professional engineer.

4. Total price of services for the project, as a bid, based on the scope of the work shown in this section and the laws of the state of South Dakota as they relate to professional engineering services.

a. Use Bid form provided in Project Manual.

b. This bid if made into a contract is not subject to retainage.

c. This bid is a lump sum made on the basis of a computation of unit prices for testing and observation services. At the end of this section a quantity of units in terms of hours and or specific activities is given. The bid provided shall be based on that information.

** The Quanity of tests required is part of the submittal by the Testing Laboratory to the Owner. (See end of Part 3)*

d. Provide a unit price for each hour or quantity asked for. These unit prices shall become the basis, if required, to provide additional testing services.

**1.3 REFERENCES**

A. ANSI/ASTM E329 - Standard Practice for Use in the Evaluation of Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.

B. ASTM E543 - Practice for Determining the Qualifications of Agencies Performing Nondestructive Testing.

C. ASTM E548 - Standard Guide for General Criteria Used for Evaluating Laboratory Competence.

D. ASTM A802 – Standard Practice for examination of steel castings, surface acceptance and visual examination.

E. ASTM E174 Standard Practice for Radiographic Examination.

F. ASTM C1077 – Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

G. ASTM C1093 - Practice for the Accreditation of Testing Agencies for Unit Masonry.

H. ANSI/ASTM D3740 - Standard Recommended Practice for Evaluation of Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

I. ASTM D4561 – Practice for quality control systems for an inspection and testing agency for bituminous paving materials.

J. ASTM E699 – Practice for criteria for evaluation of agencies involved in testing, quality assurance, and evaluating building components in accordance with test methods promulgated by ASTM committee E6.

L. ICBO Model Program for Special Inspection (excerpts).

N. CASE-Council of American Structural Engineers.

O. AIA Document A201 - General Conditions - 1997 Edition

**1.4 RELATED SECTIONS**

A. Project specifications and plans for all items to be inspected.

B. Schedule as shown in Division 01 in Project Specifications.

C. Submittals section in Division 01 as shown in Project Specifications.

D. Contract closeout section in Division 01 as shown in Project Specifications.

E. Project meeting Section in Division 01 as written in Project Specifications.

**1.5 REPORTS OF TESTING**

A. Written Reports: Submit all test reports to Owner, Architect and Engineer, within 72 hours after each test is completed. Contractor shall also be given a copy.

**B.** Verbal Phone Reports: Testing Laboratory is to give immediate verbal notification, to the Owner, the Architect, and to Heyer Engineering, immediately of any irregularity, failure, or non-compliance of tested items to ensure all necessary retesting and/or replacement of materials with the least possible delay in progress of the work.

C. Test Standards: Testing Laboratory shall furnish the Architect and Engineer upon request, one (1) copy of each standard (ASTM, AASHTO and AWS) referred to or which is pertinent to these specifications.

**D.** All reports, written and verbal, must state clearly whether work inspected or tested is/is not in compliance with Contract Documents.

## 1.6 PAYMENT OF TESTING SERVICES

**A. Initial services:**

1. The Owner, will pay for all initial-testing services requested by and anticipated by this specification. Costs for all such testing services shall be included in a proposal submitted directly to the Owner through the Architect. See information in this section.
    a. See form at end of this specification section 3 for the required testing units. These units in either hours or events will form the basis of the cost of testing laboratory services.
2. Owner will through the Architect issue a change order if additional services are required. These additional services must be agreed to in writing by the owner, the testing laboratory and the architect. Additional services will be based on unit prices submitted by the testing laboratory and listed at the end of this specification section.

B. Additional or re-testing:

1. When initial tests indicate non-compliance with the Contract Documents, all subsequent re-testing occasioned by the non-compliance shall be performed by the same Testing Laboratory and the costs thereof will be borne entirely by the **Contractor.** If needed the Owner, through the Architect, will deduct the amount of the re-testing from the Contractors pay request.

C. Contractor required specimens and tests not in this Specification Section.

1. Products and materials, such as concrete, masonry, mortar or proposed engineered fill, requiring a test report or a design done by a Professional Registered Engineer prior to use; shall be performed by the Contractor and are not a part of the cost of this section for the Testing Laboratory Services.
2. Mechanical balancing, adjusting, or startup of systems or motor startup by either Mechanical, Electrical, or Plumbing Contractors is not a part of this work.

## 1.7 NON COMPLIANCE WORK STOPPAGE

A. The Testing Laboratory shall act as the Owner's agent in testing and inspections on items in this section to determine compliance with plans and specifications.

B. The Testing Laboratory ***shall further*** **advise the Owner, the Architect and the Structural Engineer if the non-compliance should result in the Owner** stopping that type of work from being performed until corrective action or replacement is completed. Based on the following criteria:

1. If additional work would be added to existing non-complying work, adding additional expense to the Contractor to remove.
2. It is clear by the quality and status of the non-complying work that the Contractor will continue to produce substandard work.
3. It is clear that the Contractor does not understand how the work is to be produced in a manner consistent with the Contract Documents.
4. A required inspection by a governmental official cannot be done unless further work is stopped, or work needed to be inspected is in danger of being covered.
5. Public or worker safety in the sole opinion, of the Testing Agency, would be compromised if the work continues.

## 1.8 LIMITS ON AUTHORITY

A. Employment of the Testing Laboratory in no way relieves the Contractor of his obligation to perform work in accordance with requirements of Contract Documents.

B. Inspection firm may not release, revoke, alter, or enlarge any requirements of the Contract Documents.

C. Inspection firm may not approve or accept any portion of the work.

D. Inspection firm may not assume any duties of the Contractor.

E. As stated in Section 1.6 above, Owner, not Testing Laboratory, has authority to stop work.

F. Mechanical balancing, adjusting or startup of systems or motor startup by either Mechanical, Electrical or Plumbing Contractors is not a part of this work.

**1.9 CONTRACTOR SCHEDULING AND NOTIFICATION RESPONSIBILITY**

**A. Even though Contractor is not paying for the work of this section. He must perform the notification and scheduling of all Testing. Therefore Contractor shall:**

1. Provide notification to the Testing Laboratory based on schedule of all work to be inspected. Inspections missed due to the Contractor not notifying Testing Laboratory shall require contractor dismantling and un-covering of in place work.
   a. If this is not done, the Owner, will stop all construction at the contractor's expense until he receives the proper documentation that the tests were performed. Once the engineer has approved the criteria and testing results, the work may proceed.
2. The Testing Laboratory shall attend the pre-construction meeting and all other meetings during work that is to be inspected to familarize themselves with the project, the contractors and the project schedule.
   **a. The Contractor is responsible for the project schedule and for scheduling of all testing.**
3. When changes of construction schedule are necessary during construction, the Contractor shall make contact with the Testing Laboratory to determine such schedule changes.
   a. The Testing Laboratory will not be held accountable for lack of inspection when a Contractor purposely covers portions of the work to be inspected.
4. Provide incidental labor and materials to provide access to work to be inspected. Such as having ladders, available scaffolding and other components readied and in the same safe condition as that available for they're own workmen.
5. Inspection or testing performed exclusively for a Contractor's convenience shall be the sole responsibility of the Contractor. This includes strength tests for OSHA or AWAIR.

**1.10 TAKING SPECIMENS**

A. All specimens and samples for testing will be taken only by the Testing Laboratory; all sampling equipment and personnel will be provided by the Testing Laboratory; and all deliveries of specimens and samples to the Testing Laboratory will be performed only by the Testing Laboratory.
   1. The only exception for taking of specimens is that the Masonry Contractor may take his own mortar test cylinders. However they must be transported by the Testing Laboratory.

B. Contractors shall provide representatives of the Testing Laboratory access to the work at all times in order that the Laboratory may properly perform its functions.

**1.11 CODE COMPLIANCE TESTING**

A. Inspections and test required by codes or ordinances, or by a plan approval authority, not listed in Part 3 Execution, shall be the responsibility of and shall be paid for by the Contractor, unless otherwise provided in the Contract Documents.
   1. Contractor, not Testing Laboratory, is responsible for design of certain materials to be used in the field such as concrete and mortar mix designs and design of precast, wood and light gauge engineered assembles and systems.

**1.12 SPECIAL INSPECTIONS**

**A.** All requirements under the Special Inspections portion of the International Building Code are separate items not listed under this section. They however are required by the Owner of the Contractor.

**PART 2 – PRODUCTS** (Not Used)

**PART 3 - EXECUTION**

**3.1 EXCAVATION & BACKFILLING** (Includes Special Inspection per CASE and IBC 2018)

A. The Testing Laboratory shall be on site to observe and monitor the mass site excavation and backfilling of the building structure area.
   1. Verify that all unsuitable organic materials, black and soft soils have been removed.

2. Test the mass backfill and verify correct depth of material backfill lifts.

3. After mass backfill is complete, monitor and verify the correction of secondary settlement and inform the Architect/Structural Engineer and General Contractor the readiness for footing excavation to begin.

B. Inspect each footing and slab subgrade to determine if subgrade materials are acceptable. Perform hand auger borings and soil classifications. Make density tests to determine if the actual soil bearing values capacity complies with specified value.

C. Test all engineered fill materials as to density and optimum moisture content. Per ASTM D698.

1. Visit the site of the borrow pit or site and determine that anticipated values of sample are consistent with all materials to be used from the pit or site.

2. Use values determined from tests to calibrate site compaction and soil density work.

D. For footings or foundation walls. Take soil density and moisture tests at the site in all engineered fill areas. Test 4 corners of each 2000 s. f. or 2 locations in every 100 lineal foot of fill and backfill. This shall be done per every one foot of lift, of fill or backfill. Per Nuclear Density Method B in ASTM D2922 overall Basis.

G. Slab on grade work includes the use of vapor barrier and a 6" granular cushion. Examine both prior to placement of reinforcing steel to determine that:

1. All mechanical, electrical, underfloor drainage and or other below surface work are complete prior to installation of vapor barrier and or granular cushion. Do not allow placement until underground work is complete.

2. All vapor barrier seams are overlapped a min. of 12 inches. Sides of vapor barrier are raised up 12" over the top level of slab and are attached to walls and that all seams are taped.

3. The 6" granular fill is placed above the vapor barrier and the vapor barrier is not broken during placement.

**3.2 FORMWORK** (Includes Special Inspection per CASE and IBC 2018)

A. Verify formwork for all concrete will result in member size, location, and configuration as described on the contract documents, as it affects the structural integrity of the concrete elements to be placed.

1. Measure distance between forms and reinforcing to determine proper coverage of reinforcing.

2. Check for form oil or lubricants on reinforcing.

3. Verify that formwork is properly tied and supported.

**3.3 REINFORCING STEEL** (Includes Special Inspection per CASE and IBC 2018)

A. All steel bars must be positively identified as to heat number and mill analysis. Reports to be provided by the supplier. All reinforcing steel shall have a number assigned to it corresponding to the placement mark on the submittal.

1. All steel bars that cannot be identified by heat number and mill analysis shall have one tensile and one bend test made for each 2-1/2 tons or fraction thereof, of each size and kind of reinforcing steel.

Testing procedure shall conform to ASTM A615.

B. No reinforcing steel shall be placed without an approved shop drawing.

C. The testing laboratory shall verify size and location of all bars prior to concrete placement.

1. Verify that chairs or similar product have been provided and are in place for all slab reinforcement.

D. A written report shall be submitted to the Engineer stating the results of the verification and any modifications required by the General Contractor to meet the plans and or specifications.

**3.4 CONCRETE** (Includes Special Inspection per CASE and IBC 2018)

A. Portions of the following such as Engineered mix design are furnished by the installing Contractor; Testing of Concrete in the field is performed by the Testing Agency under the Owner.

B. **After Contractors Mix design work is complete, field testing shall occur as follows:**

a. Contractor or Testing Lab shall perform slump tests and take strength test cylinders (minimum of 5) at the point of application, or after it has been pumped, during first day's work. If a plasticizer is being used, test before and after addition of plasticizer and so note on the test report. Non compliant tests shall mean non-use of that trucks' product. All other days work shall be tested on every other truck after it has passed through the pumper.

b. Air entrainment tests shall be taken in the same manner as the concrete slump tests **but shall be taken by the Testing Laboratory.**

2. If slump or air content falls outside specified limits another test shall be made immediately from another portion of same batch. If this test likewise fails, the concrete of that load shall be discarded and the truck carrying it shall not be allowed to unload at the site for 1 hour. Truck identification number shall be recorded if this procedure is necessary

3. Notify batch plant of mix irregularities and request materials and proportioning check

4. Use and reporting of Field Samples:

a. Testing Lab shall perform laboratory strength tests on actual concrete work. Provide a single cylinder 7 day test and a final 28 day test with an average of 3 test cylinders, Keep one additional cylinder as a field hold to be tested in cold weather or as needed. A total of 5 (five)-test cylinders are required. Contractor may keep additional cylinders for use in determining form removal timing and to verify OSHA strength requirements for steel columns. Take daily tests on every 50 yards of each type of concrete used.

b. Furnish certified compression test reports to Owner, Engineer, Architect and Concrete Contractor. On test report indicate following information:

- Cylinder identification number and date cast.
- Portion of structure and location of structure where tested
- Type of concrete, slump and percent air.
- Compressive strength of concrete in PSI.
- Weather conditions during placing.
- Temperature of concrete.
- Maximum and minimum ambient temperature during placing.
- Ambient temperature when concrete sample in test cylinder was taken.
- Date delivered to laboratory and date tested.
- Certification by the plant that the specified mix design and all required admixtures are included.

11. Verify thickness of concrete walls, slabs, raised slabs and other concrete work.

12. Verify that concrete meets FF and FL level and flatness standards listed in Section 03300 or 03300 Part 3 Execution The system is designed to measure 4 20' x 20' test sections randomly chosen on the slab on grade and the raised deck floor not including stoops. The Sections should not adjoin each other unless the floor is less than 80'x 80' in size.

13. Verify that hot weather and or cold weather concrete installation requirements are being followed by the Contractor. If sufficient protections and methods are not being followed for the production, installation, protection and curing of concrete in cold weather or hot weather conditions, the pour must stop and only continue once conditions are remedied. See ACI 305R, ACI 306R.

**3.5 STRUCTURAL STEEL BEAMS, COLUMNS, JOISTS AND GIRDERS**(Includes Special Inspection per CASE and IBC 2018)

A. Verify that anchor bolts and their setting pattern is at correct elevation, allows for 1-1/2" grout under the base plate and that pattern matches Contract Drawings and reviewed shop drawings.

B. Welding:

1. Field-welded connections shall be inspected visually.

a. Fillet Welds - 50% of all connections, closely visually inspected as per AWS D1.1.

b. Partial Penetration - 50% of all connections, closely visually inspected as per AWS D1.1.

c. Full Penetration - 50 % of all connections, closely visually inspected as per AWS D1.1.

2. X ray testing of welded connections shall be required only if visual inspection determines that numerous (over 20%) flaws exist in the welding fillets and further visual inspection cannot be made to determine adequate welded connections.

C. Bolted Connections: Per AISC, All bolted connections shall be bolted with ASTM A325, Type 1, ¾" min. diameter bolts. All shear bolts at initial erection shall be snug fit tightened with a wrench.

1. After final erection tightening and correction of plumb and square of steel; all shear bolt connections shall have the additional requirement of paint stick match marking. Paint shall mark the connection surface, the bolt, and the nut. A final 1/4" turn past snug fit with a wrench shall be required. Then the threads shall be welded or damaged

2. Quantity of Bearing Connections inspected is: 20% of total number of connections. Each bolt in tested connection shall be tested for snug fit.

a. Retighten 100% of bolts in tested connection if any bolts within tested connections are not adequately tightened.

b. Retighten 100% of ALL bearing style connections if more than 10% of the tested connections contain bolts not adequately tightened.

c. Retest system as defined above, if system has to be re-erected.

3. Steel members shall be inspected to plumb, square and level. The standards shall vary but in general shall be no more than ½" per 16'-0"individual member.

**3.6 MASONRY** (Includes Special Inspection per CASE and IBC 2018)

A. Quality Assurance

1. Concrete Masonry Unit: For each type of concrete masonry unit indicated, verify compliance with ASTM C 90 and the strength required by design. Verification may be by reviewing certification from unit producer showing compliance.
2. Review field welder qualifications by certification or verify by retesting. Obtain welder certificates.

B. Field Testing

1. Masonry Strength Testing

a. Verification Testing Frequency: Verification of masonry strength (f'm) will be performed at the beginning of masonry construction and during construction for each 5,000 square feet of wall area or portion thereof.

b. Mortar

i. As construction begins, verify the proportions of the site-prepared mortar mix comply with the requirements of ASTM C 270 for the type specified.

ii. Verify the proportions of materials in premixed or preblended mortar comply with the requirements of ASTM C 270 for the type specified as delivered to the site.

c. Grout

i. Prior to grouting, verify the proportions of site-prepared grout mix comply with the requirements of ASTM C 476 for each type of grout used.

ii. Verify the proportions of materials in premixed or preblended grout comply with the requirements of ASTM C 476 as delivered to the site.

iii. For grout pre-mixed at a batch plant or otherwise not prepared on site, grout shall be sampled and tested in accordance with ASTM C 1019. Prepare one set of grout samples for testing at seven days and two sets for testing at 28 days.

d. For each type of wall construction indicated for testing, test representative masonry prisms by methods of sampling and testing of ASTM C 1314, and as follows:
   i. Prepare one set of prisms for testing at 7 days and one set for testing at 28 days.
   ii. For concrete masonry prisms adhere to requirements as specified under preconstruction testing. Build prisms on job using same materials and methods as for wall construction. Store prisms in air at temperature not less than 65°F in a facility supplied by the contractor where they will be undisturbed for seven (7) days. After seven (7) days, transport to laboratory in a manner which will not disturb mortar bond.
   iii. Cap each prism with suitable material to provide bearing surfaces on each end.
   iv. The preparation of prisms shall be observed by the testing agency that will test the prisms.

e. Report test results in writing and in form specified under each test method, to Architect and Contractor, on same day tests are made.

f. Retests: Where prism tests indicate non-compliance with specified requirements, additional testing shall be performed at the frequency of two additional tests for each unsatisfactory test. The cost of such additional testing shall be the responsibility of the Contractor. Where retesting fails to indicate conformance with specified requirements, any masonry construction represented by unsatisfactory tests shall be removed and replaced with acceptable masonry construction.

g. Testing of Non-Shrink Grout for Base Plates and Bearing Plates
   i. Compressive Strength Tests: Compressive strength of grout shall be determined by testing grout cubes according to the requirements of ASTM C 109 - Modified. Test one set of three cubes at one day, and one set of three cubes at 28 days.
   ii. Frequency of Testing: One set of cubes (6 cubes) shall be made for every ten base plates and bearing plates or fraction thereof but not less than one set for each day's operation. One set of cubes shall be made for each day's operation of grouting wall panels.

C. Field Inspection
   1. Mortar Joints: As construction begins, verify that mortar joints are being prepared in accordance with these specifications and ACI 530.1/ASCE 6/TMS 602.
   2. Reinforcement and Connectors: Prior to grouting, verify the size, grade, type and placement of reinforcement and connectors is in compliance with specified requirements.
   3. Grouting: Prior to any grouting procedure, the grout space shall be inspected to verify that it is clean and that cleanouts, if required, are in place and conform to requirements. Verify through continuous inspection that the placement of grout is in compliance with the requirements of the contract specifications and ACI 530.1/ASCE 6/TMS 602.
   4. Anchors: Continuously inspect the installation of anchors including anchors of masonry to other structural members, frames, or construction verifying their type, size, location, and installation.
   5. Anchors: Periodically verify the type, size and location of anchors including anchors of masonry to other structural members, frames, or construction is in compliance with specified requirements.
   6. Anchors: Verify maximum anchor tightening torque for all post-installed anchors.
   7. Welding of Reinforcing Bars: Observe the welding of reinforcing bars.
   8. Installed items: Verify that installed flashing, weep holes, construction joints, control joints and wall vents are installed in accordance with specifications.

## 3.7 FINAL REPORTING

A. At the conclusion of the work, required to be inspected by the Testing Laboratory, a written report in binder form with an index shall be submitted as a permanent record to the Owner through the Structural Engineer of all tests, logs, comments and written reports.

**END OF SECTION**

**SECTION 015000**
**TEMPORARY FACILITIES AND CONTROLS**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Temporary utilities.

B. Temporary telecommunications services.

C. Temporary sanitary facilities.

D. Temporary Controls: Barriers, enclosures, and fencing.

E. Security requirements.

F. Vehicular access and parking.

G. Waste removal facilities and services.

H. Field offices.

### 1.02 TEMPORARY UTILITIES

A. Provide and pay for all electrical power, lighting, water, heating and cooling, and ventilation required for construction purposes.

### 1.03 TELECOMMUNICATIONS SERVICES

A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.

### 1.04 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

B. Maintain daily in clean and sanitary condition.

### 1.05 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.

C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

### 1.06 INTERIOR ENCLOSURES

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

B. Construction: Framing and reinforced polyethylene sheet materials with closed joints and sealed edges at intersections with existing surfaces:

### 1.07 SECURITY

A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

### 1.08 VEHICULAR ACCESS AND PARKING

A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.

B. Coordinate access and haul routes with governing authorities and Owner.

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

D. Provide means of removing mud from vehicle wheels before entering streets.

E. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

**1.09 WASTE REMOVAL**

A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

B. Provide containers with lids. Remove trash from site periodically.

C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

**1.10 FIELD OFFICES**

A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture, drawing rack, and drawing display table.

B. Provide space for Project meetings, with table and chairs to accommodate 6 persons.

C. Locate offices a minimum distance of 30 feet from existing structures.

**1.11 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS**

A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.

B. Clean and repair damage caused by installation or use of temporary work.

C. Restore existing facilities used during construction to original condition.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

**SECTION 016000**
**PRODUCT REQUIREMENTS**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Transportation, handling, storage and protection.

B. Product option requirements.

C. Substitution limitations.

D. Maintenance materials, including extra materials, spare parts, tools, and software.

### 1.02 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 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.

### 2.02 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 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.

**3.02 STORAGE AND PROTECTION**

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 017419.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

G. Comply with manufacturer's warranty conditions, if any.

H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

I. Prevent contact with material that may cause corrosion, discoloration, or staining.

J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

K. 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 017000**
**EXECUTION AND CLOSEOUT REQUIREMENTS**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.

C. Pre-installation meetings.

D. Cutting and patching.

E. Cleaning and protection.

F. Starting of systems and equipment.

G. Demonstration and instruction of Owner personnel.

H. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

### 1.02 PROJECT CONDITIONS

A. Use of explosives is not permitted.

B. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

### 1.03 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Notify affected utility companies and comply with their requirements.

C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

F. Coordinate completion and clean-up of work of separate sections.

G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

## PART 2 PRODUCTS

### 2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 016000 - Product Requirements.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

### 3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

### 3.03 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify Architect four days in advance of meeting date.

D. Prepare agenda and preside at meeting:
   1. Review conditions of examination, preparation and installation procedures.
   2. Review coordination with related work.

E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

### 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. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. 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. Remove existing work as indicated and as required to accomplish new work.
   1. Remove items indicated on drawings.
   2. Relocate items indicated on drawings.

3. 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.
4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

C. Services (Including but not limited to ): Remove, relocate, and extend existing systems to accommodate new construction.
1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
   a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
   b. Provide temporary connections as required to maintain existing systems in service.
4. Verify that abandoned services serve only abandoned facilities.
5. Remove abandoned pipe, ducts, conduits, and equipment , including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

D. 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.

E. Adapt existing work to fit new work: Make as neat and smooth transition as possible.

F. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

G. Refinish existing surfaces as indicated:
1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.

H. Clean existing systems and equipment.

I. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

J. Do not begin new construction in alterations areas before demolition is complete.

K. 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-complying work.

D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

G. Restore work with new products in accordance with requirements of Contract Documents.

H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 078400, to full thickness of the penetrated element.

J. Patching:
1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
2. Match color, texture, and appearance.
3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

## 3.07 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. 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 017900 - Demonstration and Training.

**3.11 ADJUSTING**

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

**3.12 FINAL CLEANING**

A. Use cleaning materials that are nonhazardous.

B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

E. Clean filters of operating equipment.

F. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, drainage systems, and _____.

G. Clean site; sweep paved areas, rake clean landscaped surfaces.

H. 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.

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 Owner-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 017800**
**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 013000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Individual Product Sections: Specific requirements for operation and maintenance data.

C. 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. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   2. 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.
   3. Submit two sets of revised final documents in final form within 10 days after final inspection.

C. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
   2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

## PART 3 EXECUTION

### 2.01 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Addenda.
   3. Change Orders and other modifications to the Contract.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Record Drawings: Legibly mark each item to record actual construction including:
   1. Field changes of dimension and detail.
   2. Details not on original Contract drawings.

### 2.02 OPERATION AND MAINTENANCE DATA

A. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

B. 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.

C. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

**2.03 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. 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.

D. 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.

E. Provide servicing and lubrication schedule, and list of lubricants required.

F. Include manufacturer's printed operation and maintenance instructions.

G. Include sequence of operation by controls manufacturer.

H. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

I. Additional Requirements: As specified in individual product specification sections.

**2.04 WARRANTIES AND BONDS**

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that 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.

**END OF SECTION**

**SECTION 017900**
**DEMONSTRATION AND TRAINING**

## PART 1 GENERAL

### 1.01 SUMMARY

A. Demonstration of products and systems to be commissioned and where indicated in specific specification sections.

B. Training of Owner personnel in operation and maintenance is required for:
   1. All software-operated systems.
   2. HVAC systems and equipment.
   3. Plumbing equipment.
   4. Electrical systems and equipment.

C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:

### 1.02 RELATED REQUIREMENTS

A. Section 017800 - Closeout Submittals: Operation and maintenance manuals.

### 1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures; except:
   1. Make all submittals specified in this section, and elsewhere where indicated for commissioning purposes, directly to the Commissioning Authority.
   2. Submit one copy to the Commissioning Authority, not to be returned.
   3. Make commissioning submittals on time schedule specified by Commissioning Authority.
   4. Submittals indicated as "Draft" are intended for the use of the Commissioning Authority in preparation of overall Training Plan; submit in editable electronic format, Microsoft Word 2003 preferred.

B. Draft Training Plans: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
   1. Submit to Commissioning Authority for review and inclusion in overall training plan.

C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
   1. Include applicable portion of O&M manuals.
   2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
   3. Provide one extra copy of each training manual to be included with operation and maintenance data.

### 1.04 QUALITY ASSURANCE

A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
   1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
   2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

## PART 2 PRODUCTS - NOT USED

## PART 3 EXECUTION

### 3.01 DEMONSTRATION - GENERAL

A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.

B. Demonstrations conducted during Functional Testing need not be repeated unless Owner personnel training is specified.

C. Demonstration may be combined with Owner personnel training if applicable.

D. 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.

E. 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. Commissioning Authority will prepare the Training Plan based on draft plans submitted.

B. Conduct training on-site unless otherwise indicated.

C. Owner will provide classroom and seating at no cost to Contractor.

D. Do not start training until Functional Testing is complete, unless otherwise specified or approved by the Commissioning Authority.

E. Provide training in minimum two hour segments.

F. The Commissioning Authority is responsible for determining that the training was satisfactorily completed and will provide approval forms.

G. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.

H. 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.

I. 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.

J. 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 024100**
**DEMOLITION**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Selective demolition of building elements for alteration purposes.

### 1.02 RELATED REQUIREMENTS

A. Section 011000 - Summary: Limitations on Contractor's use of site and premises.

B. Section 015000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

C. Section 017000 - Execution and Closeout Requirements: Project conditions; existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

### 1.03 REFERENCE STANDARDS

A. 29 CFR 1926 - Safety and Health Regulations for Construction; Current Edition.

## PART 2 PRODUCTS -- NOT USED

## PART 3 EXECUTION

### 3.01 DEMOLITION

A. Remove all items as specified on Drawing Sheets D100, M200, M201, M300, E200, and E201.

### 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. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
   3. Provide, erect, and maintain temporary barriers and security devices.
   4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   5. Do not close or obstruct roadways or sidewalks without permits from authority having jurisdiction.
   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.
   7. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon, or limit access to their property.

B. Do not begin removal until receipt of notification to proceed from Owner.

C. Protect existing structures and other elements to remain in place and not removed.
   1. Provide bracing and shoring.
   2. Prevent movement or settlement of adjacent structures.
   3. Stop work immediately if adjacent structures appear to be in danger.

D. Hazardous Materials:
   1. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCBs, and mercury.

### 3.03 EXISTING UTILITIES

A. Coordinate work with utility companies. Notify utilities before starting work, comply with their requirements, and obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

## 3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Existing construction and utilities indicated on drawings are based on casual field observation and existing record documents only.
   1. Verify construction and utility arrangements are as indicated.
   2. Report discrepancies to Architect before disturbing existing installation.
   3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Maintain weatherproof exterior building enclosure, except for interruptions required for replacement or modifications; prevent water and humidity damage.

C. Remove existing work as indicated and required to accomplish new work.
   1. Remove items indicated on drawings.

D. Services including, but not limited to, HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications: Remove existing systems and equipment as indicated.
   1. Maintain existing active systems to remain in operation, and maintain access to equipment and operational components.
   2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
   3. Verify that abandoned services serve only abandoned facilities before removal.
   4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings. Remove back to source of supply where possible, otherwise cap stub and tag with identification.

E. Protect existing work to remain.
   1. Prevent movement of structure. Provide shoring and bracing as required.
   2. Perform cutting to accomplish removal work neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.
   4. Patch to match new work.

## 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 030516**
**UNDERSLAB VAPOR BARRIER**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Sheet vapor barrier under concrete slabs on grade.

### 1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Preparation of subgrade, granular fill, placement of concrete.

### 1.03 REFERENCE STANDARDS

A. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2018a.

B. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2017 (Reapproved 2023).

## PART 2 PRODUCTS

### 2.01 MATERIALS

A. Underslab Vapor Barrier:
   1. Water Vapor Permeance: Not more than 0.010 perms, maximum.
   2. Thickness: 15 mils.
   3. Basis of Design:
      a. Stego Industries LLC; Stego Wrap Vapor Barrier (15-mil): www.stegoindustries.com/#sle.
      b. Raven Industries; VaporBlock VB15.
      c. Substitutions: See Section 016000 - Product Requirements.

B. Accessory Products: Vapor barrier manufacturer's recommended tape, adhesive, mastic, etc., for sealing seams and penetrations in vapor barrier.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify that surface over which vapor barrier is to be installed is complete and ready before proceeding with installation of vapor barrier.

### 3.02 INSTALLATION

A. Install vapor barrier in accordance with manufacturer's instructions and ASTM E1643.

B. Install vapor barrier under interior slabs on grade; lap sheet over footings and seal to foundation walls.

C. Lap joints minimum 6 inches.

D. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions.

E. No penetration of vapor barrier is allowed except for reinforcing steel and permanent utilities.

F. Repair damaged vapor retarder before covering with other materials.

**END OF SECTION**

**SECTION 03 10 00**

**CONCRETE FORMING AND ACCESSORIES**

## PART 1 - GENERAL

### 1.1 WORK INCLUDED

A. Forms for all cast in place concrete
B. Form accessories.
C. Stripping forms.
D. Waterstops
E. Formdeck for stoops
F. Opening in forms for other effected work.
G. Shoring and reshoring as required. See structural notes page and details.

### 1.2 RELATED CONTRACT DOCUMENTS

A. Documents affecting work of this Section include, drawings and general provisions of Contract, all General and Supplementary Conditions and all other Division 0 and 1 Specification Section.

### 1.3 WORK INSTALLED BUT FURNISHED UNDER SECTIONS

A. Section 05 12 00 - Structural Steel: Steel fabrications attached to form work.

### 1.4 RELATED WORK

A. Section 03 20 00 - Concrete Reinforcement.
B. Section 03 30 00 –Cast-In-Place Concrete.
C. Section 05 12 00– Structural Steel

### 1.5 REFERENCES

A. ACI 301 - Specifications for Structural Concrete for Buildings.
B. ACI 315 - Details and Detailing of Concrete Reinforcement.
C. ACI 318 – Building Code Requirements for Structural Concrete.
D. ACI 350 - Code Requirements for Environmental Engineering Concrete Structures
E. ACI 347 - Recommended Practice for Concrete Formwork.
F. PS 1 - Construction and Industrial Plywood.
G. ACI 117-Standard Specifications for Tolerances.

### 1.6 QUALITY ASSURANCE

A. Construct and erect concrete form work in accordance with ACI 301.
B. Tolerances:
    1. See ACI 117.

### 1.7 CONTRACTORS RESPONSIBILITY FOR FORMWORK DESIGN AND REMOVAL

A. The form-work system shall be designed to support freshly place concrete and reinforcing materials, It shall transfer all concrete loads to the bearing soils or to completed construction in a safe manner at all times. Remove formwork, in a manner that does not damage the concrete or the elements of the project. Under the requirements of the construction documents, IBC, All local Building codes, ACI, OSHA and Local Workmen’s Compensation; The contractor, and not the engineer or architect, shall provide engineering as required to meet this obligation.

**PART 2 – PRODUCTS**

**2.1 FORM MATERIALS** (Earth is not an approved forming material)(Conform to ACI 301 and ACI 347 for design, fabrication, erection and removal of forms.)

A. Plywood: Douglas Fir or equal species; sound, undamaged sheets with straight edges, manufactured for concrete wall forms.
   1. Conform to Tables for form design in APA Form V-345, including strength.

B. Glass Fiber Fabric Reinforced Plastic Forms: Matched tight fitting, stiffened to support weight of concrete without deflection detrimental to structural tolerances and appearance of finished concrete surface.

C. Steel: Minimum 16 gauge sheet, well matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

D. Form deck: 1.5C 20 gauge (min) ASTM A653 by Vulcraft or equal, galvanized in accordance with ASTM 924-94 to a min class of G90, unless otherwise noted on plans.

E. Circular pier or round column forms: Cardboard waxed or plasticized forms such as Sonotube or equivalent.

F. Do not leave aluminum materials, which may cause a corrosive reaction, embedded in the concrete. Aluminum forms are acceptable.

**2.2 FORMWORK ACCESSORIES**

A. Form Ties: factory fabricated, adjustable length, removable or snap off form ties which results in no metal being closer than 1 1/2" from surface of concrete when forms are removed.

B. Form Release Agent: Colorless material that will not stain concrete, or absorb moisture.
   1. Do not allow form release agent to come in contact with reinforcing steel or inserts in the concrete.

C. Fillets for Chamfered Corners: Wood strips or rigid plastic as detailed. ¾" x ¾".

D. Nails, Spikes, Lag Bolts, Through Bolts, Anchorage's: Sized as required; of strength and character to maintain form work in place while placing concrete.

E. Shelf Angle Inserts
   1. Wedge type inserts for 5/8" diameter bolts. Include horseshoe shims.
   2. Minimum capacity 2,100 pounds

F. Dovetail Anchor Slots:
   1. 1" deep with 5/8" throat, 24 gauge galvanized steel.

G. Flashing Reglets: 3/4" deep with 1/4" throat, 26 gauge galvanized steel.

H. PVC weeps: 3" diameter PVC pipe.

I. Waterstops: See plans and details for location.
   1. Extrudable non-leaching polyurethane products that will swell upon moisture contact.
      a. Sika Products: SikaSwell S one part water swelled extruded polyurethane sealant, including special triangular shaped nozzle.
      b. An equal approved product with one part polyurethane makeup that is free of bentonite or other leaching materials
   2. PVC Waterstop.
      a. Unless otherwise noted within the construction documents,4" Ribbed Center Bulb style shall be used at all cold formed joints in liquid bearing structures.
      b. Waterstop shall have a minimum design head pressure capacity of 100' or greater.
      c. PVC Waterstop must meet or exceed the performance required by U.S. Army Corps of Engineers Specification CRD-C 572-74.

## PART 3 – EXECUTION

### 3.1 INSPECTION

A. Verify lines, levels, and measurements before proceeding with formwork.
B. Depth or thickness of concrete being formed is to be as shown on plans. No variation in thickness or depth is allowed. (i.e.) a 4" slab is not to be poured at 3-5/8".

### 3.2 PREPARATION

A. Arrange and assemble formwork to permit dismantling and stripping so that concrete is not damaged during its removal.
B. Arrange forms to allow stripping without removal of principal shores, where required to remain in place.

### 3.3 ERECTION

A. Provide bracing to ensure stability of formwork. Strengthen formwork liable to be overstressed by construction loads.
B. Construct forms in accordance with ACI 301.

### 3.4 TOLERANCES

A. Set and maintain forms to provide completed surfaces meeting the tolerances given in ACI 117. See Part 1 of these specifications.
    1. Tolerances given in ACI 117 are not cumulative. Maximum tolerance for any formed surface, except footings, shall be one inch.

### 3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Provide formed openings where required for work embedded in or passing thorough concrete. Fill these voids with a readily removable material to prevent entry of concrete into voids or:
    1. Use void forming systems of correct size for openings required in the concrete. Follow manufacturers' instructions for proper strength ratings of void forms.
B. Coordinate work of other Sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, including electrical boxes and conduit and other inserts.
    1. Ensure that forms will provide sufficient coverage for reinforcing. See Section 03200 for requirements.
C. Install accessories in accordance with manufacturers' instructions level and plumb. Ensure items are not disturbed during concrete placement.
D. Apply extruded waterstop in form locations as shown on plans and details. Form all joints as a continuous ¾" bead strictly according to the manufacturer's instructions so that waterstops are continuous.
    1. Following manufacturers' instructions, use largest of the 2 precut triangular nozzles to insure proper form and size of bead. Apply to clean, dry flat surfaces.
        a. Depending on concrete thickness more than one bead may be required. Consult manufacturer's instructions.
    2. Waterstop must be allowed to pass through all form bulkheads. Notch bulkheads at end of all pour intersections.
        a. **To prevent waterstop damage**, install 2-3 hours prior to any concrete pour where vertical height is more than 20 inches. Use of a tremie to limit concrete drop to 20 inches is required if waterstop is less than 2 days old.
        b. If wall is higher than 10'-0" contact Engineer for use of SikaSwell Hose.
E. Build in dovetail anchor slots. Install anchor slots in concrete walls, columns, piers, beams and spandrels deeper than 14 inches and wider than 16 inches which will be in contact with masonry or elsewhere as indicated on the Drawings. Install anchor slots vertically, spaced 16 inches on center.

## 3.6 FORM RELEASE AGENT APPLICATION

A. Apply agent on formwork only in accordance with manufacturer's instructions.
   1. Apply prior to installation of reinforcing steel, anchoring devices or embedments.
   2. If unable to completely remove agent from unintended items, replace the reinforcing steel, anchors or embedments.

## 3.7 FORM REMOVAL

A. Replace concrete damaged by early removal of forms. Consult ACI 318, 301 and the following:

   1. Do not remove forms, shoring or bracing until concrete has sufficient strength to support its own weight, and construction and design loads that may be imposed upon it.
   2. Temperatures below 50 degrees F will prolong the timing of form removal.

B. Form removal timing: Contractor shall verify the exact timing of form removal using these minimum removal times based on 28 day strength design of concrete and ACI 318.
   1. Footings: 24 hours minimum.
   2. 12" Walls under 5'-0" and 5'0" columns: 36 hours minimum.
      a. For walls thicker than 12" and up to 20" add 8 hours.
      b. For walls thicker than 20" same as 3 below.
   3. Walls and columns over 5'-0": 72 hours minimum but not until concrete, by cylinder test, has reached 50% of its 28-day design strength.
   4. Beams, girders, raised decks or floors: 75% of its 28-day design strength. No time limit.

C. Do not damage concrete surfaces during form removal.

D. Reshoring: Reshoring is designed to allow concrete to deflect and support its own weight after initial set has occurred and forms have been removed. Remove forms and tightly place reshores only after initial concrete deflection. Do not remove reshores until concrete has reached its specified strength.
   1. Apply no construction loads or other loads to members being reshored
   2. Provide reshores for all two-way slabs until concrete reaches specified strength.

E. Forms for post-tensioned members may be removed as soon as full post-tension has been applied. Provide reshores as for non-post-tensioned members.

F. At removal of forms patch all locations where wire ties protrude through the concrete or are exposed. Use primer and Non Shrink grout to solidly fill these holes. Also patch and grind to provide a smooth formed finish where required. See Part 1 of these specifications.

## 3.8 ALLOWABLE FACE & CORNER FINISHES

A. Rough Form Finish: Concrete faces not exposed to view in the finished work shall have a rough form finish as defined by ACI 347.3.4 as a Class D finish. Holes shall be no larger than 3/8" and honeycombing or surface irregularities shall be no more than 1" in a 5'-0" area. However any exposed reinforcing steel or ties must be solidly grouted to match reinforcing coverage requirements.

B. Smooth Form Finish: Concrete faces exposed to view in the finished work shall have a smooth form finish as defined by ACI 347.3.4 as a Class B surface. Class B surfaces have no more than ¼ " abrupt or gradual irregularities in a 5'-0" area and no holes larger than 1/4" on the surface. The contractor shall grind the surface where necessary to comply with these ACI requirements.

C. Prominently exposed Class A finish: Concrete faces exposed to view as part of the architectural design or surfaces to receive finishes of any type (paint, textured paint, etc.) shall receive an class A smooth form finish as defined by ACI 347.3.4. These class A surfaces have no more than 1/8 " abrupt or gradual irregularities in a 5'-0" area and no holes larger than 1/8" on the surface. The contractor shall then fill all holes and grind the exposed surface to provide a finish compatible with a heavily scrutinized surface.

D. Corners not exposed to view may be formed either square or chamfered.

E. Corners exposed to view shall be square, smooth, solid, unbroken lines except where a chamfered surface is called for on architectural plans
   1. Chamfered Corners shall be formed with chamfer strips to produce uniformly straight

lines and tight edge joints. Unless otherwise stated the chamfers shall be 3/4" along both adjoining planes of the concrete edge. Extend the edges of the chamfers to the end of the formed surface. Match adjacent changes of direction by mitering to produce a connection without breaks in appearance. See architectural plans for where chamfers are required.

## 3.9 CLEANING

A. Clean forms to remove foreign matter as erection proceeds.
B. Ensure that water and debris drain to exterior through clean-out ports.

**END OF SECTION**

**SECTION 03 20 00**

**CONCRETE REINFORCING**

## PART 1 - GENERAL

### 1.1 WORK INCLUDED

A. Weldable and non-welded reinforcing steel bars, for cast-in-place concrete.
B. Support chairs, bolster, bar supports, ties and spacers for supporting reinforcement.
C. Adhesive installation of dowels and or bars into prior placed concrete, masonry or structure.

### 1.2 RELATED CONTRACT DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 0 and 1 Specification Sections apply to this Section

### 1.3 RELATED WORK

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A. Division 2 Earth and Site work.
B. Section 03 10 00 - Concrete Forming and Accessories
C. Section 03 30 00 – Cast-In-Place Concrete.
D. Section 05 12 00 – Structural Steel

### 1.4 REFERENCES (Except where noted use latest edition)

A. ACI 301 - Specification for Structural Concrete for Buildings.
B. ACI 350 – Code Requirements For Environmental Engineering Concrete Structures
C. ACI 318 – Building Code Requirements for Structural Concrete
D. ACI 315 - Details and Detailing of Concrete Reinforcement.
E. ANSI/ASTM A82 - Cold Drawn Steel Wire for Concrete Reinforcement.
F. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.
G. ASTM A 184/A - Welded Deformed Steel Bar Mats for Concrete Reinforcement.
H. ANSI/AWS D1.4 - Structural Welding Code Reinforcing Steel.
I. ASTM A615 – Standard Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
J. ASTM A706 – Welding Bars for Concrete Reinforcement.
K. CRSI - Manual of Practice.

### 1.5 QUALITY ASSURANCE

A. Perform concrete reinforcement work in accordance with CRSI Manual of Standard Practice, and Documents 63 and 65.
B. Conform to ACI.
C. Have all reinforcing inspected by local authority and testing laboratory prior to concrete pour. See section 01 45 29.

### 1.6 SHOP DRAWINGS

A. Submit shop drawings in no more or no less than 4 copies. Shop drawings shall show arrangement and layout, bending and assembly diagrams, bar schedules, stirrup spacing, splicing and laps of bars and shall be prepared in accordance with CRSI standards.
B. Allow a minimum of 7 calendar days for processing not including shipping times.
C. Provide layout with gridline coordinates and dimensions. Provide in accordance with ACI publication SP-66 / 315R-94 and 315-92 detailing manual.

1. Provide cutting / bending lists and cut through concrete details that show all sizes,

spacing, concrete cover, locations, splices and quantities of reinforcing steel.

a. Supporting devices are part of the work and must be shown on the submittal.

D. Make a request in writing to Heyer Engineering to use portions of original design contract document drawings for layout of their submittal. If agreed, comply with the following:
- The title block, sheet numbers and all designers' stamps, signatures and references are removed and are never to be used by the fabricator or user.
- Dimensions shown on contract documents are not verified and are not to be reused. Detailer shall create new dimensions from architectural contract documents for erection purposes. Gridlines only should be reused.
- Non-reinforcing elements except for concrete or masonry shall be removed.
- Details and elevations shown on contract documents are only for design and need to be completely redone by the detailer for erection purposes.

## PART 2 – PRODUCTS

### 2.1 MATERIALS

A. Non Welded Reinforcing Steel: ASTM A615, 60 ksi yield grade billet-steel deformed bars, uncoated finish. Also includes smooth dowels. Use at all locations where A706 type is not specifically stated.
1. At construction joints, grease and wrap the exposed end portion of smooth dowels prior to next concrete pour.
2. See Structural details for corner bar requirements in footings, foundations and masonry.

B. Weldable Reinforcing Steel: ASTM A706 60 ksi yield grade low alloy steel deformed bars with uncoated finish. See locations required on plans and details.

C. Welded Steel Wire Fabric: ASTM A185 plain type; uncoated finish. Where size not noted, use 6 x 6 W2.1 x W2.1.
1. Must be flat sheets only. Coils or wire rolls are not permitted.

D. Reinforcing supports:
1. For footing, wall, pier or foundation supports use stirrups or wire meeting either CRSI Class 1-2 gauge tie wire meeting ASTM A82.
2. Slab Reinforcing Supports: Use Stirrups, chairs, masonry materials, or concrete pre-placements meeting CRSI requirements. Wood materials are prohibited. Supports are to be furnished by material supplier unless masonry or concrete preplacements. Coordinate with contractor.

### 2.2 ACCESSORY MATERIALS

A. Tie Wire: ASTM A82; minimum 16 gauge, annealed type, black.

B. Adhesive Anchoring Products See Section 051200 for materials to be used when rebar must be embedded into existing structures.

### 2.3 FABRICATION

A. Fabricate in accordance with ACI 315, providing concrete cover specified in this section.

B. Locate reinforcing splices not indicated on Drawings at points of minimum stress. Indicate location of splices on shop drawings.

C. If required in plans or details, weld reinforcing bars in accordance with ANSI/ASW D1.4.

### 2.4 JOBSITE STORAGE

A. Reinforcing steel shall be stored at site on timbers or planks, not concrete, which will keep steel free from mud and water. If storage is during winter months cover and ventilate.

## PART 3 – EXECUTION

## 3.1 INSPECTION

A. Prior to concrete placement all reinforcing shall be inspected by a Testing agency. See Section 01 45 29. This inspection shall verify that reinforcing is installed per the plans and specifications and is not contaminated with form lubricants. In case of a conflict between the plans and the submittal drawings promptly contact the Engineer for resolution.
B. When the supporting medium is a raised platform inspect the platform or decking to insure that the substrate is the proper specified platform and that the finish of the deck is as specified.
C. Prior to concrete placement, notify all required governmental authorities of the work to allow for their inspection and comment.
D. Before placing concrete, clean reinforcement of foreign particles or coatings including form oils. If reinforcement cannot be completely cleaned, replace contaminated reinforcement.

## 3.2 COVERAGE

A. Maintain concrete cover around reinforcing as shown on structural plans and note sheet.

## 3.3 INSTALLATION

A. For slabs and exterior walkways adjacent to building if reinforcement is not shown install 6 x 6 W2.1 x W2.1 flat sheet Woven Wire Fabric. Do not use coils.
B. Place, support, and secure reinforcement against displacement. Do not deviate from alignment or measurement.
C. Provide ties, bar supports and other permanent methods of keeping reinforcing steel at required position in the concrete.
    1. Anchor bolts or dowels for structure above footings or foundations may be placed in the top of initial pour prior to set of that concrete pour, within 30 minutes. They must be placed correctly and have all concrete at the area of the insertion hand troweled to provide a smooth and level top of concrete surface.
    2. Retaining walls, however, must have all elements including anchor bolts or dowels placed and supported in the initial pour.
D. Chair up all steel bar slab reinforcing. Do not allow reinforcing to be at bottom of slabs. The process of lifting up bars during slab pouring is not permitted unless it is to lift it up onto pins or chairs, during pour, for permanent placement.
    1. Slabs where bars are not properly placed shall be replaced at contractors' expense.
E. Where smooth dowel construction joints are utilized, grease and wrap one end of the dowel.
F. See plans and details for specific locations that call for weldable reinforcing steel. At these locations use A706 reinforcing steel.
G. For drilling or placing bolts, rods, anchors or similar embedments into existing masonry or concrete whether vertical or horizontal use an adhesive anchorage system. See Section 05121 for products to use and temperature restrictions. Substrate must not be below $32^0$ F.
H. For masonry see placement details for horizontal, corner and vertical bars in masonry cores, bond beams, jambs and lintels on structural drawing sheets.

**END OF SECTION**

**SECTION 03 30 00**
**CAST-IN-PLACE CONCRETE**

## PART 1 - GENERAL

### 1.1 RELATED CONTRACT DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and 01 Specification Sections apply to this section.

### 1.2 WORK INCLUDED

A. Furnish and install all cast-in-place concrete for footings, foundations, piers, columns, exterior stoops, interior slab on grade and raised slabs, equipment pads and other work as shown on plans and details.
   1. Equipment pads and similar concrete items. Division 15 and 16 contractors are responsible only for dimension, location and layout of the pads. Contractor of this section shall furnish and install concrete. If pad is located on top of a precast or other raised deck, provide information to the general contractor to adjust deck load prior to manufacturer's design of deck.

B. Protection of freshly poured and concrete undergoing curing.
C. Shelters, heat and weather protection of Cast in Place Concrete.
D. Pumping of Concrete materials if required.
E. Water stops. (See section 03 10 00).
F. Installation or metal angles, embeds and anchor bolts furnished by Division 5 into the concrete.
G. Core fill grouting of masonry (installed by mason)
H. Admixtures, curing compounds and accessories.
I. Sawcutting control joints.
J. ASTM and ACI standards of level and flatness.
K. Grouting of all control and construction joints with cemtitious products compatible with flooring glues prior to flooring installation.

### 1.3 RELATED WORK

A. Division 02- Earthwork
B. Section 03 10 00 - Concrete Forming and Accessories
C. Section 03 20 00 - Concrete Reinforcing
D. Section 04 20 00 – Masonry
E. Section 05 12 00 – Structural Steel Framing
F. Section 05 21 00 – Steel Joist Framing
G. Section 05 31 00 – Steel Decking

### 1.4 REFERENCES (Use latest publication date unless otherwise noted)

A. ACI 301 – Standard Specifications for structural concrete for buildings. (THE FIELD GUIDE)
B. ACI 315 – Details and Detailing of Concrete Reinforcement
C. ACI 318 – Building code requirements for structural concrete
D. ACI 350 – Code Requirements For Environmental Engineering Concrete Structures
E. ASTM C33 - Concrete aggregates.
F. ASTM C618 – Standard specification for coal fly ash- type C. Use Coal Creek brand of fly ash only.
G. ASTM C94 - Ready-Mixed concrete.
H. ASTM C150 - Portland cement.
I. ASTM C260 - Air-Entraining admixtures for concrete.
J. ASTM C494 - Chemical admixtures for concrete.

K. ASTM C309 – Curing compounds for concrete.
L. ACI 210-Guide to durable concrete.
M. ASTM C171- Specification for sheet material for curing concrete.

N. ASTM E1155 – Standard test method for determining (FF) Floor flatness and (FL) Floor levelness numbers.
O. ACI C308 - Standard practice for curing concrete.
P. ACI C305R – Hot weather concrete work.
Q. ACI C306R – Cold weather concrete work.
R. AASHTO M-148 for curing materials.
S. ASTM C192- Test methods for concrete.
T. ASTM C156 - Test method for moisture retention for concrete.
U. ASTM C 295 - Petrographic examination of aggregates for concrete.

## 1.5 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301.
B. Have a current copy of ACI 301 on the jobsite for reference during the work of this section.
C. Dimensions as shown on Construction Drawings are as intended. Slabs listed as 4" shall be 4".
D. If the Concrete provided does not meet these specifications, The Contractors' Independent Engineering & Testing Agency shall perform batch inspections for the design mix and shall sample and test mix ingredients until concrete quality is established to the satisfaction of these Specifications.

## 1.6 DESIGN & TESTING

Submit the design mixes 10 days prior to placing concrete. Receive Engineers' review prior to use. Mix designs shall be no more than one-year-old from the date they are to be used. The following information shall be provided for each design mix.

(1) Fine and coarse aggregate gradations per ASTM C33.
(2) Method of determination the mix design proportions.
(3) Water/cement ratio.
(4) Entrained and non-entrained air content of freshly poured concrete.
(5) Compressive strength at 28 days per ASTM C 39.
(6) Chloride ion content of the concrete per ASTM C1218.
(7) The proportions and types of all cementitious materials and admixtures.
(8) The Shale and deleterious contents of all aggregates used.
(9) Slump. Including slump both prior and after introduction of plasticizers; if they are used.
(10) Location where concrete is to be placed. (i.e.) footings, topping etc.

B. After design mix is approved, the testing and analysis of jobsite delivered concrete will be performed under provisions of Section 01 45 23including:
1. Strength tests: 4 Cylinders (1-7day, average of 2-28 day, 1 field hold) per every 50 yards of each type of concrete for each days pour.
a. Contractor shall keep and test additional cylinders for use in his determination of form removal timing, for cold or hot weather verification and for OSHA required column strengths.
2. Slump tests at the point of application and before and after addition of plasticizer. Send back non-compliant trucks.
3. Air entrainment tests at same time as slump tests. Air tests in fresh concrete are intended to show current air content. Send back non-compliant trucks.

D. Vehicles on which non-compliant concrete are delivered shall not be allowed to modify concrete to be in compliance. Vehicle shall return to redi-mix plant & offload non-compliant concrete prior to batching of new concrete. No rebatched, formerly rejected concrete shall be used.

## 1.7 SUBMITTALS

A. Shop Drawings
1. Construction Joints: Submit drawings of proposed construction joint locations in concrete for slab-on-grade, walls and foundations. Submit any additional or changed reinforcing that is required at construction joints that differs from that shown on drawings.
2. Openings, Sleeves, and Cores: Submit drawings of all openings to be formed, sleeved,

cored, or sawcut in cast-in-place elements. Drawings shall indicate size and location of openings, sleeves, or cores.

3. Embedded Items: Submit drawing showing all items to be embedded in concrete elements, including plates, angles, bolts and any non-structural items such as conduit. Drawings shall indicate locations, size, orientation and type of embedded item.
4. Anchor Rods: Submit drawings showing layout and details for steel templates used for placing anchor rods.

**PART 2 – PRODUCTS**

**2.1 CONCRETE PROPERTIES, MATERIALS & MIXING**

A. Concrete shall be plant redi-mix type meeting ASTM C94. Site mixed concrete is not acceptable.
B. Proportion mixes in accordance with ACI 211.1.
C. Compressive strength (ASTM C31) and C39): See Chart for individual requirements.
D. Water: potable, clean and free of injurious quantities of substances known to be harmful to and conforming to ASTM C94.
   1. Water / cement ratio: To be calculated for each mixed design. See Chart for individual basic requirements
   2. Maximum water to cement ratio for exterior concrete subject to freeze thaw cycles shall be 0.45. Use 8.32 lbs. per gallon.
E. Portland Cement: ASTM C 150, Type I / II or Type I. All shall be low Alkali. If acid resistance is needed use type II. If high early strength is required use type III or add a minimum of 47 lbs. to each mix. Each bag is 94 lbs.
   1. Use the minimum quantity to reach desired 28-day compressive strength +15% overage.
F. Type C Fly Ash, meeting ASTM C618. Maximum allowable percentage and allowable time of use is stated in Chart in Article 2.6.
G. Fine aggregate: clean, durable and sound natural sand conforming to ASTM C33, #4 and down.
   1. Shale or deleterious content shall be no more than .5% for slabs and 1% for all other concrete.
H. Course aggregate: clean, durable and sound natural processed gravel conforming to ASTM C33 and free or materials that can cause Alkali-silica reaction (ASR). See chart in Part 2 for maximum sizes.
   1. Shale or deleterious content shall be no more than .5% for slabs and 1% for all other concrete.
   2. Maximum size shall not exceed 33 1/3% of the depth of any slab section.
   3. Test course aggregate for ASR under ASTM C295 or ASTM C1260.
I. Air content: Tested to ASTM C231. See chart in Part 2 for required fresh entrained quantities. All concrete has some non-entrained air.
J. Slump: Tested to ASTM C 143. See chart in Part 2 for requirements.

**2.2 COMMON CONCRETE ACCESSORIES AND ADDITIVES**

A. No products containing calcium chloride in a content of more than 0.06% of the cement weight in chloride ions or Thiocyanates will be permitted. See ASTM C494 and ACI 318. - **If additional admixtures are used after mix approval, notify the Structural Engineer.**
   1. Use an exterior curing compound for all exterior horizontal and exposed vertical surfaces. Product shall meet ASTM C309 Type 2, Class B. These products leave a white Dye.
   2. Clear interior cure and seal products are required for interior slab concrete, where no floor covering or coating will be applied; they must meet ASTM C1315 type 2.
      a. Verify that no floor covering or finish exists with Architect.
   3. On interior slabs on grade or raised placed in an enclosed temperature controlled building where floor covering will be adhered. Use a resin type, dissipating concrete curing compound meeting AASHTO M-148, and ASTM C309 Type I Class B. Verify that product shall penetrate and not leave material on surface.
   4. Wet curing materials for interior slab on grade or raised slab work where building has not been erected and concrete is exposed.

a. Burlap, cotton mats and rags, rugs or similar material under polyethylene sheets. Fabric must not have been previously used for sugar, fertilizer or acidic materials storage. Take care that material does not have dye which will stain the concrete. The material shall meet AASHTO M-147 and ASTM C156.
b. Combination poly and cloth sheets meeting ASTM C156.

5. Performed expansion and wall isolation joint Filler: Non extruded type joint filler constructed of asphalt impregnated fibers meeting ASTM D1751. Material shall be full depth of slab of edge joint and exposed width shall be 1/2".
6. Super plasticizer. Meeting ASTM C494F: For workability or for pumping the contractor may use a High Range Water Reducing Admixture/ or Super Plasticizer to go to a max. temporary slump of 6. Water must not be used to obtain this increase.
7. Mid Range Plasticizer. Meeting ASTM C494 Type D: Combination water reducer and agent to improve workability for concrete during placement, at a level less than a superplasticizer.
8. Water reducing admixtures: Water reducing admixtures meet ASTM C494, Type A.
9. Air Entraining: Tests to ASTM C231. Air content is shown on chart in Part 2 for individual types of concrete. Air entraining products must meet ASTM C260. All concrete does have some non-entrained air.
   a. Adjust if using a super or midrange plasticizer.
10. Concrete Bonding Agents: If concrete is to be placed on top of existing concrete or masonry use products meeting ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
11. Non-Chloride Accelerating Admixtures: If a faster initial set up is desired, or is specified in chart, use products meeting ASTM C 494 Type C. Never use chlorides.

## 2.3 GROUT FOR STRUCTURAL METAL BASEPLATES AND DOWELS

A. See Section 05 12 00 for non-shrink non-metallic grout.
B. Grout for dowels, See section 05 12 00 for adhesive anchoring systems.

## 2.4 GROUT FOR INTERIOR CONTROL JOINT, COLD JOINTS, CRACKS OR EXPANSION JOINT FILLING

A. Fill All Control Joints, construction joints and cracks over 1/16" in width except exterior required to prior to flooring or colorant installation
   1. Use a cementitious thin patch that can be applied from featheredge to 1”inch thick. Products must contain at least 80% ASTM C150 cementitious materials. Product shall self-bonding to clean dry concrete and meet ASTM C1157 performance and ASTM C191 for material set characteristics. Some of these require flooring glues to be applied within 24 hours.

## 2.5 CONCRETE MIXING AND TRANSPORTING

A. Do not add water to concrete at the site except with the direct written approval of the Structural Engineer or Architect. Delivery trucks shall deliver with minimum drum revolutions. No concrete older than 90 minutes from time of mixing in the truck shall be used for the project. See Article 1.6 on non-complaint concrete trucks.

## 2.6 CONCRETE MATERIALS, TYPES, STRENGTHS AND ADDITIVES

A. Install mixes that provide following minimum requirements:
   1. Concrete design mixes shall have a min. 15% over-design of compressive strength.
   3. Type C fly ash from Coal Creek Station in Stanton, North Dakota may be used up to the maximum percentages shown in non-cold weather conditions. Do not use fly ash within 48 hours prior to or 72 hours after an air temperature of 50 degrees or lower exists. Do not use from November 1st till April 15th where concrete is not in a 28-day environment where the temperature is kept above 50$^{O}$. Fly ash will retard initial set.

- **Footings & Footing Pads**
  - Low Alkali Cementitious Product Types: Portland Type I or I/II

| | | |
|---|---|---|
| | | Maximum 25% Fly Ash Allowed |
| o | Maximum Aggregate Size: | 1½" |
| o | Max Slump: | 5" |
| o | 28 Day Compressive Strength: | 3,000psi |
| o | Max w/c Ratio | 0.55 |
| o | Allowed Admixtures; Air Entrainment | WRDA Series upon Approval<br>Use of Entrained Air is Contractors Option |

- **Grout for CMU Wall Core Fill and CMU Bond Beams**

| | | |
|---|---|---|
| o | Low Alkali Cementitious Product Types: | Portland Type I<br>Maximum 25% Fly Ash Allowed |
| o | Maximum Aggregate Size: | 3/8" and min. 70% Fine Aggregate |
| o | Max Slump: | 8" |
| o | 28 Day Compressive Strength: | 3,000psi |
| o | Max w/c Ratio | 0.60 |
| o | Allowed Admixtures; Air Entrainment | WRDA Series upon Approval<br>Mid-Range Plasticizer OK<br>Super Plasticizer is Prohibited<br>5% Entrained Air is Contractors Option |

## 2.7 RELATED PRODUCTS

A. Post-Installed Anchors.

1. Mechanical Anchors: Only anchors having passed Acceptance Criteria 193 for use in cracked concrete and resisting wind and seismic loads shall be approved for use. Reports from the following organizations are acceptable:
   a. ICC Evaluation Service Report.
   b. IAPMO Uniform Evaluation Services.
2. Adhesive Anchoring Systems: Only adhesive anchor systems that comply with the latest revision of ICC-ES Acceptance Criteria 308 for use in cracked concrete and resisting wind and seismic loads shall be approved for use. Reports from the following organizations are acceptable:
   a. ICC Evaluation Service Report.
   b. IAPMO Uniform Evaluation Services.
3. Cold Weather Placement: See ACI 306R

B. Anchor Rods:
1. ASTM F1554, Grade 36

C. Non-Shrink Grout:
1. Type: Grout for base plates, bearing plates and grouting under precast or tilt-up wall panels shall be a non-metallic, shrinkage resistant, premixed, non-corrosive, non-staining product containing Portland cement, silica sands, shrinkage compensating agents and fluidity improving compounds.
2. Specifications: Non-shrink grout shall conform to ASTM C 1107.
3. Compressive Strength: Provide the minimum strength as shown below as determined by grout cube tests at 28 days:
   a. 6,000 PSI for supporting concrete 3,000 PSI and less.
   b. 8,000 PSI for supporting concrete greater than 3,000 PSI and less than or equal to 4,000 PSI.
   c. Unless noted otherwise on the drawings, grout strength on supporting concrete greater than 4,000 PSI shall be 8,000 PSI.

# PART 3 – EXECUTION

## 3.1 INSPECTION AND PROTECTION

A. Notify Engineer minimum 24 hours prior to commencement of concrete placement.
B. Verify anchors, seats, plates, reinforcement, drains and other items to be cast into concrete are accurately placed, held securely, and will not cause hardship in placing concrete. Provide written

verification as well as photographs of the area to be poured.

C. Insure polyurethane waterstops have been installed for at least 3 hours prior to pour and that rigid waterstop types are continually supported.

D. Work area and Concrete may be exposed to potentially hazardous damage after initial set has been achieved. Take measures to protect concrete from traffic, ladders, fluids and indentation during initial set and curing. Ladders and all materials with sharp edges must have protective plywood under the rungs or edges.

## 3.2 PREPARATION

A. Prepare existing concrete or masonry, for additional concrete by cleaning with steel brush and a neutral pH cleaning solution to insure removal of existing solvents, greases, plant products and other solutions. Apply an ASTM C1059 bonding agent in accordance with manufacturer's instructions.

B. If concrete is to be placed on top of metal platforms, or decks, prepare metal surface by cleaning with an acid etching solution or vinegar. Do not place concrete if rust or oxidation is present. Notify Architect.

C. If concrete is a slab to be placed on top of soil, insure that the soil is well compacted to specifications shown in earthwork section and that no debris or organic materials are present. Dampen the surface with water but do not flood.

D. At any location where new concrete is doweled to existing work, use an adhesive anchoring system. See section 05 12 00.

E. Protect and tape over all surfaces to be exposed, of all floor drains, openings and devices to be set into the concrete.

F. Protect all concrete from freezing during placement and initial set. Under no circumstances can concrete be placed on top of frozen soil, snow, ice, and frozen precast or any other frozen object.

## 3.3 VAPOR RETARDER

A. For all interior Slab on Grade Concrete with flooring or a finish applied; A vapor retarder shall be placed directly above granular subbase.

B. Use screed bars and platforms and means / methods keep vapor retarder unbroken.

## 3.4 PLACING CONCRETE

A. Place concrete in accordance with ACI 301. Keep an ACI 301 book on site for reference at all times.

1. Do not allow a vertical drop of more than 5'-0" without use of a Tremie to prevent aggregate segregation.

2. Hot Weather Placement: See ACI 305R
3. Cold Weather Placement: See ACI 306R

B. Ensure reinforcement, inserts, embedded parts, drains and formed joints are not disturbed during concrete placement. If movement occurs the concrete contractor must remove and replace the effected item and the effected concrete.

C. See section 03 20 00 and structural notes sheet for minimum concrete cover.

D. Use a minimum 1/8" per foot slope for all floor drains. Pitch entire room slab or maximum area of 20'- 0" and increase to 1/4" per foot of pitch in final 4'-0" of space around the drain. The concrete shall be worked well around all surfaces of the drain fitting.

E. All slab reinforcing must be on chairs. Hand lifting without supports during pour is prohibited.

F. Place concrete continuously between predetermined construction and control joints. Do not break or interrupt successive pours that would cause new cold joints to occur.

G. Excessive honeycombing or embedded debris in concrete is not acceptable. Contractor must replace or repair. See section 03 10 00, Part 3 for acceptable finishes.

H. Concrete may be placed by means of a Concrete pumper. A plasticizer and a decrease in course aggregate size may be used only with permission of the Engineer when pumping is used. Cementitious content will need to be raised if aggregate size is modified. See requirements on slump and super plasticizer in Part 2.

I. The concrete shall be screeded or struck off slightly above final elevation, then consolidated.

1. Consolidate concrete by vibrating, so that concrete is thoroughly worked around reinforcement, around embedded items and into corners of forms to eliminate air or stone packers that may cause honeycombing, pitting or weakness.
   a. Vibrating shall be done by experienced workers in a manner to eliminate consolidation. Do not vibrate forms or reinforcing materials.
2. After consolidation the concrete shall not be further worked until finishing.

J. Do not add water during placement or when finishing.

K. Depth or thickness of concrete is to be as shown on the plans. No variation in thickness or depth is allowed.
   1. Slab concrete that is shown as 4 inches shall not be formed and poured at 3 5/8".

L. Do not use cement or sand to take up excess surface water.

**3.5 HORIZONTAL SURFACE FINISHING** (Including interior & exterior floors)

A. Finish the concrete when the water sheen has disappeared and the surface has stiffened enough to permit the finishing operation. Follow ACI 302.1R.

B. Types of final finishes are:
   1. For all interior flat exposed, resilient tile, or thin set ceramic tile covered floors float and then "Hard Steel Trowel Finish" the concrete surface in accordance with finishing class 5. This is designed to provide a smooth floor. Provide very close surface tolerances and no telegraphing of cementitious surfaces into the tile.
      a. Use the same finish for carpet covered floors.
   2. For all interior floors that will have ceramic or material requiring a grout bed provide only a floated finish with a wood float surface that allows for a level but not perfectly smooth surface. Considered a class 1,2 or 3 surface, but without any final troweling.
   3. For all interior concrete that contains air entrainment of 3% or less, an aluminum or magnesium float followed by a "Hard Steel Trowel Finish" shall be applied. Class 2.
   4. For all exterior concrete that contains air entrainment, an aluminum or magnesium float followed by a "Light Soft Bristle Broom Finish" shall be applied.
   5. For all interior concrete that requires slip resistance, an aluminum or magnesium float, followed by minimal steel trowling for levelness and a "Light Soft Bristle Broom Finish" shall be applied.
   6. See ACI 302.1R for class 6 and higher floors that are impact, high traffic or super flat.

B. All concrete horizontal surfaces, including floors must be flat and level. The following chart shows ASTM E1155 values in an average commercial situation for a flat and level floor that shall be followed:
   1. $F_F$ defines the maximum floor curvature allowed over successive 24" measurements on a 20'-0" x 20'-0" floor or flat surface. It is concerned with floor waviness.
   2. $F_L$ defines the maximum difference in elevations in decimals of an inch, between two points separated by 10'-0" taken any place on the floor. It is concerned with local levelness.
   3. The specified overall numbers are the maximum obtainable.
   4. The minimum localized numbers are the required expected values for the test section.

C. A traditional method to determine floor flat and levelness is to place a 10'-0" flat level anywhere on the surface. No more than a 3/16" gap would be measured under the level at any place on the floor or interior or exterior surface. In the chart we have listed this traditional measurement ***as a guide only.***

D. The ASTM system is designed to measure 4 20' x 20' test sections randomly chosen on the floor or surface in question. The Sections should not adjoin each other unless the floor is less than 80'x 80' in size.

| Types of concrete Horizontal surfaces & Their Quality Classifications | Minimum FF / FL Numbers Required | | | Local Levelness Value | Maximum Clearance Under a 10' Level |
|---|---|---|---|---|---|
| | Overall Flatness Value | Local Flatness Value | Overall Levelness Value | | |

| | | | | | |
|---|---|---|---|---|---|
| Flat concrete base for grout bed | 20 | 15 | 15 | 10 | 3/8" |
| Precast Topping Surface | 30 | 20 | 15 | 10 | 3/16" |
| Raised Slab Surface | 30 | 20 | 15 | 10 | 3/16" |
| Interior Slab on Grade surface | 35 | 24 | 30 | 20 | 1 / 8" |
| Exterior & garage floors, stoops, paving surfaces | 20 | 15 | 13 | 10 | 1 / 4" |

### 3.6 CRACKS, EXPANSION, CONSTRUCTION, AND CONTRACTION JOINTS

A. Horizontal and vertical construction joints in concrete shall be made only where shown for structural drawings and or approved by Engineer. All cold construction joints shall be provided with a suitable bonding agent at all grooves and keyways, and surfaces against which new concrete is to be laid shall be thoroughly cleaned with a stiff wire brush and water.
   1. Where smooth dowel construction (cold) joints are used, grease and wrap the exposed end of the dowel to allow horizontal movement.

B. Expansion joints at edges of the building or bay shall be filled with expansion material to within ¾" of top of all adjacent slabs or edges and shall be located where shown on drawings. See Part 2 products for types of materials to use.

C. Control joints shall be saw cut and located as shown on structural drawings. If not shown cut at intervals of (36 x slab thickness)" by (36 x slab thickness)" (+/- 5'-0"). Locate under wall partitions if possible.
   1. Saw cut control joints at an optimum time after finishing. Use 3/16-inch thick blade, cutting at least 1/4 into depth of slab thickness. (i.e.) 4" slab to be cut 1"+ deep. Fill saw cut control joint with a semi rigid joint filler, in accordance with ACI301, section 11.3.9. General Contractor is responsible for joint and semi rigid joint filler condition up to 90 days after building is occupied. After the 90 days, owner is responsible for joint maintenance.

D. All exposed joints and cracks over 1/16" in interior concrete upon which flooring or colorants are to be applied shall be grouted solid with a cementitious grout acceptable to flooring glue manufacturer. Contractor shall install prior to flooring installation but after initial cracking and movement due to shrinkage is complete. Generally 28 days. See part 2 products for material to use. Coordinate with flooring work. Some products have a limited time for installation of flooring.
   1. All joints that are under walls or partitions or are unexposed shall be sealed with a semi rigid joint filler, in accordance with ACI 301, section 11.3.9.

### 3.7 CONCRETE CURING AND SEALING (See also ACI 308)

A. All interior and exterior concrete must be kept between 55 and 80 degrees F and in a moist condition, to decrease water evaporation from the exposed surfaces during the first 7 days after placement.
   1. For building or shelter-enclosed concrete, Contractor may use temporary heaters provided that he vent all flue gases from units to the outside of the enclosure. Use only fresh outside air for combustion. All heaters of this type must also be equipped with a heat exchanger vented to the outside.

B. All interior slabs receiving glued down flooring, either on grade or raised, that are enclosed by the building shall be kept between $55^{O}$ and $80^{O}$ F and cured in the following manner.
   1. Either use the method in Paragraph C.1. below or:
   2. After finish troweling apply a resin based dissipating cure product meeting ASTM C309 with no surface residue in a double cross coat application. This will provide moisture retention only. Keep foot and equipment traffic off the slab for 7 days. Use products that do not leave residue on slab surface. See Part 2 Products.
   **3. Do not apply to concrete that will have colorant or exposed aggregate.**

C. All interior slabs, receiving glued down flooding either on grade or raised **that are exposed to weather and not enclosed** by the building during concrete pour and cure shall be kept between $55^{O}$ and $80^{O}$ F and cured in the following manner.
   1. Cover the slab with wet, non-ink containing burlap or similar material, under a 4-mil thick polyethylene plastic sheeting or a combination burlap / polyethylene cloth to retain

moisture. Keep burlap or similar material moist and the slab cured in this manner for 7 days at a temperature range of 55 to 70 degrees F.

2. Install materials to hold down the material.
3. If high early strength, Type III, concrete is used and temperature is kept above 73 degrees the period of time of wet curing required may be reduced to 3 days.

D. Allow the surface of the concrete to further cure and dry for a period of 28 days prior to exposure to epoxy finishes, flooring glues, hard surface traffic, steel wheels or shovels.

E. All exterior exposed uncolored vertical or horizontal concrete shall have a white dye release curing compound meeting ASTM C309 Type 2 applied.
1. See Part 2 Products and follow manufacturer recommendations & limitations for their use.

F. All interior slabs, left uncovered and not receiving any finish, colorant or flooring, either on grade or raised shall have a curing and sealing compound meeting either ASTM C1315 Type 1 or C309 Type 1applied.
1. See Part 2 Products for type and Architectural Plans for locations.

## 3.8 GROUTING OF CORES IN MASONRY UNITS

A. Fill all cells containing reinforcing with grout once masonry units have reached sufficient strength to resist grout pressure.
1. Grout masonry units in a height that allows full access to each lift's cores. Generally no more than 4'-0" in height each lift.
2. If core fill grout is to be placed in more than one lift, depress level of grout in first row of cells by 2" inches to insure an adequate bond on the following upper masonry layer.
3. At the top surface of the masonry stack bond, strike off any excess material above the surface.
4. At the top surface of the masonry stack bond, strike off any excess material above the surface.

B. Keep cells to be filled clean.

C. Center metal bars and dowels in the cells.

D. Vibrate if necessary to ensure grout has reached entire depth of cell.

## 3.9 SETTING AND GROUTING OF STRUCTURAL METALS AND BASEPLATES

A. See section 05 12 00.

B. Setting of anchor bolts is by this 03 30 00 Section using template, Contract Drawings and reviewed shop drawings from Section 05 12 00.

## 3.10 FOOTING & FOUNDATION CONCRETE

A. Do not use earth forms for footings.

B. Insure that all forms are braced sufficiently to handle weight and shifting from pouring of concrete.

C. Have an inspection done of all footings prior to pouring this concrete. Correct any reinforcement or form deficiencies prior to pouring. Do not imbed horizontal or cross bracing reinforcing after concrete has been poured. Dowels may be set after pouring but must be placed while concrete is still wet and pliable not after initial set. Drilling in dowels after set is not acceptable.

D. Use vibration to insure that all concrete is solidly placed and that no voids or honeycombs are allowed to occur.

E. Insure that top of footing concrete is level and able to receive masonry or concrete foundations without excessive dips or void areas.

F. Keep forms in place until the concrete is sufficiently strong enough to avoid deflection. See Section 031000.

G. During backfilling operations, brace foundation walls to prevent flexural distortion in curing concrete.

## 3.11 DEFECTIVE CONCRETE (See Chapter 9 of ACI 301)

A. Modify or replace concrete not conforming to required levels and lines, thickness, details, and elevations.

B. Repair or replace concrete not properly placed, indented or damaged, not of the specified type, frozen, spalling, under strength by more than 15%, or improperly cured. Testing agency that

designed concrete, Engineer and Architect shall be final arbiters of quality.

## 3.12 FIELD QUALITY CONTROL

A. See Division 01 and Part 1 of this specification

## 3.13 CLEANUP

A. At completion of each day's work, remove all concrete spillage and splash from adjacent areas and work.
   1. If Glass has been effected carefully, remove particles using methods approved by the glazing manufacturer. Do not use products that could etch glass.
   2. Provide a disposal place for ready mix truck wash down. Do not allow wash down concrete to be deposited in the street, on finished landscaping or onto other work. Costs of cleanup of improperly disposed of wash down will be deducted from future payment and will include replacement of damaged or soiled property.

**END OF SECTION**

**SECTION 042000**
**UNIT MASONRY**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Concrete Block.

B. Accessories.

### 1.02 RELATED REQUIREMENTS

A. Section 055000 - Metal Fabrications: Loose steel lintels.

B. Section 061000 - Rough Carpentry: Nailing strips built into masonry.

C. Section 079200 - Joint Sealants: Sealing control and expansion joints.

### 1.03 REFERENCE STANDARDS

A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata (2024).

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

D. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2022.

E. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2023.

F. ASTM C91/C91M - Standard Specification for Masonry Cement; 2023.

G. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units; 2023.

H. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.

I. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.

J. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.

K. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2024.

L. ASTM C476 - Standard Specification for Grout for Masonry; 2023.

### 1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.

C. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.

### 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 five years of documented experience.

### 1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

## PART 2 PRODUCTS

### 2.01 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depths as indicated on drawings for specific locations.
   2. Load-Bearing Units: ASTM C90, normal weight.
      a. Hollow block, as indicated.
      b. Exposed Faces: Manufacturer's standard color and texture where indicated.
   3. Non-Loadbearing Units: ASTM C129.
      a. Hollow block, as indicated.

### 2.02 MORTAR AND GROUT MATERIALS

A. Masonry Cement: ASTM C91/C91M, Type N.

B. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.
   1. Not more than 0.60 percent alkali.

C. Mortar Aggregate: ASTM C144.

D. Grout Aggregate: ASTM C404.

E. Water: Clean and potable.

### 2.03 ACCESSORIES

A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
   1. Manufacturers:
      a. Blok-Lok Limited: www.blok-lok.com/#sle.
      b. Hohmann & Barnard, Inc: www.h-b.com/#sle.
      c. WIRE-BOND: www.wirebond.com/#sle.

B. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

### 2.04 MORTAR AND GROUT MIXES

A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
   1. Interior, loadbearing masonry: Type N.
   2. Interior, non-loadbearing masonry: Type O.

B. Grout: ASTM C476; consistency required to fill completely volumes indicated 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.

C. Admixtures: Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.

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.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

### 3.02 PREPARATION

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

### 3.03 COLD AND HOT WEATHER REQUIREMENTS

A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.

B. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

### 3.04 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:
   1. Bond: Running.
   2. Coursing: One unit and one mortar joint to equal 8 inches.
   3. Mortar Joints: Concave.

### 3.05 PLACING AND BONDING

A. Lay hollow masonry units with face shell bedding on head and bed joints.

B. Remove excess mortar and mortar smears as work progresses.

C. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.

D. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

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

F. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.

G. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

### 3.06 REINFORCEMENT AND ANCHORAGE - GENERAL

A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.

B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

C. Place continuous joint reinforcement in first and second joint below top of walls.

D. Lap joint reinforcement ends minimum 6 inches.

### 3.07 LINTELS

A. Install loose steel lintels over openings.

### 3.08 BUILT-IN WORK

A. As work progresses, install built-in metal door frames and other items to be built into the work and furnished under other sections.

B. Install built-in items plumb, level, and true to line.

C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.

D. Do not build into masonry construction organic materials that are subject to deterioration.

### 3.09 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.

F. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

**3.10 CUTTING AND FITTING**

A. Cut and fit for chases. Coordinate with other sections of work to provide correct size, shape, and location.

B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

**3.11 CLEANING**

A. Remove excess mortar and mortar droppings.

B. Clean soiled surfaces with cleaning solution.

**3.12 PROTECTION**

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

**END OF SECTION**

**SECTION 051200**

**STRUCTURAL STEEL FRAMING**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Structural steel framing members, support members.

B. Base plates, expansion joint plates.

C. Grouting under base plates.

### 1.02 RELATED REQUIREMENTS

A. Section 01 4523 – Quality Control – Testing and Inspecting Services

### 1.03 REFERENCE STANDARDS

A. AISC (MAN) - Steel Construction Manual; American Institute of Steel Construction, Inc.; 2011.

B. AISC S303 - Code of Standard Practice for Steel Buildings and Bridges; American Institute of Steel Construction, Inc.; 2005.

C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2012.

D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

E. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2012.

F. ASTM A514/A514M - Standard Specification for High-Yield Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding; 2005 (Reapproved 2009).

G. ASTM A992/A992M - Standard Specification for Structural Steel Shapes; 2011.

H. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2013.

I. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2010.

J. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc.; 2011.

### 1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Submit drawings showing complete details and schedules for fabrication and assembly of structural steel members. Drawings shall include the following minimum information:

1. Details of cuts, connections, camber, holes, and other pertinent data.
2. Indication of welds by standard AWS symbols, and show size, length, and type of each weld.
3. Indication of type, size, and length of bolts, distinguishing between shop and field bolts. Identify the type of high-strength bolted connection (slip-critical, direct-tension, or bearing connections). Indicate locations of pretensioned bolts.
4. Connection material specification and sizes.
5. Joints or groups of joints in which a specific assembly order, welding sequence, welding technique, or other special precautions are required.
6. Holes, flange cuts, slots, and openings shall be made as required by the structural drawings, all of which shall be properly located by means of templates.
7. Setting drawings, templates, and directions for installation of anchor rods and other anchorages to be installed by others.
8. Non-Destructive Testing (NDT) to be performed by the Fabricator, if any.
9. A letter sealed by the Fabricator's Professional Engineer responsible for the design of any of the connections shown on the shop drawings attesting that the engineer has reviewed

the shop drawings and that the connections detailed and shown on the shop drawings conform to the engineer’s design.

C. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.

D. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

### 1.05 QUALITY ASSURANCE

A. Fabricate structural steel members in accordance with AISC "Steel Construction Manual."

B. Fabricator: The structural steel fabricator shall have not less than 5 years of experience in the successful fabrication of structural steel similar to this project.

C. Erector: Company specializing in performing the work of this section with minimum 5 years of documented experience.

D. Design connections not detailed on the drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.

E. The Professional Engineer employed by the Fabricator for connection design shall be experienced in the specific area of structural steel connection design with demonstrated experience of not less than three projects of similar scope and complexity.

## PART 2 PRODUCTS

### 2.01 MATERIALS

A. Steel Angles and Plates: ASTM A36/A36M.

B. Steel W Shapes and Tees: ASTM A992/A992M.

C. Rolled Steel Structural Shapes: ASTM A992/A992M.

C. Square and Rectangular HSS: ASTM A500, Grade C (Fy=50 ksi)

D. Steel Plate: ASTM A514/A514M.

E. Structural Bolts and Nuts: ASTM F 3125 Grade A325 Type 1 or ASTM F 3125 Grade A490 Type 1

F. Headed Studs used as Anchors for Structural Steel Plates and Members connecting to Concrete: AWS Type A studs manufactured in conformance with ASTM A 29 with a minimum tensile strength of 61,000 psi of sizes as specified on the drawings.

G. Headed Studs used as Composite Member Shear Connectors: AWS type B studs manufactured in conformance with ASTM A 29 with a minimum tensile strength of 65,000 psi of sizes as specified on the drawings.

H. All anchor rods shall conform to ASTM F 1554. unless noted otherwise on the drawings and shall be of the yield strength Grade 36. Substitution for Grade 36 anchor rods with Grade 55 anchor rods shall only be permitted provided the Grade 55 anchor rods comply with Supplementary requirements S1 of ASTM F 1554.

I. Welding Materials: AWS D1.1; type required for materials being welded.

J. Grout: Non-shrink, non-metallic aggregate type, complying with ASTM C1107/C1107M and capable of developing a minimum compressive strength of 7,000 psi (48 MPa) at 28 days.

K. Shop and Touch-Up Primer: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

### 2.02 FABRICATION

A. Shop fabricate to greatest extent possible.

B. Continuously seal joined members by continuous welds. Grind exposed welds smooth.

C. Fabricate connections for bolt, nut, and washer connectors.

D. Camber of structural steel members is indicated on the drawings. Camber shall be measured in the Fabricator's shop in the unstressed condition, prior to erection. The Fabricator shall provide camber measurements of all beams and a report to the Testing Laboratory confirming this has been done. Where possible, camber of beams shall be applied by a cold bend process.

E. Anchor Rods: Furnish anchor rods and other connectors required for securing structural steel to foundations and other in-place work. Furnish 1/8" minimum steel templates for presetting bolts and other anchors to accurate locations.

**2.03 CONNECTIONS**

A. Connection details are based on information from existing drawings and have not been field verified. Existing structure to be field verified to confirm connections shown are applicable. Fabricator to confirm connections can be achieved and provide alternate connections as required.

**2.04 FINISH**

A. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete, or high strength bolted.

B. Coordinate all shop painting of structural steel with Architect's painting requirements as specified on the architectural drawings and in the specifications. The Fabricator shall be responsible for determining all painting requirements (which surfaces are to be painted or left unpainted) on the project prior to fabrication.

C. All structural steel items and their connections permanently exposed to exterior conditions or that are within areas of unconditioned airspace, whether specified on the drawings or not, shall be hot-dip galvanized after fabrication unless indicated on the drawings or in Specification to receive a primer and/or finish coat.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

**3.02 ERECTION**

A. Erect structural steel in compliance with AISC "Code of Standard Practice for Steel Buildings and Bridges".

B. Allow for erection loads, and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.

C. The Erector shall design and provide all required temporary shoring and bracing to hold structural framing securely in position and to safely withstand all loads as specified in the Code of Standard Practice and ASCE 37 unless larger loads are required by the local building code or specified herein. Provide all bracing, any additional structural members, and increase member sizes and/or connections shown on the drawings as required to accommodate the erection loads, methods, sequence of erection, and equipment until the lateral-load resisting or stability-providing system is completely installed. Clearly show all temporary supports and modifications to designed members on the Shop Drawings and the Erection-bracing Drawings. A qualified licensed professional engineer, hired by the Erector, shall design the temporary shoring and bracing and shall seal the erection-bracing drawings.

D. Initial Survey: Check elevations of concrete and masonry bearing surfaces, anchor bolt locations, embedded connection plates, and all dimensions of existing structures to which new connections are to be made prior to erection and submit any discrepancies to the Engineer prior to the start of erection. Corrections or compensating adjustments to the structural steel shall be made and approved prior to the start of erection.

E. Do not field cut or alter structural members without approval of Architect.

F. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

G. Grout solidly between column plates and bearing surfaces, complying with manufacturer's instructions for nonshrink grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.

### 3.03 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4523.

**END OF SECTION**

**SECTION 061000**
**ROUGH CARPENTRY**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Rough opening framing for doors, windows, and roof openings.

B. Miscellaneous framing and sheathing.

C. Concealed wood blocking, nailers, and supports.

### 1.02 RELATED REQUIREMENTS

A. Section 092116 - Gypsum Board Assemblies: Gypsum-based sheathing.

### 1.03 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

B. PS 20 - American Softwood Lumber Standard; 2021.

### 1.04 DELIVERY, STORAGE, AND HANDLING

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

## PART 2 PRODUCTS

### 2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
   1. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
   2. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at www.alsc.org, and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

### 2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Sizes: Nominal sizes as indicated on drawings, S4S.

B. Moisture Content: S-dry or MC19.

C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
   1. Lumber: S4S, No. 2 or Standard Grade.
   2. Boards: Standard or No. 3.

### 2.03 ACCESSORIES

A. Fasteners and Anchors:
   1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

## 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 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top

story and roof/attic space; other material acceptable to authorities having jurisdiction may be used in lieu of solid wood blocking.

C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.

D. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

**3.03 ROOF-RELATED CARPENTRY**

A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

B. Provide wood curb at each roof opening except where prefabricated curbs are specified and where specifically indicated otherwise; form corners by alternating lapping side members.

**3.04 CLEANING**

A. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.

B. Prevent sawdust and wood shavings from entering the storm drainage system.

**END OF SECTION**

**SECTION 062000**
**FINISH CARPENTRY**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Finish carpentry items.

B. Wood casings and moldings.

C. Hardware and attachment accessories.

### 1.02 RELATED REQUIREMENTS

A. Section 061000 - Rough Carpentry: Support framing, grounds, and concealed blocking.

B. Section 064100 - Architectural Wood Casework: Shop fabricated custom cabinet work.

### 1.03 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).

B. BHMA A156.9 - Cabinet Hardware; 2020.

C. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2020.

D. NHLA G-101 - Rules for the Measurement and Inspection of Hardwood and Cypress; 2023.

E. PS 1 - Structural Plywood; 2023.

F. PS 20 - American Softwood Lumber Standard; 2021.

### 1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data:
   1. Provide manufacturer's product data, storage and handling instructions for factory-fabricated units.
   2. Provide instructions for attachment hardware and finish hardware.

C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
   1. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).

D. Samples: Submit two samples of finish wood wall paneling, 12 x 12 inch in size illustrating wood grain and specified finish.

E. Samples: Submit two samples of wood trim 12 inch long.

F. Manufacturer's Instructions: Provide manufacturer's installation instructions for factory-fabricated units.

### 1.05 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

### 1.06 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Provide five year warranty for resilient stage floor to include warranty against discoloration due to cleaning, crazing or cracking, and staining.

### 1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver factory-fabricated units to project site in original packages, containers or bundles bearing brand name and identification.

B. Store finish carpentry items under cover, elevated above grade, and in a dry, well-ventilated area not exposed to heat or sunlight.

C. Protect work from moisture damage.

D. Handle materials and products to prevent damage to edges, ends, or surfaces.

E. Place wood flooring materials in stage area at least 7 days in advance of start of installation. Open sealed packages of wood flooring to permit natural adjustment of moisture content.

## PART 2 PRODUCTS

### 2.01 FINISH CARPENTRY ITEMS

A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

B. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.

C. Interior Woodwork Items:
   1. Moldings, Bases, Casings, and Miscellaneous Trim; prepare for transparent finish.
   2. Wood Paneling.

D. Wood Flooring WDF-1:
   1. Basis of Design: Nydree Flooring Inc., Maverick Collection.
      a. Material: Lynchburg Walnut.
      b. Size: 8" W X 86.61" L.
      c. Thickness: .445".
      d. Wear Layer: 0.6mm.
      e. Finish: UV-cured urethane; deep matte.

### 2.02 LUMBER MATERIALS

A. Hardwood Lumber: Walnut species, plain sawn, maximum moisture content of 6 percent; with flat grain, of quality suitable for transparent finish.
   1. Grading: In accordance with NHLA G-101 Grading Rules; www.nhla.org.

### 2.03 SHEET MATERIALS

A. Softwood Plywood, Not Exposed to View: Any face species, medium density fiberboard core; PS 1 Grade A-B, glue type as recommended for application.

B. Hardwood Plywood: Face species Walnut, plain sawn, book matched, veneer core; HPVA HP-1, Front Face Grade AA, Back Face Grade 1, glue type as recommended for application.

### 2.04 FASTENINGS

A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.

B. Adhesive for factory-fabricated units: Manufacturer's recommended adhesive for application.

C. Fasteners: Of size and type to suit application;

D. Concealed Joint Fasteners: Threaded steel.

### 2.05 ACCESSORIES

A. Adhesive: Type recommended by fabricator to suit application.

B. Lumber for Shimming and Blocking: Softwood lumber of pine species.

C. Upholstery (FAB-1): 61% Polyester, 39% Post-Consumer Recycled Polyester.
   1. Manufacturer: Maharam
   2. Style: Willow 466542.
   3. Color: Getaway.
   4. Width: 54".

D. Primer: Alkyd primer sealer.

E. Wood Filler: Solvent base, tinted to match surface finish color.

### 2.06 HARDWARE

A. Hardware: Comply with BHMA A156.9.

## 2.07 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. Fit exposed sheet material edges with 3/8 inch matching hardwood edging. Use one piece for full length only.

C. Shop prepare and identify components for book match grain matching during site erection.

D. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

## 2.08 FIELD FINISHING

A. Sand work smooth and set exposed nails and screws.

B. Apply wood filler in exposed nail and screw indentations.

C. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.

D. Prime paint surfaces in contact with cementitious materials.

# PART 3 EXECUTION

## 3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

## 3.02 INSTALLATION

A. Install work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.

B. Install factory-fabricated units in accordance with manufacturer's printed installation instructions.

C. Set and secure materials and components in place, plumb and level.

D. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

## 3.03 PREPARATION FOR SITE FINISHING

A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

## 3.04 TOLERANCES

A. Maximum Variation from True Position: 1/16 inch.

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

**END OF SECTION**

**SECTION 064100**
**ARCHITECTURAL WOOD CASEWORK**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Specially fabricated cabinet units.

B. Cabinet hardware.

### 1.02 REFERENCE STANDARDS

A. BHMA A156.9 - Cabinet Hardware; 2020.

B. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

C. BHMA A156.9 - American National Standard for Cabinet Hardware; Builders Hardware Manufacturers Association; 2010 (ANSI/BHMA A156.9).

D. NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association; 2005.

### 1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.

C. Product Data: Provide data for hardware accessories.

### 1.04 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

### 1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect units from moisture damage.

### 1.06 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. Cabinets:
   1. Finish - Exposed Exterior Surfaces: Decorative laminate.
   2. Finish - Concealed Surfaces: Manufacturer's option.
   3. Door and Drawer Front Edge Profiles: 3 mm edge band.
   4. Adjustable Shelf Loading: 50 lbs. per sq. ft.
   5. Cabinet Style: Flush overlay.
   6. Drawer Side Construction: Multiple-dovetailed.
   7. Drawer Construction Technique: Dovetail joints.

### 2.02 WOOD-BASED COMPONENTS

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

### 2.03 LAMINATE MATERIALS

A. Manufacturers:
   1. Wilsonart: www.wilsonart.com.
   2. Substitutions: See Section 016000 - Product Requirements.

B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.

## 2.04 COUNTERTOPS

A. Countertops are specified in Section 123600.

## 2.05 ACCESSORIES

A. Adhesive: Type recommended by fabricator to suit application.

B. Plastic Edge Banding: Extruded 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.

C. Fasteners: Size and type to suit application.

D. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and chrome-plated finish in exposed locations.

E. Concealed Joint Fasteners: Threaded steel.

F. Grommets: Standard plastic grommets for cut-outs, in color to match adjacent surface.

## 2.06 HARDWARE

A. Hardware: BHMA A156.9, types as recommended by fabricator for quality grade specified.

B. Adjustable Shelf Supports: Standard back-mounted system using surface mounted metal shelf standards and coordinated cantilevered shelf brackets, satin chrome, painted, or painted finish, for nominal 1 inch spacing adjustments.

C. Countertop Supports:
   1. Material: Aluminum
   2. Finish/Color: Black powdercoat.
   3. Manufacturers:
      a. Rakks/Rangine Corporation; Sill Supports: www.rakks.com/#sle

D. Drawer and Door Pulls: "U" shaped wire pull, steel with chrome finish, 4 inch centers.

E. Cabinet Locks: Keyed cylinder, two keys per lock, master keyed, steel with chrome finish.

F. Catches: Magnetic.

G. Drawer Slides:
   1. Type: Extension types as scheduled.
   2. Static Load Capacity: Commercial grade.
   3. Mounting: Side mounted.
   4. Stops: Integral type.
   5. Manufacturers
      a. Accuride International, Inc: www.accuride.com.
      b. Grass America Inc: www.grassusa.com.
      c. Hettich America, LP: www.hettichamerica.com.
      d. Knape & Vogt Manufacturing Company: www.knapeandvogt.com.
      e. Substitutions: See Section 016000 - Product Requirements.

H. Hinges: European style concealed self-closing type, steel with polished finish.
   1. Manufacturers:
      a. Grass America Inc: www.grassusa.com.
      b. Hardware Resources: www.hardwareresources.com.
      c. Hettich America, LP; Sensys: www.hettichamerica.com/#sle.
      d. Julius Blum, Inc: www.blum.com.
      e. Substitutions: See Section 016000 - 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.
   1. Cap exposed plastic laminate finish edges with material of same finish and pattern.

E. Mechanically fasten back splash to countertops as recommended by laminate manufacturer at 16 inches on center.

F. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify location and sizes of utility rough-in associated with work of this section.

### 3.02 INSTALLATION

A. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.

B. Use concealed joint fasteners to align and secure adjoining cabinet units.

C. 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 068316**
**FIBERGLASS REINFORCED PANELING**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Fiberglass reinforced plastic panels.

B. Trim.

### 1.02 REFERENCE STANDARDS

A. ASTM D5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels; 2022.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

### 1.03 SUBMITTALS

A. See Section 013000 - 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. Samples: Submit two samples 4 by 4 inch in size illustrating material and surface design of panels.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.

### 1.04 DELIVERY, STORAGE, AND HANDLING

A. Store panels flat, indoors, on a clean, dry surface. Remove packaging and allow panels to acclimate to room temperature for 48 hours prior to installation.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Fiberglass Reinforced Plastic Panels: Basis of Design: Sequentia by Crane Composites.
   1. Marlite, Inc; _____: www.marlite.com/#sle.
   2. Nudo Products, Inc; _____: www.nudo.com/#sle.
   3. Panolam Industries International, Inc; _____: www.panolam.com/#sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

### 2.02 PANEL SYSTEMS

A. Wall Panels:
   1. Panel Size: 4 by 10 feet.
   2. Panel Thickness: 0.09 inch.
   3. Surface Design: Smooth.
   4. Color: See Drawings.
   5. Attachment Method: Adhesive only, sealant joints, no trim.

### 2.03 MATERIALS

A. Panels: Fiberglass reinforced plastic (FRP), complying with ASTM D5319.
   1. Surface Burning Characteristics: Maximum flame spread index of 25 and smoke developed index of 450; when system tested in accordance with ASTM E84.

B. Trim: Vinyl; color coordinating with panel.

C. Sealant: Type recommended by panel manufacturer; white.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify existing conditions and substrate flatness before starting work.

B. Verify that substrate conditions are ready to receive the work of this section.

### 3.02 INSTALLATION - WALLS

A. Install panels in accordance with manufacturer's instructions.

B. Cut and drill panels with carbide tipped saw blades, drill bits, or snips.

C. Apply adhesive to the back side of the panel using trowel as recommended by adhesive manufacturer.

D. Apply panels to wall with seams plumb and pattern aligned with adjoining panels.

E. Install panels with manufacturer's recommended gap for panel field and corner joints.

F. Place trim on panel before fastening edges, as required.

G. Fill channels in trim with sealant before attaching to panel.

H. Install trim with adhesive and screws or nails, as required.

I. Seal gaps at floor, ceiling, and between panels with applicable sealant to prevent moisture intrusion.

J. Remove excess sealant after paneling is installed and prior to curing.

**END OF SECTION**

**SECTION 075323**
**ETHYLENE-PROPYLENE-DIENE-MONOMER ROOFING (EPDM)**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. EPDM membrane roofing system, including all components specified.

B. Comply with the published recommendations and instructions of the roofing membrane manufacturer, at http://manual.fsbp.com.

C. Commencement of work by Contractor shall constitute acknowledgement by Contractor that this specification can be satisfactorily executed, under the project conditions and with all necessary prerequisites for warranty acceptance by roofing membrane manufacturer. No modification of the Contract Sum will be made for failure to adequately examine the Contract Documents or the project conditions.

### 1.02 RELATED REQUIREMENTS

A. Section 061000 - Rough Carpentry: Wood nailers associated with roofing and roof insulation.

### 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 C209 - Standard Test Methods for Cellulosic Fiber Insulating Board; 2020.

C. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.

D. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2023a.

E. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics; 2016 (Reapproved 2023).

F. ASTM D1622/D1622M - Standard Test Method for Apparent Density of Rigid Cellular Plastics; 2020.

G. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.

H. SPRI ES-1 - Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems; 2011.

### 1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data:
   1. Provide membrane manufacturer's printed data sufficient to show that all components of roofing system, including insulation and fasteners, comply with the specified requirements and with the membrane manufacturer's requirements and recommendations for the system type specified; include data for each product used in conjunction with roofing membrane.

C. Shop Drawings: Provide:
   1. The roof membrane manufacturer's standard details customized for this project for all relevant conditions, including flashings, base tie-ins, roof edges, terminations, expansion joints, penetrations, and drains.
   2. For tapered insulation, provide project-specific layout and dimensions for each board.

D. Specimen Warranty: Submit prior to starting work.

E. Installer Qualifications: Letter from manufacturer attesting that the roofing installer meets the specified qualifications.

F. Executed Warranty.

## 1.05 QUALITY ASSURANCE

A. Installer Qualifications: Roofing installer shall have the following:
   1. Current approval, license, or authorization as applicator by the manufacturer.
   2. At least five years experience in installing specified system.

## 1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact and legible.

B. Store materials clear of ground and moisture with weather protective covering.

C. Keep combustible materials away from ignition sources.

## 1.07 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Comply with all warranty procedures required by manufacturer, including notifications, scheduling, and inspections.

C. Warranty: Limited 20 Year Warranty covering membrane, roof insulation, and other indicated components of the system, for the term indicated.
   1. Limit of Liability: No dollar limitation.
   2. Scope of Coverage: Repair leaks in the roofing system caused by:
      a. Ordinary wear and tear of the elements.
      b. Manufacturing defect in brand materials.
      c. Defective workmanship used to install these materials.
      d. Damage due to winds up to 72 mph.
   3. Not Covered:
      a. Damage due to winds in excess of 72 mph.
      b. Damage due hurricanes or tornadoes.
      c. Hail.
      d. Intentional damage.
      e. Unintentional damage due to normal rooftop inspections, maintenance, or service.

D. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of roofing system such as roof membrane, base flashing, roof insulation, fasteners, roof pavers, for the following warranty period:
   1. Warranty Period: Two (2) years from Date of Substantial Completion.

E. Comply with Manufacturer's requiremnts where patching the existing roof to maintain warranty at existing roof areas.

F. Metal Roof Edging: Holcim Elevate full-system warranty for roof edge system, covering blow-off from winds up to 72 mph.

G. Metal Roof Edging with Exposed Decorative Fascia: Provide 20 year warranty for painted finish covering color fade, chalk, and film integrity.

# PART 2 PRODUCTS

## 2.01 MANUFACTURERS

A. Acceptable Manufacturer - Roofing System: Basis of Design: Holcim Elevate. www.hocimelevate.com.
   1. Roofing systems manufactured by others are acceptable provided the roofing system is completely equivalent in materials and warranty conditions and the manufacturer meets the following qualifications:
      a. Specializing in manufacturing the roofing system to be provided.
      b. Other manufacturers desiring approval shall submit requests to the Architect. Requests shall include PART 2- Products to show compliance with these specifications.

c. Roofing systems manufactured by the companies listed below are acceptable provided they are completely equivalent in materials and warranty conditions:
    1) Carlisle Syntec Systems.
    2) Versico Roofing Systems.
    3) Johns Manville.

B. Manufacturer of Insulation and Cover Boards: Same manufacturer as roof membrane.

C. Substitutions: See Section 016000 - Product Requirements.
    1. Submit evidence that the proposed substitution complies with the specified requirements.

## 2.02 ROOFING SYSTEM DESCRIPTION

A. Roofing System: Ethylene-propylene-diene-monomer (EPDM) single-ply membrane.
    1. Membrane Attachment: Fully adhered.
    2. Warranty: Full system warranty; Holcim Elevate 20 year Red Shield Limited Warranty covering membrane, roof insulation, and membrane accessories.
    3. Comply with applicable local building code requirements.

B. Roofing System Components: Listed in order from the top of the roof down:
    1. Membrane: Thickness as specified.
    2. Insulation Cover Board: High density polyisocyanurate; mechanically attached
    3. Insulation:
        a. Maximum Board Thickness: 3 inches; use as many layers as necessary; stagger joints in adjacent layers.
        b. Tapered: Slope as indicated; provide minimum R-value at thinnest point; place tapered layer on top.
        c. Thickness: Match existing.
        d. Top Layer: Polyisocyanurate foam board, non-composite; mechanically fastened.
        e. Bottom Layer: Polyisocyanurate foam board, non-composite; mechanically fastened.
        f. Crickets: Tapered insulation of same type as specified for top layer; slope as indicated.

## 2.03 EPDM MEMBRANE MATERIALS

A. Roofing and Flashing Membrane: Black, cured synthetic single-ply membrane composed of ethylene propylene diene terpolymer (EPDM) with the following properties:
    1. Thickness: 0.060 inch.
    2. Sheet Width: Provide the widest available sheets to minimize field seaming.

B. Flashing Membrane: Self-curing, non-reinforced membrane composed of nonvulcanized EPDM rubber, complying with ASTM D4811 Type II, and with the following properties:

C. Self-Adhesive Flashing Membrane: Semi-cured 45 mil EPDM membrane laminated to 35 mil EPDM tape adhesive; QuickSeam Flashing by Elevate.

D. Pre-Molded Pipe Flashings: EPDM, molded for quick adaptation to different sized pipes; Elevate EPDM Pipe Flashing.

E. Self-Adhesive Lap Splice Tape: 35 mil EPDM-based, formulated for compatibility with EPDM membrane and high-solids primer; QuickSeam Splice Tape by Elevate.

F. Splice Adhesive: Synthetic polymer-based, formulated for compatibility with EPDM membrane and metal surfaces; SA-1065 Splice Adhesive by Elevate.

G. Bonding Adhesive: Neoprene-based, formulated for compatibility with EPDM membrane and wide variety of substrate materials, including masonry, wood, and insulation facings; Bonding Adhesive BA-2004 by Elevate.

H. Adhesive Primer: Synthetic rubber based primer formulated for compatibility with EPDM membrane and tape adhesive; QuickPrime Plus by Elevate.

I. Seam Edge Treatment: EPDM rubber-based sealant, formulated for sealing exposed edges of membrane at seams; Lap Sealant HS by Firestone.

J. Pourable Sealer: Two-part polyurethane, two-color for reliable mixing; Pourable Sealer by Firestone.

K. Water Block Seal: Butyl rubber sealant for use between two surfaces, not exposed; Water Block Seal by Firestone.

L. Metal Plates and Strips Used for Fastening Membrane and Insulation: Steel with Galvalume coating; corrosion-resistance meeting FM 4470 criteria.

M. Termination Bars: Aluminum bars with integral caulk ledge; 1.3 inches wide by 0.10 inch thick; Firestone Termination Bar by Firestone.

## 2.04 ROOF INSULATION AND COVER BOARDS

A. Polyisocyanurate Board Insulation: Closed cell polyisocyanurate foam with black glass reinforced mat laminated to faces, complying with ASTM C1289 Type II Class 1, with the following additional characteristics:
   1. Thickness: Match existing.
   2. Size: 48 inches by 96 inches, nominal.
      a. Exception: Insulation to be attached using adhesive or asphalt may be no larger than 48 inches by 48 inches, nominal.
   3. Compressive Strength: 20 psi when tested in accordance with ASTM C1289.
   4. Ozone Depletion Potential: Zero; made without CFC or HCFC blowing agents.
   5. Recycled Content: 19 percent post-consumer and 15 percent post-industrial, average.

B. High Density Polyisocyanurate Cover Board: Non-combustible, water resistant, high density closed cell polyisocyanurate core with coated glass mat facers, with the following characteristics:
   1. Basis of Design: Elevate ISOGARD HD
   2. Size: 48 inches by 96 inches, nominal.
   3. Thickness: 1/2 inch.
   4. Thermal Value: R-value of 2.5, when tested in accordance with ASTM C518 and ASTM C177.
   5. Surface Water Absorption: 3 percent, maximum, when tested in accordance with ASTM C209.
   6. Compressive Strength: 120 psi, when tested in accordance with ASTM D1621.
   7. Density: 5 pcf, when tested in accordance with ASTM D1622/D1622M.
   8. Factory Mutual approved for use with FM 1-60 and 1-90 rated roofing assemblies.
   9. Mold Growth Resistance: Passing ASTM D3273.

C. Insulation Fasteners: Type and size as required by roof membrane manufacturer for roofing system and warranty to be provided; use only fasteners furnished by roof membrane manufacturer.

## 2.05 METAL ACCESSORIES

A. Metal Roof Edging and Fascia: Continuous metal edge member serving as termination of roof membrane and retainer for metal fascia; watertight with no exposed fasteners; mounted to roof edge nailer.
   1. Wind Performance:
      a. Membrane Pull-Off Resistance: 100 lbs/ft, minimum, when tested in accordance with ANSI/SPRI/FM 4435/ES-1 Test Method RE-1, current edition.
      b. Fascia Pull-Off Resistance: At least the minimum required when tested in accordance with ANSI/SPRI/FM 4435/ES-1 Test Method RE-2, current edition.
      c. Provide product listed in current Factory Mutual Research Corporation Approval Guide with at least FM 1-270 rating.
   2. Fascia Face Height: 5 inches.
   3. Edge Member Height Above Nailer: 1-1/4 inches.
   4. Length: 144 inches.
   5. Functional Characteristics: Fascia retainer supports while allowing for free thermal cycling of fascia.

6. Aluminum Bar: Continuous 6063-T6 alloy aluminum extrusion with pre-punched slotted holes; miters welded; injection molded EPDM splices to allow thermal expansion.
7. Anchor Bar Cleat: 20 gage, 0.036 inch G90 coated commercial type galvanized steel with pre-punched holes.
8. Curved Applications: Factory modified.
9. Fasteners: Factory-provided corrosion resistant fasteners, with drivers; no exposed fasteners permitted.
10. Special Shaped Components: Provide factory-fabricated pieces necessary for complete installation, including miters, scuppers, and end caps; minimum 14 inch long legs on corner pieces.
11. Accessories: Provide matching brick wall cap, downspout, extenders, and other special fabrications as shown on the drawings. BY ROOF MANUFACTURER.

**2.06 ACCESSORY MATERIALS**

A. Wood Nailers: PS 20 dimension lumber, Structural Grade No. 2 or better Southern Pine, Douglas Fir; or PS 1, APA Exterior Grade plywood; pressure preservative treated.
   1. Width: 3-1/2 inches, nominal minimum, or as wide as the nailing flange of the roof accessory to be attached to it.
   2. Thickness: Same as thickness of roof insulation.

**PART 3 INSTALLATION**

**3.01 GENERAL**

A. Install roofing, insulation, flashings, and accessories in accordance with roofing manufacturer's published instructions and recommendations for the specified roofing system. Where manufacturer provides no instructions or recommendations, follow good roofing practices and industry standards. Comply with federal, state, and local regulations.

B. Obtain all relevant instructions and maintain copies at project site for duration of installation period.

C. Do not start work until Pre-Installation Notice has been submitted to manufacturer as notification that this project requires a manufacturer's warranty.

D. Perform work using competent and properly equipped personnel.

E. Temporary closures, which ensure that moisture does not damage any completed section of the new roofing system, are the responsibility of the applicator. Completion of flashings, terminations, and temporary closures shall be completed as required to provide a watertight condition.

F. Install roofing membrane only when surfaces are clean, dry, smooth and free of snow or ice; do not apply roofing membrane during inclement weather or when ambient conditions will not allow proper application; consult manufacturer for recommended procedures during cold weather. Do not work with sealants and adhesives when material temperature is outside the range of 60 to 80 degrees F.

G. Protect adjacent construction, property, vehicles, and persons from damage related to roofing work; repair or restore damage caused by roofing work.
   1. Protect from spills and overspray from bitumen, adhesives, sealants and coatings.
   2. Particularly protect metal, glass, plastic, and painted surfaces from bitumen, adhesives, and sealants within the range of wind-borne overspray.
   3. Protect finished areas of the roofing system from roofing related work traffic and traffic by other trades.

H. Until ready for use, keep materials in their original containers as labeled by the manufacturer.

I. Consult membrane manufacturer's instructions, container labels, and Material Safety Data Sheets (MSDS) for specific safety instructions. Keep all adhesives, sealants, primers and cleaning materials away from all sources of ignition.

### 3.02 EXAMINATION

A. Examine roof deck to determine that it is sufficiently rigid to support installers and their mechanical equipment and that deflection will not strain or rupture roof components or deform deck.

B. Verify that surfaces and site conditions are ready to receive work. Correct defects in the substrate before commencing with roofing work.

C. Examine roof substrate to verify that it is properly sloped to drains.

D. Verify that the specifications and drawing details are workable and not in conflict with the roofing manufacturer's recommendations and instructions; start of work constitutes acceptable of project conditions and requirements.

E. Verify that wood nailers have been properly installed.

### 3.03 PREPARATION

A. Remove all of the existing roof system down to the roof deck including all existing composition base flashings. Dispose of all materials properly. Perform asbestos removal in accordance with federal, state and local regulations and dispose of waste in legal manner.
   1. At penetrations, remove all existing flashings, including lead, asphalt, mastic, etc.
   2. At walls, curbs, and other vertical and sloped surfaces, remove loose and unsecured flashings; remove mineral surfaced and coated flashings; remove excessive asphalt to provide a smooth, sound surface for new flashings.

B. Take appropriate measures to ensure that fumes from adhesive solvents are not drawn into the building through air intakes.

C. Prior to proceeding, prepare roof surface so that it is clean, dry, and smooth, and free of sharp edges, fins, roughened surfaces, loose or foreign materials, oil, grease and other materials that may damage the membrane.

D. Fill all surface voids in the immediate substrate that are greater than 1/4 inch wide with fill material acceptable insulation to membrane manufacturer.

E. Seal, grout, or tape deck joints, where needed, to prevent bitumen seepage into building.

### 3.04 INSULATION AND COVER BOARD INSTALLATION

A. Install insulation in configuration and with attachment method(s) specified in PART 2, under Roofing System.

B. Install only as much insulation as can be covered with the completed roofing system before the end of the day's work or before the onset of inclement weather.

C. Lay roof insulation in courses parallel to roof edges.

D. Neatly and tightly fit insulation to all penetrations, projections, and nailers, with gaps not greater than 1/4 inch. Fill gaps greater than 1/4 inch with acceptable insulation. Do not leave the roofing membrane unsupported over a space greater than 1/4 inch.

E. Mechanical Fastening: Using specified fasteners and insulation plates engage fasteners through insulation into deck to depth and in pattern required by membrane manufacturer.

### 3.05 SINGLE-PLY MEMBRANE INSTALLATION

A. Beginning at low point of roof, place membrane without stretching over substrate and allow to relax at least 30 minutes before attachment or splicing; in colder weather allow for longer relax time.

B. Lay out the membrane pieces so that field and flashing splices are installed to shed water.

C. Install membrane without wrinkles and without gaps or fishmouths in seams; bond and test seams and laps in accordance with membrane manufacturer's instructions and details.

D. Install membrane adhered to the substrate, with edge securement as specified.

E. Adhered Membrane: Bond membrane sheet to substrate using membrane manufacturer's recommended bonding material, application rate, and procedures.

F. Edge Securement: Secure membrane at all locations where membrane terminates or goes through an angle change greater than 2 in 12 inches using mechanically fastened reinforced perimeter fastening strips, plates, or metal edging as indicated or as recommended by roofing manufacturer.
   1. Exceptions: Round pipe penetrations less than 18 inches in diameter and square penetrations less than 4 inches square.
   2. Metal edging is not merely decorative; ensure anchorage of membrane as intended by roofing manufacturer.

## 3.06 FLASHING AND ACCESSORIES INSTALLATION

A. Install flashings, including laps, splices, joints, bonding, adhesion, and attachment, as required by membrane manufacturer's recommendations and details.

B. Metal Accessories: Install metal edgings, gravel stops, and copings in locations indicated on the drawings, with horizontal leg of edge member over membrane and flashing over metal onto membrane.
   1. Follow roofing manufacturer's instructions.
   2. Remove protective plastic surface film immediately before installation.
   3. Install water block sealant under the membrane anchorage leg.
   4. Flash with manufacturer's recommended flashing sheet unless otherwise indicated.
   5. Where single application of flashing will not completely cover the metal flange, install additional piece of flashing to cover the metal edge.
   6. If the roof edge includes a gravel stop and sealant is not applied between the laps in the metal edging, install an additional piece of self-adhesive flashing membrane over the metal lap to the top of the gravel stop; apply seam edge treatment at the intersections of the two flashing sections.
   7. When the roof slope is greater than 1:12, apply seam edge treatment along the back edge of the flashing.

C. Flashing at Walls, Curbs, and Other Vertical and Sloped Surfaces: Install weathertight flashing at all walls, curbs, parapets, curbs, skylights, and other vertical and sloped surfaces that the roofing membrane abuts to; extend flashing at least 8 inches high above membrane surface.
   1. Use the longest practical flashing pieces.
   2. Evaluate the substrate and overlay and adjust installation procedure in accordance with membrane manufacturer's recommendations.
   3. Complete the splice between flashing and the main roof sheet with specified splice adhesive before adhering flashing to the vertical surface.
   4. Provide termination directly to the vertical substrate as shown on roof drawings.

D. Flashing at Penetrations: Flash all penetrations passing through the membrane; make flashing seals directly to the penetration.
   1. Pipes, Round Supports, and Similar Items: Flash with specified pre-molded pipe flashings wherever practical; otherwise use specified self-curing elastomeric flashing.
   2. Structural Steel Tubing: If corner radii are greater than 1/4 inch and longest side of tube does not exceed 12 inches, flash as for pipes; otherwise, provide a standard curb with flashing.
   3. Flexible and Moving Penetrations: Provide weathertight gooseneck set in sealant and secured to deck, flashed as recommended by manufacturer.

## 3.07 FIELD QUALITY CONTROL

A. Inspection by Manufacturer: Provide final inspection of the roofing system by a Technical Representative employed by roofing system manufacturer specifically to inspect installation for warranty purposes (i.e. not a sales person).

B. Perform all corrections necessary for issuance of warranty.

## 3.08 CLEANING

A. Clean all contaminants generated by roofing work from building and surrounding areas, including bitumen, adhesives, sealants, and coatings.

B. Repair or replace building components and finished surfaces damaged or defaced due to the work of this section; comply with recommendations of manufacturers of components and surfaces.

C. Remove leftover materials, trash, debris, equipment from project site and surrounding areas.

**3.09 PROTECTION**

A. Where construction traffic must continue over finished roof membrane, provide durable protection and replace or repair damaged roofing to original condition.

**END OF SECTION**

**SECTION 079005**
**JOINT SEALERS**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Precompressed foam sealers.

### 1.02 REFERENCE STANDARDS

A. ASTM C834 - Standard Specification for Latex Sealants; 2017.

B. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2012 (Reapproved 2017).

C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.

D. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2015e1.

### 1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with other sections referencing this section.

### 1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating sealant chemical characteristics.

C. Samples: Submit two samples, 1/2 x 1/2 inch in size illustrating sealant colors for selection.

D. Manufacturer's Installation Instructions: Indicate special procedures.

### 1.05 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

### 1.06 WARRANTY

A. See Section 017800 - 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 which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Gunnable and Pourable Sealants:
   1. Adhesives Technology Corporation: www.atc.ws.
   2. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
   3. Bostik Inc: www.bostik-us.com.
   4. ARDEX Engineered Cements: www.ardexamericas.com.
   5. Dow Corning Corporation: www.dowcorning.com.
   6. Hilti, Inc: www.us.hilti.com.
   7. Momentive Performance Materials, Inc (formerly GE Silicones): www.momentive.com.
   8. Pecora Corporation: www.pecora.com.
   9. The QUIKRETE Companies: www.quikrete.com.
   10. Red Devil: www.reddevil.com.
   11. Tremco Global Sealants: www.tremcosealants.com.
   12. Sherwin-Williams Company: www.sherwin-williams.com.
   13. Sika Corporation: www.usa-sika.com.
   14. W.R. Meadows, Inc: www.wrmeadows.com.
   15. Substitutions: See Section 016000 - Product Requirements.

B. Preformed Compressible Foam Sealers:
   1. EMSEAL Joint Systems, Ltd: www.emseal.com.

2. Sandell Manufacturing Company, Inc: www.sandellmfg.com.
3. Dayton Superior Corporation: www.daytonsuperior.com.
4. Tremco Global Sealants: www.tremcosealants.com.
5. Substitutions: See Section 016000 - Product Requirements.

**2.02 SEALANTS**

A. General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable.
   1. Color: To be selected by Architect from manufacturer's full range.
   2. Applications: Use for:
      a. Interior wall and ceiling control joints.
      b. Joints between door and window frames and wall surfaces.
      c. Other interior joints for which no other type of sealant is indicated.

B. Acoustical Sealant for Concealed Locations:
   1. Composition: Acrylic latex emulsion sealant.
   2. Applications: Use for concealed locations only:
      a. Sealant bead between top stud runner and structure and between bottom stud track and floor.
   3. Products:
      a. Bostik Inc: www.bostik-us.com.
      b. Pecora Corporation; AIS-919 Acoustical and Insulation Latex Sealant: www.pecora.com.
      c. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
      d. Tremco Global Sealants: www.tremcosealants.com.
      e. Hilti, Inc.; CP 506 Smoke and Acoustical Sealant: www.us.hilti.com.
      f. Substitutions: See Section 016000 - Product Requirements.

C. Polyurea Concrete Floor Joint Filler: Self-leveling, pourable, semi-rigid sealant intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
   1. Composition: Single or multi-part,100 percent solids by weight.
   2. Hardness: 75, minimum, after 7 days, when tested in accordance with ASTM D2240 Shore A.

**2.03 ACCESSORIES**

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Backing: Round foam rod compatible with sealant; ASTM D 1667, closed cell PVC; oversized 30 to 50 percent larger than joint width.

D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify that substrate surfaces are ready to receive work.

B. Verify that joint backing and release tapes are compatible with sealant.

**3.02 PREPARATION**

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean and prime joints in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Protect elements surrounding the work of this section from damage or disfigurement.

## 3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Perform acoustical sealant application work in accordance with ASTM C919.

D. Install bond breaker where joint backing is not used.

E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

G. Tool joints concave.

H. Concrete Floor Joint Filler: Install concrete floor joint filler per manufacturer's written instructions. After floor joint filler is fully cured, shave joint filler flush with top of concrete slab.

## 3.04 CLEANING

A. Clean adjacent soiled surfaces.

## 3.05 PROTECTION

A. Protect sealants until cured.

**END OF SECTION**

**SECTION 081113**
**HOLLOW METAL DOORS AND FRAMES**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Non-fire-rated hollow metal doors and frames.

B. Hollow metal frames for wood doors.

C. Fire-rated hollow metal doors and frames.

D. Hollow metal borrowed lites glazing frames.

### 1.02 RELATED REQUIREMENTS

A. Section 087100 - Door Hardware.

B. Section 088000 - Glazing: Glass for doors and borrowed lites.

### 1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.

C. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2024.

D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2023.

E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2020.

F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2023, with Editorial Revision.

H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.

I. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

J. ITS (DIR) - Directory of Listed Products; Current Edition.

K. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2017.

L. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.

M. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.

N. UL (DIR) - Online Certifications Directory; Current Edition.

O. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

### 1.04 SUBMITTALS

A. See Section 013000 - 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. 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/#sle.
   2. Curries, an Assa Abloy Group company: www.assaabloydss.com/#sle.
   3. Republic Doors, an Allegion brand; ____: www.republicdoor.com/#sle.
   4. De La Fontaine Inc: www.delafontaine.com.
   5. Steelcraft, an Allegion brand: www.allegion.com/#sle.
   6. Substitutions: See Section 016000 - Product Requirements.

## 2.02 PERFORMANCE REQUIREMENTS

A. Requirements for Hollow Metal Doors and Frames:
   1. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
   2. Accessibility: Comply with ICC A117.1 and ADA Standards.
   3. Finish: Factory primed, for field finishing.

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. Interior Doors, Non-Fire-Rated:
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 3 - Extra Heavy-duty.
      b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Model 1 - Full Flush.
      d. Door Face Metal Thickness: 16 gage, 0.053 inch, minimum.
   2. Door Thickness: 1-3/4 inch, nominal.

B. Interior Doors, Fire-Rated Doors:
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 3 - Extra Heavy-duty.
      b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Model 1 - Full Flush.
      d. Door Face Metal Thickness: 16 gage, 0.053 inch, minimum.
   2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
      a. Provide units listed and labeled by UL (DIR) or ITS (DIR).
      b. Attach fire rating label to each fire rated unit.
   3. Door Thickness: 1-3/4 inches, 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. General:
   1. Comply with the requirements of grade specified for corresponding door.
      a. Frames for Wood Doors: Comply with frame requirements in accordance with ANSI/SDI A250.8 (SDI-100), Level 1, 18 gage, 0.042 inch, minimum thickness.
   2. Finish: Same as for door.
   3. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.

C. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
   1. Frame Metal Thickness: 18 gage, 0.042 inch, minimum.

D. Door Frames, Fire-Rated: Full profile/continuously welded type.
   1. Fire Rating: Same as door, labeled.

E. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.

F. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.

## 2.05 ACCESSORIES

A. Glazing: As specified in Section 088000, factory installed.

B. Grout for Frames: Portland cement grout with maximum 4 inch slump for hand troweling; thinner pumpable grout is prohibited.

C. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.

D. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

## 2.06 FINISHES

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

B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

# 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. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

E. Install door hardware as specified in Section 087100.

F. Comply with glazing installation requirements of Section 088000.

### 3.04 TOLERANCES

A. Maximum Diagonal Distortion: 1/16 inch 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 081416
# FLUSH WOOD DOORS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

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

### 1.02 RELATED REQUIREMENTS

A. Section 081113 - Hollow Metal Doors and Frames.

B. Section 087100 - Door Hardware.

C. Section 088000 - Glazing.

### 1.03 REFERENCE STANDARDS

A. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.

### 1.04 SUBMITTALS

A. See Section 013000 - 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. Specimen warranty.

E. Samples: Submit two samples of door veneer, 6 by 6 inch in size illustrating wood grain, stain color, and sheen.

F. Manufacturer's Installation Instructions: Indicate special installation instructions.

### 1.05 QUALITY ASSURANCE

A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than three years of documented experience.

### 1.06 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver and store doors in accordance with specified quality standard.

B. Accept doors on site in manufacturer's packaging. 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 017800 - 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. Graham Wood Doors: www.grahamdoors.com.
   2. VT Industries.

### 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 finishmatching sample provided by Architect.

**2.03 DOOR AND PANEL CORES**

A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.

**2.04 DOOR FACINGS**

A. Veneer Facing for Transparent Finish: Red oak, 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.

**2.05 ACCESSORIES**

A. Glazed Openings:
1. Heat-Strengthened and Fully Tempered Glass: {\rs\#1}.
2. Glazing: Single vision units, 1/4 inch glass.
3. Tint: Clear.

B. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws.

C. Astragals for Non-Rated Double Doors: Steel, T shaped, overlapping and recessed at face edge.

**2.06 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.

**2.07 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. Sheen: Flat.

B. Factory finish doors in accordance with sample to be provided.

**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.

D. Install doors in accordance with manufacturer's instructions and specified quality standard.

E. Use machine tools to cut or drill for hardware.

F. Coordinate installation of doors with installation of frames and hardware.

G. Coordinate installation of glazing.

**3.02 TOLERANCES**

A. Comply with specified quality standard for fit and clearance tolerances.

B. Comply with specified quality standard for telegraphing, warp, and squareness.

**3.03 ADJUSTING**

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

**3.04 SCHEDULE**

A. Refer to Door and Frame Schedule appended to this section.

**END OF SECTION**

**SECTION 086200**
**UNIT SKYLIGHTS**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Skylights with integral frame.

### 1.02 RELATED REQUIREMENTS

A. Section 061000 - Rough Carpentry: Wood framing for rough opening.

### 1.03 REFERENCE STANDARDS

A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for Windows, Doors, and Skylights; 2022.

B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

C. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

D. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights; 2023.

### 1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Include structural, thermal, and daylighting performance values.

C. Shop Drawings: Indicate configurations, dimensions, locations, fastening methods, and installation details.

D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

E. Manufacturer's qualification statement.

F. Specimen warranty.

### 1.05 QUALITY ASSURANCE

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

### 1.06 WARRANTY

A. See Section 017800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide five-year manufacturer warranty including coverage for leakage due to defective skylight materials or construction. Complete forms in Owner's name and register with manufacturer.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Unit Skylights: Basis of Design: Wasco Skylights - EcoSky Unit Skylight
   1. Elevate: www.holcimelevate.com/#sle.
   2. FAKRO America LLC: www.fakrousa.com/#sle.
   3. Kingspan Light + Air, LLC: www.kingspanlightand air.us/#sle.
   4. PHP Systems/Design: www.vtechskylights.com/#sle.
   5. Velux America, Inc: www.veluxusa.com/#sle.
   6. Substitutions: See Section 016000 - Product Requirements.

### 2.02 SKYLIGHTS

A. Skylights: Factory-assembled glazing in aluminum frame, free of visual distortion, and weathertight.
   1. Shape: Square dome.

2. Glazing: Single.
3. Operation: None; fixed.
4. Roof Slope: As indicated on drawings.
5. Nominal Size: 36 by 36 inch.

### 2.03 PERFORMANCE REQUIREMENTS

A. Provide unit skylights that comply with the following:
   1. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific skylight type:
   2. Allow for expansion and contraction within system components caused by a cycling surface temperature range of 170 degrees F without causing detrimental effects to system or components.

### 2.04 DESIGN CRITERIA

A. Unit Skylight Design: Design and size components to withstand dead loads and live loads caused by snow, hail, and positive and negative wind loads acting on skylight unit without damage or permanent set.
   1. Regulatory Requirements: Comply with applicable code criteria for loads.

### 2.05 COMPONENTS

A. Double Glazing: Acrylic plastic; factory sealed. Basis of Design: Acrylite Satin Sky 2.
   1. Outer Glazing: Clear transparent.
   2. Inner Glazing: White translucent.
   3. Thermal Transmittance (U-Value): .61, nominal.
   4. Visible Light Transmittance (VLT): 60% percent minimum.
   5. Solar Heat Gain Coefficient (SHGC): 45 percent, nominal.

B. Frames: ASTM B221 ASTM B221M Extruded aluminum thermally broken, reinforced and welded corner joints, integral curb frame mounting flange and counterflashing to receive roofing flashing system, with integral condensation collection gutter, glazing retainer; clear anodized finish.

### 2.06 ACCESSORIES

A. Anchorage Devices: Type recommended by manufacturer, exposed to view.

B. Counterflashings: Same metal type and finish as skylight frame.

C. Protective Back Coating: Zinc molybdate alkyd.

D. Sealant: Elastomeric, silicone or polyurethane, compatible with material being sealed .

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that openings and substrate conditions are ready to receive work of this section.

C. Verify that curbs installed under other sections are complete.

### 3.02 PREPARATION

A. Apply protective back coating on aluminum surfaces of skylight units that will be in contact with cementitious materials or dissimilar metals.

### 3.03 INSTALLATION

A. Install unit skylights in accordance with manufacturer's instructions and ASTM E2112.

B. Install aluminum curb assembly, fastening securely to roof decking; flash curb assembly into roofing system.

C. Install skylight units and mount securely to curb assembly; install counterflashing as required.

D. Apply sealant to achieve watertight assembly.

### 3.04 CLEANING

A. Remove protective material from prefinished aluminum surfaces.

B. Wash down exposed surfaces; wipe surfaces clean.

C. Remove excess sealant.

**END OF SECTION**

**SECTION 087100**
**DOOR HARDWARE**

## PART 1 - GENERAL

### 1.1 CONDITIONS

A. Conditions of the contract (General and Supplementary Conditions) and Division 01 - General Requirements, govern the work of this section.

B. This section includes all material, and related service necessary to furnish all finish hardware indicated on the drawings or specified herein.

C. Furnish UL listed hardware for all labeled and 20 min. openings in conformance with the requirements for the class of opening scheduled. Underwriters' requirements shall have precedence over specification where conflicts exist.

D. All work shall be in accordance with all applicable state and local building codes. Code requirements shall have precedence over this specification where conflicts exist.

### 1.2 WORK INCLUDED

A. This section includes the following:

1. Furnish door hardware (for hollow metal, wood and aluminum doors) specified herein, listed in the hardware schedule, and/or required by the drawings.
2. Cylinders for Aluminum Doors
3. Thresholds and Weather-stripping (Aluminum frame seals to be provided by aluminum door supplier)
4. Electro-Mechanical Devices
5. Access Control components and or systems specified within this section.

B. Where items of hardware are not definitely or correctly specified and is required for the intended service, such omission, error or other discrepancy should be directed to the Architect prior to the bid date for clarification by addendum. Otherwise furnish such items in the type and quantity established by this specification for the appropriate service intended.

### 1.3 RELATED WORK IN OTHER SECTIONS

A. This section includes coordination with related work in the following sections:

1. Division 06 Section "Finish Carpentry".
2. Division 06 Section "Cabinet Hardware"
3. Division 08 Section "Hollow Metal Doors and Frames".
4. Division 08 Section "Wood Doors"
5. Division 08 Section “Storm Doors”
6. Division 08 Section "Aluminum Entrances and Storefronts"
7. Division 26 Sections “Electrical”
8. Division 28 Sections "Electronic Safety and Security".

### 1.4 REFERENCES

A. Publications of agencies and organizations listed below form a part of this specification section to the extent referenced.

1. DHI – Installation Guide for Doors and Hardware (2020).
2. NFPA 80 - Standards for Fire Doors and Windows.
3. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures.
4. UL - Building Material Directory.
5. DHI - Door and Hardware Institute
6. WHI - Warnock Hersey
7. BHMA - Builders Hardware Manufacturers Association
8. ANSI – American National Standards Institute

9. IBC - International Building Code 2018 Edition (as adopted and amended by local building code)

## 1.5 SUBMITTALS

A. Within ten days after award of contract, submit detailed hardware schedule in quantities as required by Division 01 - General Requirements.

B. Schedule format shall be consistent with recommendations for a vertical format as set forth in the Door & Hardware Institute's (DHI) publication "Sequence and Format for the Hardware Schedule". Hardware sets shall be consolidated to group multiple door openings which share similar hardware requirements. Schedule shall include the following information:

1. Door number, location, size, handing, and rating.
2. Door and frame material, handing.
3. Degree of swing.
4. Manufacturer
5. Product name and catalog number
6. Function, type and style
7. Size and finish of each item
8. Mounting heights
9. Explanation of abbreviations, symbols, etc.
10. Numerical door index, indicating the hardware set/ group number for each door.

C. The schedule will be prepared under the direct supervision of a certified Architectural Hardware Consultant (AHC), or certified Door Hardware Consultant (DHC) employed by the hardware distributor. The hardware schedule shall be signed and embossed or stamped with the DHI certification seal of the supervising AHC or DHC. The supervising AHC or DHC shall attend any meetings related to the project when requested by the architect.

D. Check the specified hardware for suitability and adaptability to the details and surrounding conditions.

E. Review drawings from related trades as required to verify compatibility with specified hardware. Indicate unsuitable or in compatible items, and proposed substitutions in the hardware schedule.

F. Provide documentation for all hardware to be furnished on labeled fire doors indicating compliance with positive pressure fire testing UL 10C.

G. Furnish manufacturers' catalog data for each item of hardware in quantities as required by Division 01 - General Requirements.

H. Submit a sample of each type of hardware requested by the architect. Samples shall be of the same finish, style, and function as specified herein. Tag each sample with its permanent location so that it may be used in the final work.

I. Furnish with first submittal, a list of required lead times for all hardware items.

J. After final approved schedule is returned, transmit corrected copies for distribution and field use in quantities as required by Division 01 - General Requirements.

K. Furnish approved hardware schedules, template lists, and pertinent templates as requested by related trades.

L. Furnish necessary diagrams, schematics, voltage and amperage requirements for all electro-mechanical devices or systems as required by related trades. Wiring diagrams shall be opening specific and include both a riser diagram and point to point diagram showing all wiring terminations.

M. After receipt of approved hardware schedule, Hardware supplier shall initiate a meeting including the owner’s representative to determine keying requirements. Upon completion of initial key meeting, hardware supplier shall prepare a proposed key schedule with symbols and abbreviations as set forth in the door and hardware institute’s publication “Keying Procedures, Systems, and Nomenclature”. Submit copies of owner approved key schedule for review and

field use in quantities as required by Division 01 - General Requirements. Wiring diagrams shall be included in final submittals transmitted for distribution of field use.

## 1.6 QUALITY ASSURANCE

A. Manufacturers and model numbers listed are to establish a standard of function and quality. Similar items by approved manufacturers that are equal in design, function, and quality, may be considered for prior approval of the architect, provided the required data and physical samples are submitted for approval as set forth in Division 01 - General Requirements.

B. Where indicated in this specification, products shall be independently certified by ANSI for compliance with relevant ANSI/BHMA standards A156.1 - A156.36 – Standards for Hardware and Specialties. All products shall meet or exceed certification requirements for the respective grade indicated within this specification. Supplier shall provide evidence of certification when requested by the architect.

C. Obtain each type of hardware (hinges, latch & locksets, exit devices, closers, etc.) from a single manufacturer, although several may be indicated as offering products complying with requirements.

D. Electrical drawings and electrical specifications are based on the specific electrified hardware components specified in hardware sets. When electronic hardware components other than those indicated in hardware sets are provided, the supplier shall be responsible for all costs incurred by the design team and their consultants to review and revise electrical drawings and electrical specifications. Supplier shall also be responsible for any additional costs associated with required changes in related equipment, materials, installation, or final hook up to ensure the system will operate and function as indicated in the construction documents, including hardware set operational / functional descriptions.

E. All hardware items shall be manufactured no earlier than 6 months prior to delivery to site.

F. Hardware supplier shall be factory trained and certified by the manufacture to provide and support all computer managed locks and system components.

G. Installation of hardware shall be installed or directly supervised and inspected by a skilled installer certified by the manufacturer of locksets, door closers, and exit devices used on the project, or with not less than 3 years' experience in successful completion of projects similar in size and scope.

H. Provide hardware for all labeled fire doors, which complies with positive pressure fire testing UL 10C.

I. Comply with all applicable provisions of the standards referenced within section 1.4 of this specification.

J. Hardware supplier shall participate when reasonably requested to meet with the contractor and or architect to inspect any claim for incorrect or non-functioning materials; following such inspection, the hardware supplier shall provide a written statement documenting the cause and proposed remedy of any unresolved items.

## 1.7 DELIVERY, STORAGE AND HANDLING

A. Hardware supplier shall deliver hardware to the job site unless otherwise specified.

B. All hardware shall be delivered in manufacturers' original cartons and shall be clearly marked with set and door number.

C. Coordinate with contractor prior to hardware delivery and recommend secure storage and protection against loss and damage at job site.

D. Contractor shall receive all hardware and provide secure and proper protection of all hardware items to avoid delays caused by lost or damaged hardware. Contractor shall report shortages to the Architect and hardware supplier immediately after receipt of material at the job site.

E. Coordinate with related trades under the direction of the contractor for delivery of hardware items necessary for factory installation.

### 1.8 PRE-INSTALLATION MEETING

A. Schedule a hardware pre-installation meeting on site to review and discuss required door operating clearances and the installation of continuous hinges, locksets, door closers, exit devices, overhead stops, and electromechanical door hardware.

B. Meeting attendees shall be notified 7 days in advance and shall include: Architect, Contractor, Door Hardware Installers (including low voltage hardware), Manufacturers representatives for above hardware items, and any other effected subcontractors or suppliers.

C. All attendees shall be prepared to distribute installation manuals, hardware schedules, templates, and physical hardware samples.

### 1.9 WARRANTY

A. All hardware items shall be warranted against defects in material and workmanship as set forth in Division 01 - General Requirements.

B. Repair, replace, or otherwise correct deficient materials and workmanship without additional cost to owner.

## PART 2 - PRODUCTS

### 2.1 FASTENERS

A. All exposed fasteners shall be Phillips head or as otherwise specified and shall match the finish of the adjacent hardware. All fasteners ex-posed to the weather shall be non-ferrous or stainless steel. Furnish correct fasteners to accommodate surrounding conditions.

B. Coordinate required reinforcements for doors and frames. Seek approval of the architect prior to furnishing through-bolts. Furnish through-bolts as required for materials not readily reinforced.

### 2.2 BUTT HINGES

A. Acceptable manufacturers and respective catalog numbers:

| | Ives | Stanley | Hager | McKinney |
|---|---|---|---|---|
| 1. Standard Weight, Plain Bearing | 5PB1 | F179 | **** | T2714 |
| 2. Standard Weight, Ball Bearing | 5BB1 | BB179 | BB1279 | TB2714 |
| 3. Standard Weight, Ball Bearing, Non-Ferrous | 5BB1 | FBB191 | BB1191 | TB2314 |
| 4. Heavy Weight, Ball Bearing | 5BB1HW | FBB168 | BB1168 | T4B3786 |
| 5. Heavy Weight, Ball Bearing, Non-Ferrous | 5BB1HW | FBB199 | BB1199 | T4B3386 |

B. Hinges shall be independently certified by ANSI for compliance with ANSI A156.1 (2006). Hinges shall meet or exceed the following ANSI grade requirements as indicated below:

1. Standard Weight, Plain Bearing Hinges: Grade 3
2. Standard Weight, 2 Ball Bearing Hinges: Grade 2
3. Heavy Weight, 4 Ball Bearing Hinges: Grade 1

C. Unless otherwise specified, furnish the following hinge quantities for each door leaf.

1. 3 hinges for doors up to 90 inches.
2. 1 additional hinge for every 30 inches on doors over 90 inches.
3. 4 hinges for Dutch door applications.

D. Unless otherwise specified, top and bottom hinges shall be located as specified in Division 08 Section "Hollow Metal Doors and Frames". Intermediate hinges shall be located equidistant from others.

E. Unless otherwise specified, furnish hinge weight and type as follows:

1. Standard weight: plain bearing hinge 5PB1 or ball bearing hinge 5BB1 for interior openings through 36 inches wide without a door closer.

2. Standard weight: ball bearing hinge 5BB1 for interior opening over 36 through 40 inches wide without a door closer, and for interior openings through 40 inches wide with a door closer.
3. Heavyweight: 4 ball bearing hinge 5BB1HW for interior openings over 40 inches wide, and for all vestibule doors.
4. Heavyweight: 4 ball bearing hinge 5BB1HWss for exterior openings unless otherwise listed in groups.
5. Heavyweight: 4 ball bearing hinge 5BB1HWss 5” for all exterior doors or 4 ball bearing hinge 5BB1HW 5” for interior doors, that have an automatic operator.

F. At existing frames receiving new hinges, match existing hinge size and weight.

G. Unless otherwise specified, furnish hinges for exterior doors, fabricated from brass, bronze, or stainless steel. Unless otherwise specified, hinges for interior doors may be fabricated from steel.

H. Unless otherwise specified, furnish hinges in the following sizes:
1. 5" x 5" 2-1/4" thick doors
2. 4-1/2" x 4-1/2" 1-3/4" thick doors
3. 3-1/2" x 3-1/2" 1-3/8" thick doors

I. Furnish hinges with width to accommodate trim and allow for 180-degree swing.

J. Unless otherwise specified, furnish hinges with flat button tips with non-rising pins at interior doors, non-removable loose pins (NRP) at exterior, and out-swinging lockable interior doors.

K. Unless otherwise specified, furnish all hinges to template standards.

## 2.3 POWER TRANSFERS

A. Acceptable manufacturers and respective catalog numbers:

| | Von Duprin | ASSA |
|---|---|---|
| 1. Concealed Two Wire | EPT-2 | CEPT-10 |

B. Door cords shall be armored cable with screw on caps.

C. Concealed power transfers shall be concealed in the door and frame when the door is closed.

D. Concealed power transfers shall have a steel tube to protect wires from being cut.

E. Concealed power transfers with spring tubes shall be rejected.

F. Concealed power transfers shall be supplied with a mud box to house all terminations.

## 2.4 FLUSH BOLTS AND DUST PROOF STRIKES

A. Acceptable manufacturers and respective catalog numbers:

| | Ives | Door Controls | Hager |
|---|---|---|---|
| 1. Dust Proof Strike | DP2 | 80 | 280X |
| 2. Constant Latching Bolt (Metal Door) | FB51P | 845 | 293D |
| 3. Constant Latching Bolt (Wood Door) | FB61P | 945 | 294D |

B. Unless otherwise specified, provide 12" rods for manual flush bolts for door 7'6" or less, 24" top rods for doors over 7'6" to 8'6".

C. Unless otherwise specified, provide doors over 8'6" with automatic top bolts.

D. Provide automatic flush bolts where required to maintain fire door listing and or egress requirements on pairs of doors.

E. All flush-bolt applications shall be UL listed to be installed with top flush-bolt only. Provide auxiliary fire bolt as required for fire rated openings where less bottom bolt has been specified.

F. Provide all bottom flush bolts with non-locking dust proof strikes.

## 2.5 EXIT DEVICES

A. Acceptable manufacturers and respective catalog numbers:

| | Von Duprin | No Substitution |
|---|---|---|
| 1. Wide Stile, Push Pad | 99 Series | |

A. Exit devices shall be independently certified by ANSI for compliance with ANSI A156.3, Grade 1 (2008).

B. Obtain exit devices from a single manufacturer, although several may be indicated as offering products complying with requirements.

C. All exit devices shall be equipped with a sound-dampening feature to reduce touch pad return noise.

D. On full glass doors there shall be no exposed fasteners on the back of the mechanism visible through the glass.

E. All exit devices shall be provided with flush end caps to reduce potential damage from impact.

F. All exit devices shall be provided with dead-locking latch bolts to ensure security.

G. All exit devices shall be U.L. listed for accident hazard. Exit device for use on fire doors shall also be U.L. listed for fire exit hardware.

H. Provide optional strikes, special length rods, and adapter plates to accommodate door and frame conditions. Provide narrow style series devices in lieu of wide stile series devices where optional strikes will not accommodate door and frame conditions.

I. Coordinate with related trades to ensure adequate clearance and reinforcement is provided in doors and frames. Provide thru bolts as required.

J. Refer to hardware groups for exit device applications utilizing the option of: "less bottom rod and floor strike" (LBR)

K. All exit devices shall be provided with optional trim designs to match other lever and pull designs used on the project.

L. Unless specific exit device dogging options are noted within hardware sets, provide dogging options as follows:
   1. Fire Rated devices: Dogging not permitted.
   2. Non-Rated Exit Only functions not equipped with outside trim or pull: Less Dogging.
   3. Non-Rated Classroom functions: Less Dogging.
   4. Non-Rated devices utilizing electric latch retraction or electrified outside trim: Less Dogging.
   5. All Other Non-Rated devices: Cylinder Dogging utilizing interchangeable core cylinders. Cylinder keyway shall match locksets furnished on this project.

M. Provide glass bead kits as required to accommodate door conditions. Screws shall not be visible through full glass doors.

N. Where specified, provide compatible keyed mullions with cylinder for pairs of doors.

O. Provide Von Duprin #154 or equivalent mullion/frame stabilizers at the following application(s):
   1. Lockable exterior or vestibule paired openings with a fixed or removable hollow metal or aluminum mullion.
   2. Lockable exterior or vestibule single doors in aluminum frames.

P. Provide reinforced crossbars for all traditional style exit devices applied to doors over 36" wide.

## 2.6 LOCKS AND LATCHES

A. Acceptable manufacturers and respective catalog numbers:

| | Schlage |
|---|---|
| 1. Grade 1 Cylindrical | ND Series TLR |

B. Bored locks shall be independently certified by ANSI for compliance with ANSI A156.2 (2011). Interconnected locks shall be independently certified by ANSI for compliance with ANSI A156.12

(2013). Mortise locks shall be independently certified by ANSI for compliance with ANSI A156.13 (2012).

C. Unless otherwise specified, all locks and latches to have:
   1. 2-3/4" Backset
   2. 1/2" minimum throw latchbolt
   3. 1" throw deadbolt
   4. ANSI A115.2 strikes

D. Provide guarded latch bolts for all locksets, and latch bolts with throw to maintain fire rating of both single and paired door assemblies.

E. Provide strike with lip length adequate to clear surrounding trim.

F. Provide wrought boxes for strikes at inactive doors, wood frames, and metal frames without integral mortar covers.

G. Provide Von Duprin #154 or equivalent mullion/frame stabilizers at the following application(s) unless provided with deadbolt:
   1. Lockable exterior or vestibule paired openings with a fixed or removable hollow metal or aluminum mullion.
   2. Lockable exterior or vestibule single doors in aluminum frames.

## 2.7 PULLS, PUSH BARS, PUSH/PULL PLATES

A. Acceptable manufacturers and respective catalog numbers:

| | | | | |
|---|---|---|---|---|
| 1. | Push Plate (.050 6"X 16") | 8200 6" X 16" | 56 | 30S 6 x 16 |
| 2. | Pull Plate (1" dia., 10" CTC - .050" X 4" X 16") | 8303-0 4" X 16" | 5426C | 34J 4 x 16 |

A. Adjust dimensions of push plates to accommodate stile and rail dimensions, lite and louver cutouts, and adjacent hardware. Where required by adjacent hardware, push plates shall be factory drilled for cylinders or other mortised hardware. All push plates shall be beveled 4 sides and counter sunk.

B. Where required on wide stile doors, install straight pull offset of cylinder to allow for access to cylinder.

C. Where possible, provide back-to-back, and concealed mounting for pulls and push bars. Push bar length shall be 3" less door width, or center of stile to center of stile for stile & rail or full glass doors.

## 2.8 CLOSERS

A. Acceptable manufacturers and respective catalog numbers:

| | LCN |
|---|---|
| 1. | 4011 /4111 EDA |

B. Door closers shall be independently certified by ANSI for compliance with ANSI A156.4, Grade 1 (2013).

C. Obtain door closers from a single manufacturer, although several may be indicated as offering products complying with requirements.

D. Provide extra heavy-duty arm (EDA / HD) when closer is to be installed using parallel arm mounting.

E. Hardware supplier shall coordinate with related trades to ensure aluminum frame profiles will accommodate specified door closers.

F. Closers shall use high strength cast iron cylinders, forged main arms, and one-piece forged steel pistons.

G. Closers shall utilize a stable fluid withstanding temperature range of +120deg F to -30deg F without seasonal adjustment of closer speed to properly close the door. Closers for fire-rated doors shall be provided with temperature stabilizing fluid that complies with standards UL10C.

H. Unless otherwise specified, all door closers shall have full covers and separate adjusting valves for sweeps, latch, and backcheck.

I. Provide closers for all labeled doors. Provide closer series and type consistent with other closers for similar doors specified elsewhere on the project.

J. Provide closers with adjustable spring power. Size closers to ensure exterior and fire rated doors will consistently close and latch doors under existing conditions. Size all other door closers to allow for reduced opening force not to exceed 5 lbs.

K. Install closers on the room side of corridor doors, stair side of stairways and interior side of exterior doors.

L. Closers shall be furnished complete with all mounting brackets and cover plates as required by door and frame conditions, and by adjacent hardware.

M. Door closers shall be provided with a powder coat finish to provide superior protection against the effects of weathering. Powder coat finish shall successfully pass a 100 hour salt spray test.

N. Pressure Relief Valve, PRV, shall not be acceptable.

## 2.9 LOW ENERGY ELECTRO-HYDRAULIC AUTOMATIC OPERATORS

A. Acceptable manufacturers and respective catalog numbers:

| | LCN | No Substitution |
|---|---|---|
| 1. Electro-Hydraulic Operator | 4640 | |

B. Low energy operators shall be independently certified by ANSI for compliance with ANSI A156.19 (2002).

C. Where low kinetic energy, as defined by ANSI/BHMA Standard A156.19, power operators are indicated for doors required to be accessible to the disabled, provide electrically powered operators complying with the ADA for opening force and time to close standards.

D. The closing action shall be controlled by modern type cast iron door closer cylinder filled with a flat viscosity fluid, stable from +120F to -30F that would require no seasonal adjustments. The closer shall have field adjustable spring power; have two independent closing speed adjustment valves, and hydraulic back-check.

E. Full closing force shall be provided when the power or assist cycle ends.

F. All power operator systems shall include the following features and functions:

1. Provisions for separate conduits to carry high and low voltage wiring in compliance with the National Electrical Code, section 725-31.
2. The operator will be designed with an electronically controlled mechanical clutching mechanism to prevent damage to the operator if the system is actuated while the door is latched or if the door is forced closed during the opening cycle.
3. All covers, mounting plates and arm systems shall be powder coated and successfully pass a minimum of 100 hours testing as outlined in ANSI/BHMA Standard A156.18.
4. UL listed for use on labeled doors.
5. All operators shall be non-handed with spring power over a range of at least four sizes; either 1 through 4 or 2 through 5.
6. The power operator shall incorporate microprocessor controlled digital controls including factory default memory settings, on-board diagnostics, non-volatile memory, and integrated delay and relay for controlling door release devices.
7. Provisions in the control box or module shall provide control {inputs and outputs) for; electric strike delay, auxiliary contacts, sequential operation, fire alarms systems, actuators, swing side sensors, and stop side sensors.

8. Exterior switches shall be weather resistant and mount on a single gang electrical box furnished by Division 26.

G. All electrically powered operators shall include the following features or functions:
   1. When an obstruction or resistance to the opening swing is encountered, the operator will pause at that point, then attempt to continue opening the door. If the obstruction or resistance remains, the operator will again pause the door.
   2. Easily accessible main power and maintain hold open switches will be provided on the operator.
   3. An electronically controlled clutch to provide adjustable opening force.
   4. A microprocessor to control all motor and clutch functions.
   5. An on-board power supply capable of delivering both 12V and 24V outputs up to a maximum of 1.0 ampere combined load.
   6. All input and output power wiring shall be protected by slow blow fuses. These fuses shall be easily replaceable without special tools or component replacement.
   7. If electrical failure occurs, the unit shall operate as a standard door closer.

H. Power Operators shall be warranted by the manufacture to be free from defects in material and workmanship for a period of two years.

## 2.10 KICK PLATES AND MOP PLATES

A. Furnish protective plates as specified in hardware groups.

B. Where specified, provide 10" kick plates, 34" armor plates, and 4" mop plates. Unless otherwise specified, metal protective plates shall be .050" thick; plastic plates shall be 1/8" thick.

C. Protective plates shall be 2" less door width, or 1" less door width at pairs. All protective plates shall be beveled 4 sides and counter sunk.

D. Protection plates over 16" shall not be provided for labeled doors unless specifically approved by door manufacturers listing. When protection plates over 16” are provided for labeled doors, the plate shall be labeled.

E. Where specified, provide surface mounted door edges. Edges shall butt to protective plates. Provide edges with cutouts as required adjacent hardware.

F. Adjust dimensions of protection plates to accommodate stile and rail dimensions, lite and louver cutouts, and adjacent hardware. Where required by adjacent hardware, protection plates shall be factory drilled for cylinders or other mortised hardware.

## 2.11 OVERHEAD STOPS

A. Acceptable manufacturers and respective catalog numbers:

| | Glynn-Johnson | Rixson | Sargent |
|---|---|---|---|
| 1. Heavy Duty Surface Mount | GJ900 Series | 9 Series | 590 |
| 2. Heavy Duty Concealed Mount | GJ100 Series | 1 Series | 690 |

B. Unless otherwise specified, furnish GJ900 series overhead stop for hollow metal or 1-3/4” solid core doors equipped with regular arm surface type closers that swing more than 140 degrees before striking a wall, for hollow metal or 1-3/4” solid core doors that open against equipment, casework, sidelights, or other objects that would make wall bumpers inappropriate, and as specified in hardware groups.

C. Furnish sex bolt attachments for wood and mineral core doors unless doors are supplied with proper reinforcing blocks.

D. Provide special stop only (“SE” suffix) overhead stops when used in conjunction with electronic hold open closers.

E. Do not provide holder function for labeled doors.

## 2.12 WALL STOPS AND HOLDERS

A. Acceptable manufacturers and respective catalog numbers:

| | Ives | Hager | Burns |
|---|---|---|---|
| 1. Wrought Convex Wall Stop | WS406CVX | 232W | 570 |
| 2. Wrought Concave Wall Stop | WS406CCV | 236W | 575 |

B. Furnish a stop or holder for all doors.

C. Provide concave style wall stop at all adjacent integral push button locks; provide convex style wall stop at all other locations.

D. Where wall stops are not applicable, furnish overhead stops.

E. Furnish floor stops or hinge pin stops only where specified in hardware sets.

F. Do not provide holder function for labeled doors.

## 2.13 WEATHERSTRIP, GASKETING

A. Acceptable manufacturers and respective catalog numbers:

| | Zero | Pemko | NGP | Reese |
|---|---|---|---|---|
| 1. Adhesive Gasket | 188 | S88 | 5050 | 797 |

B. Weatherstrip and gasketing shall be independently certified by ANSI for compliance with ANSI A156.22 (2005).

C. Where specified in the hardware groups, furnish the above products unless otherwise detailed in groups.

D. Provide weatherstripping all exterior doors and where specified.

E. Provide intumescent and other required edge sealing systems as required by individual fire door listings to comply with positive pressure standards UL 10C.

F. Provide Zero 188 smoke gaskets at all fire rated doors and smoke and draft control assemblies.

G. Provide gasketing for all meeting edges on pairs of fire doors. Gasketing shall be compatible with astragal design provided by door supplier as required for specific fire door listings.

## 2.14 FINISHES AND BASE MATERIALS

A. Unless otherwise indicated in the hardware groups or herein, hardware finishes shall be applied over base metals as specified in the following finish schedule:

| HARDWARE ITEM | BHMA FINISH AND BASE MATERIAL |
|---|---|
| 1. Butt Hinges: Exterior, or Non-Ferrous | 630 (US32D - Satin Stainless Steel) |
| 2. Butt Hinges: Interior | 652 (US26D - Satin Chromium) |
| 3. Flush Bolts | 626 (US26D - Satin Chromium) |
| 4. Exit Devices | 626 (US26D - Satin Chromium) |
| 5. Locks and Latches | 626 (US26D - Satin Chromium) |
| 6. Pulls and Push Plates/Bars | 630 (US32D - Satin Stainless Steel) |
| 7. Closers | 689 (Powder Coat Aluminum) |
| 8. Protective Plates | 630 (US32D - Satin Stainless Steel) |
| 9. Overhead Stops | 630 (US32D - Satin Stainless Steel) |
| 10. Wall Stops and Holders | 630 (US32D - Satin Stainless Steel) |
| 11. Thresholds | 719 (Mill Aluminum) |
| 12. Weather-strip, Sweeps Drip Caps | Aluminum Anodized |
| 13. Miscellaneous | 626 (US26D - Satin Chromium) |

## 2.15 KEYING

A. All locks and cylinders shall accommodate existing key system.

B. Cores and keys shall be provided by owner.

C. The owner shall install the cores.

D. The contractor must request all owner keys 24 hours in advance of using them. The contractor will be charged for any keys that are not returned to the owner when the project is completed. The charge will be equal to the cost of replacing any locks and keys relevant to the key code for those locks and keys.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Prior to installation of hardware, installer shall examine door frame installation to ensure frames have been set square and plumb. Installer shall examine doors, door frames, and adjacent wall, floor, and ceiling for conditions, which would adversely affect proper operation and function of door assemblies. Do not proceed with hardware installation until such deficiencies have been corrected.

### 3.2 INSTALLATION

A. Before hardware installation, general contractor/construction manager shall coordinate a hardware installation seminar with a 1 week notice to all parties involved. The seminar is to be conducted on the installation of hardware, specifically of locksets, closers, exit devices, continuous hinges and overhead stops. Manufacturer's representative of the above products to present seminar. Seminar to be held at the job site and attended by installers of hardware (including low voltage hardware) for aluminum, hollow metal and wood doors. Training to include use of installation manuals, hardware schedule, templates and physical products samples.

B. Shim doors as required to maintain proper operating clearance between door and frame.

C. Install all hardware in accordance with the approved hardware schedule and manufacturer’s instructions for installation and adjustment.

D. Set units level, plumb and true to the line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

E. Provide blocking or reinforcement for all hardware mounted to drywall construction, including wall mounted door stops and holders.

F. Drill and countersink units which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accord with industry standards.

G. Drill appropriate size pilot holes for all hardware attached to wood doors and frames.

H. Unless otherwise specified, locate all hardware in accordance with the recommended locations for builders hardware for standard doors and frames as published by the Door and Hardware Institute (TDH-007-20).

I. Use only fasteners supplied by or approved by the manufacturer for each respective item of hardware.

J. Mortise and cut to close tolerance and conceal evidence of cutting in the finished work.

K. Conceal push and pull bar fasteners where possible. Do not install through bolts through push plates.

L. Install hardware on UL labeled openings in accordance with manufacturer's requirements to maintain the label.

M. Apply self-adhesive gasketing on frame stop at head & latch side and on rabbet of frame at hinge side.

N. Install hardware in accordance with supplemental "S" label instructions on all fire rated openings.

O. Install wall stops to contact lever handles or pulls. Do not mount wall stops on casework, or equipment.

P. Where necessary, adjust doors and hardware as required to eliminate binding between strike and latchbolt. Doors should not rattle.

Q. Overhead stops used in conjunction with electrified hold open closers shall be templated and installed to coincide with engagement of closer hold open position.

R. Install door closers on corridor side of lobby doors, room side of corridor doors, and stair side of stairways.

S. Adjust spring power of door closers to the minimum force required to ensure exterior and fire rated doors will consistently close and latch doors under existing conditions. Adjust all other door closers to ensure opening force does not to exceed 5 lbs.

T. Adjust "sweep", "latch", & "back check" valves on all door closers to properly control door throughout the opening and closing cycle. Adjust total closing speed as required to comply with all applicable state and local building codes.

U. Install "hardware compatible" (bar stock) type weatherstripping continuously for an uninterrupted seal. Adjust templating for parallel arm door closers, exit devices, etc., as required to accommodate weatherstripping.

V. Unless otherwise specified or detailed, install thresholds with the bevel in vertical alignment with the outside door face. Notch and closely fit thresholds to frame profile. Set thresholds in full bed of sealant.

W. Compress sweep during installation as recommended by sweep manufacturer to facilitate a water-resistant seal.

X. Deliver to the owner 1 complete set of installation and adjustment instructions, and tools as furnished with the hardware.

## 3.3 FIELD QUALITY CONTROL

A. After installation has been completed, the hardware supplier and manufacturers representative for locksets, door closers, exit devices, and overhead stops shall check the project and verify compliance with installation instructions, adjustment of all hardware items, and proper application according to the approved hardware schedule. Hardware supplier shall submit a list of all hardware that has not been installed correctly.

B. After installation has been completed, the hardware supplier and manufacturers representative shall meet with the owner to explain the functions, uses, adjustment, and maintenance of each item of hardware. Hardware supplier shall provide the owner with a copy of all wiring diagrams. Wiring diagrams shall be opening specific and include both a riser diagram and point to point diagram showing all wiring terminations.

## 3.4 ADJUSTMENT AND CLEANING

A. At final completion, and when H.V.A.C. equipment is in operation, installer shall make final adjustments to and verify proper operation of all door closers and other items of hardware. Lubricate moving parts with type lubrication recommended by the manufacturer.

B. All hardware shall be left clean and in good operation. Hardware found to be disfigured, defective, or inoperative shall be repaired or replaced.

## 3.5 HARDWARE SCHEDULE

A. The following schedule of hardware groups are intended to describe opening function. The hardware supplier is cautioned to refer to the preamble of this specification for a complete description of all materials and services to be furnished under this section.

**HW SET 01**

| | | | | |
|---|---|---|---|---|
| | EA | HINGES | (AS SPECIFIED) | IVE |
| 1 | EA | ENTRANCE LOCK | ND53 | SCH |
| 1 | EA | WALL STOP | WS406/407CCV | IVE |

FUNCTION: ND53 (F109) ENTRANCE LOCK
TURN/PUSH-BUTTON LOCKING; PUSHING AND TURNING BUTTON LOCKS OUTSIDE LEVER, REQUIRING USE OF KEY UNTIL BUTTON IS MANUALLY UNLOCKED. PUSH-BUTTON LOCKING; PUSHING BUTTON LOCKS OUTSIDE LEVER UNTIL UNLOCKED BY KEY OR BY TURNING INSIDE LEVER.

**HW SET 02**

| | | | | |
|---|---|---|---|---|
| | EA | HINGES | (AS SPECIFIED) | IVE |
| 1 | EA | CONST LATCHING BOLT | FB51T / FB61T (TOP BOLT) | IVE |
| 1 | EA | STOREROOM LOCK | ND80 | SCH |
| 1 | EA | OH STOP | 90S | GLY |
| 1 | EA | WALL STOP | WS406/407CCV | IVE |
| 1 | EA | OVERLAP ASTRAGAL | (BY DOOR SUPPLIER) | |

FUNCTION: ND80 (F86) STOREROOM LOCK
OUTSIDE LEVER FIXED. ENTRANCE BY KEY ONLY. INSIDE LEVER ALWAYS UNLOCKED.

**HW SET 03**

| | | | | |
|---|---|---|---|---|
| | EA | HINGES | (AS SPECIFIED) | IVE |
| 1 | EA | PASSAGE SET | ND10S | SCH |
| 1 | EA | SURFACE CLOSER | 4011 / 4111 EDA | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | IVE |
| 1 | EA | WALL STOP | WS406/407CCV | IVE |
| 1 | EA | SMOKE SEALS | 188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY) | ZER |

FUNCTION: ND10 (F75) PASSAGE LATCH
BOTH LEVERS ALWAYS UNLOCKED

**HW SET 04**

| | | | | |
|---|---|---|---|---|
| | EA | HINGES | (AS SPECIFIED) | IVE |
| 1 | EA | PRIVACY LOCK W/ OUTSIDE INDICATOR | ND40 OS-OCC | SCH |
| 1 | EA | SURFACE CLOSER | 4011 / 4111 EDA | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | IVE |
| 1 | EA | WALL STOP | WS406/407CCV | IVE |
| 1 | EA | SMOKE SEALS | 188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY) | ZER |

FUNCTION: ND40 (F76) BATH/BEDROOM PRIVACY LOCK
PUSH-BUTTON LOCKING. CAN BE OPENED FROM OUTSIDE WITH SMALL SCREWDRIVER. TURNING INSIDE LEVER OR CLOSING DOOR RELEASES BUTTON.

**HW SET 05**

| | | | | |
|---|---|---|---|---|
| | EA | HINGES | (AS SPECIFIED) | IVE |
| 1 | EA | STOREROOM LOCK | ND80 | SCH |
| 1 | EA | SURFACE CLOSER | 4011 DEL / 4111 DEL EDA | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | IVE |
| 1 | EA | WALL STOP | WS406/407CCV | IVE |
| 1 | EA | SMOKE SEALS | 188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY) | ZER |

FUNCTION: ND80 (F86) STOREROOM LOCK
OUTSIDE LEVER FIXED. ENTRANCE BY KEY ONLY. INSIDE LEVER ALWAYS UNLOCKED.

**HW SET 06**

| | | | | |
|---|---|---|---|---|
| | EA | HINGES | (AS SPECIFIED) | IVE |
| 1 | EA | STOREROOM LOCK | ND80 | SCH |
| 1 | EA | OH STOP | 90S | GLY |
| 1 | EA | SURFACE CLOSER | 4011 DEL / 4111 DEL EDA | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | IVE |
| 1 | EA | SMOKE SEALS | 188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY) | ZER |

FUNCTION: ND80 (F86) STOREROOM LOCK
OUTSIDE LEVER FIXED. ENTRANCE BY KEY ONLY. INSIDE LEVER ALWAYS UNLOCKED.

**HW SET 07**

| | | | | |
|---|---|---|---|---|
| | EA | HINGES | (AS SPECIFIED) | IVE |
| 1 | EA | PANIC HARDWARE | CD-9947-L-DT | VON |
| 1 | EA | ELEC PANIC HARDWARE | CD-LX-9947-L-NL | VON |
| 3 | EA | PERMANENT CORE | (BY OWNER) | |
| 1 | EA | OH STOP | 90S | GLY |
| 1 | EA | SURFACE CLOSER | 4111 SCUSH | LCN |
| 1 | EA | SURF. AUTO OPERATOR | 4642 | LCN |
| 2 | EA | ACTUATOR, TOUCH | 8310-853 / 8310-818 | LCN |
| 2 | EA | KICK PLATE | 8400 10" X 1" LDW B-CS | IVE |

FUNCTION: (NL) LATCHBOLT RETRACTED INSIDE BY EXIT DEVICE PUSH PAD AND OUTSIDE BY KEY IN CYLINDER. DOOR LOCKS WHEN KEY IS REMOVED AND DOOR IS CLOSED.
THIS DOOR HAS A POWER OPERATOR. WALL PLATE ACTUATORS ARE WIRED IN SERIES WITH THE LX SWITCH IN THE PANIC DEVICE. WHEN DEVICE IS DOGGED DOWN, THE WALL PLATE ACTUATORS ARE ACTIVE. WHEN THE DEVICE IS NOT DOGGED DOWN (LOCKED) THE WALL PLATE ACTUATORS ARE INACTIVE.

**HW SET 08**

| | | | | |
|---|---|---|---|---|
| | EA | HINGES | (AS SPECIFIED) | IVE |
| 2 | EA | PUSH PLATE | 8200 6" X 16" | IVE |
| 2 | EA | PULL PLATE | 8303 10" 4" X 16" | IVE |
| 1 | EA | SURFACE CLOSER | 4011 / 4111 EDA | LCN |
| 1 | EA | SURF. AUTO OPERATOR | 4642 | LCN |
| 2 | EA | ACTUATOR, TOUCH | 8310-853 / 8310-818 | LCN |
| 2 | EA | KICK PLATE | 8400 10" X 1" LDW B-CS | IVE |
| 2 | EA | WALL STOP | WS406/407CCV | IVE |

FUNCTION: PUSH/PULL.
THIS DOOR HAS A POWER OPERATOR. BOTH ACTUATORS ALWAYS ACTIVE TO OPEN THE DOOR.

**HW SET 09**

| | | | | |
|---|---|---|---|---|
| | EA | HINGES | (AS SPECIFIED) | IVE |
| 2 | EA | PUSH PLATE | 8200 6" X 16" | IVE |
| 2 | EA | PULL PLATE | 8303 10" 4" X 16" | IVE |
| 2 | EA | OH STOP | 90S | GLY |
| 1 | EA | SURFACE CLOSER | 4011 / 4111 EDA | LCN |
| 1 | EA | SURF. AUTO OPERATOR | 4642 | LCN |
| 2 | EA | ACTUATOR, TOUCH | 8310-853 / 8310-818 | LCN |
| 2 | EA | KICK PLATE | 8400 10" X 1" LDW B-CS | IVE |

FUNCTION: PUSH/PULL
THIS DOOR HAS A POWER OPERATOR. BOTH ACTUATORS ALWAYS ACTIVE TO OPEN THE DOOR.

**HW SET 10**

| | | | | |
|---|---|---|---|---|
| | EA | HINGES | (AS SPECIFIED) | IVE |
| 2 | EA | PUSH PLATE | 8200 6" X 16" | IVE |
| 2 | EA | PULL PLATE | 8303 10" 4" X 16" | IVE |
| 1 | EA | OH STOP | 90S | GLY |
| 1 | EA | SURFACE CLOSER | 4011 / 4111 EDA | LCN |
| 1 | EA | SURF. AUTO OPERATOR | 4642 | LCN |
| 2 | EA | ACTUATOR, TOUCH | 8310-853 / 8310-818 | LCN |
| 2 | EA | KICK PLATE | 8400 10" X 1" LDW B-CS | IVE |
| 1 | EA | WALL STOP | WS406/407CCV | IVE |

FUNCTION: PUSH/PULL
THIS DOOR HAS A POWER OPERATOR. BOTH ACTUATORS ALWAYS ACTIVE TO OPEN THE DOOR.

**SECTION 088000**
**GLAZING**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Glazing units.

B. Glazing compounds and accessories.

### 1.02 RELATED REQUIREMENTS

A. Section 081213 - Hollow Metal Frames: Glazed borrowed lites.

### 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; 2015 (Reaffirmed 2020).

C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.

D. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2021a.

E. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.

F. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.

G. ITS (DIR) - Directory of Listed Products; Current Edition.

H. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.

I. NFPA 257 - Standard on Fire Test for Window and Glass Block Assemblies; 2022.

J. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2023.

K. UL (DIR) - Online Certifications Directory; Current Edition.

L. UL 9 - Standard for Fire Tests of Window Assemblies; Current Edition, Including All Revisions.

M. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

N. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

O. UL 263 - Standard for Fire Tests of Building Construction and Materials; Current Edition, Including All Revisions.

### 1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.

C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.

D. Samples: Submit one samples 12 by 12 inch in size of glass units.

E. Manufacturer's Qualification Statement.

### 1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section with minimum five 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 017800 - Closeout Submittals, for additional warranty requirements.

B. Insulating Glass Units: Provide a five (5) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Float Glass Manufacturers:
   1. Viracon, Inc.: www.viracon.com/#sle.
   2. Cardinal Glass Industries: www.cardinalcorp.com/#sle.
   3. Guardian Industries Corp.: www.sunguardglass.com/#sle.
   4. Pilkington North America Inc.: www.pilkington.com/na.
   5. PPG Industries, Inc.: www.ppgideascapes.com/#sle.
   6. Oldcastle, Inc..
   7. Substitutions: Refer to Section 016000 - Product Requirements.

### 2.02 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 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.
   4. Tinted Type: ASTM C1036, Class 2 - Tinted, Quality-Q3, color and performance characteristics as indicated.

B. Type M-1 - Transparent One-Way Mirror: Mirror quality float glass with pyrolytic (hard coat) type coating located on high light level surface of glass; ASTM C1376.
   1. Applications: Locations as indicated on drawings.
   2. Thickness: 1/4 inch.
   3. Glass Tint: Grey.
   4. Glass Type: Fully tempered.
   5. Lighting Ratio: Maintain at least 8:1 lighting level ratio between coated side (bright-observed side) and uncoated side (dim-observer side).

## 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 the minimum required face and edge clearances are being provided.

C. 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.

D. Verify that sealing between joints of glass framing members has been completed effectively.

E. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

### 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 sealants in accordance with ASTM C1193, GANA Sealant Manual, and manufacturer's instructions.

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

C. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.

D. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.

E. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

### 3.04 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.

### 3.05 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**

**SECTION 092116**
**GYPSUM BOARD ASSEMBLIES**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Metal stud wall framing.

B. Metal channel ceiling framing.

C. Acoustic insulation.

D. Cementitious backing board.

E. Gypsum wallboard.

F. Joint treatment and accessories.

G. Textured finish system.

### 1.02 RELATED REQUIREMENTS

A. Section 061000 - Rough Carpentry: Wood blocking product and execution requirements.

B. Section 078400 - Firestopping: Top-of-wall assemblies at fire-resistance-rated walls.

### 1.03 REFERENCE STANDARDS

A. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2023.

B. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2020.

C. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2023.

D. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2019.

E. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2017.

F. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.

G. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.

H. GA-216 - Application and Finishing of Gypsum Panel Products; 2021.

### 1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.

C. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.

## PART 2 PRODUCTS

### 2.01 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.

B. Manufacturers - Metal Framing, Connectors, and Accessories:
   1. ClarkDietrich Building Systems; ____: www.clarkdietrich.com/#sle.
   2. Jaimes Industries; ____: www.jaimesind.com/#sle.
   3. Marino: www.marinoware.com/#sle.
   4. SCAFCO Corporation; _____: www.scafco.com/#sle.
   5. Phillips Manufacturing Company: www.phillipsmfg.com.
   6. Substitutions: See Section 016000 - Product Requirements.

C. 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. Ceiling Channels: C-shaped.
3. Furring: Hat-shaped sections, minimum depth of 7/8 inch.

D. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.

E. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.

1. Material: ASTM A653/A653M steel sheet, SS Grade 50/340, with G60/Z180 hot dipped galvanized coating.
2. Deflection and Firestop Track:
   a. Provide mechanical anchorage devices as described above that accommodate deflection while maintaining the fire-rating of the wall assembly.

## 2.02 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:

1. American Gypsum Company: www.americangypsum.com/#sle.
2. CertainTeed Corporation: www.certainteed.com/#sle.
3. Georgia-Pacific Gypsum: www.gpgypsum.com/#sle.
4. National Gypsum Company; ____: www.nationalgypsum.com/#sle.
5. USG Corporation: www.usg.com/#sle.
6. Substitutions: See Section 016000 - Product Requirements.

B. Fire Resistant Wallboard:

1. Application: Fire barrier locations as indicated on drawings..
2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
3. Type: Fire-resistance-rated Type X, UL or WH listed.
4. Thickness: 5/8 inch.
5. Edges: Tapered.

C. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.

1. Application: Ceilings, unless otherwise indicated.
2. Thickness: 5/8 inch.
3. Edges: Tapered.
4. Products:
   a. American Gypsum; Interior Ceiling Board.
   b. CertainTeed Corporation; ProRoc Interior Ceiling.
   c. Georgia-Pacific Gypsum; ToughRock Span 24 Ceiling Board.
   d. Lafarge North America Inc; Sagcheck.
   e. National Gypsum Company; High Strength Brand Ceiling Board.
   f. Pacific Coast Building Products, Inc; PABCO Ceiling Board.
   g. USG Corporation; Sheetrock Brand Sag-Resistant Interior Gypsum Ceiling Board.
   h. Substitutions: See Section 016000 - Product Requirements.
5. Glass Mat Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.
6. Core Type: Regular.
7. Regular Board Thickness: 1/2 inch.
8. Glass Mat Faced Products:
   a. CertainTeed Corporation; GlasRoc Brand.
   b. Georgia-Pacific Gypsum; DensGlass Sheathing.
   c. National Gypsum Company; Gold Bond eXP Sheathing.
   d. Substitutions: See Section 016000 - Product Requirements.

## 2.03 GYPSUM WALLBOARD ACCESSORIES

A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced. Thickness: 6 inch.

B. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, galvanized steel, or rolled zinc, unless noted otherwise.

C. Decorative Metal Trim:
   1. Material: Extruded aluminum alloy 6063-T5 temper.
   2. Finish: Anodized, clear.
   3. Type: As shown on drawings.
   4. Reveal Trim:
      a. Products:
         1) Fry Reglet.
         2) Substitutions: See Section 016000 - Product Requirements.
   5. Paper Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
   6. Ready-mixed vinyl-based joint compound.
   7. Chemical hardening type compound.

D. 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.

E. 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.

B. Suspended Ceilings and Soffits: Space framing and furring members at 16 inches on center.

C. Studs: Space studs at 16 inches on center.
   1. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.

D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

E. Blocking: Install wood blocking for support of:
   1. Framed openings.
   2. Wall mounted cabinets.
   3. Plumbing fixtures.
   4. Toilet partitions.
   5. Toilet accessories.
   6. Wall mounted door hardware.

## 3.03 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.

## 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. Fire-Resistance-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.

### 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. Decorative Trim: Install at locations shown on drawings and in accordance with manufacturer's instructions.

### 3.06 JOINT TREATMENT

A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, embed and finish with setting type joint compound.

B. 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.

C. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
   1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
   2. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.

### 3.07 TEXTURE FINISH

A. Apply light orange-peel finish texture coating by means of spraying apparatus in accordance with manufacturer's instructions and to match approved sample.

**END OF SECTION**

**SECTION 092216**
**NON-STRUCTURAL METAL FRAMING**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Metal partition, ceiling, and soffit framing.

B. Framing accessories.

### 1.02 RELATED REQUIREMENTS

A. Section 061000 - Rough Carpentry: Wood blocking within stud framing.

B. Section 09 2116 - Gypsum Board Assemblies: Metal studs for gypsum board partition framing.

### 1.03 REFERENCE STANDARDS

A. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2018.

B. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2020.

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; 2022.

### 1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data describing framing member materials and finish, product criteria, load charts, and limitations.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Metal Framing, Connectors, and Accessories:
   1. Clarkwestern Dietrich Building Systems LLC: www.clarkdeitrich.com.
   2. Marino: www.marinoware.com/#sle.
   3. Simpson Strong Tie: www.strongtie.com/#sle.
   4. Substitutions: See Section 016000 - Product Requirements.

### 2.02 FRAMING MATERIALS

A. 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/240 at 5 psf.
   1. Studs: C shaped with flat or formed webs with knurled faces.
   2. Runners: U shaped, sized to match studs.
   3. Ceiling Channels: C shaped.
   4. Furring: Hat-shaped and Z shaped sections, minimum depth of 7/8 inch.
   5. Steel Stud Framing Connectors:
      a. Products:
         1) Simpson Strong Tie, Bridging Connectors; DBC Bridging Connector: www.strongtie.com.
         2) Substitutions: See Section 016000 - Product Requirements.

B. Loadbearing Studs: As specified in Section 054000.

C. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.

D. 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 .

E. Tracks and Runners: Same material and thickness as studs, bent leg retainer notched to receive studs with provision for crimp locking to stud.

F. Fasteners: ASTM C1002 self-piercing tapping screws.

G. Anchorage Devices: Powder actuated.

## 2.03 FABRICATION

A. Fabricate assemblies of framed sections to sizes and profiles required.

B. Fit, reinforce, and brace framing members to suit design requirements.

# PART 3 EXECUTION

## 3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that rough-in utilities are in proper location.

## 3.02 INSTALLATION OF STUD FRAMING

A. Double stud at wall openings, door and window jambs, not more than 2 inches from each side of openings.

## 3.03 CEILING AND SOFFIT FRAMING

A. Securely anchor hangers to structural members or embed in structural slab. Space hangers as required to limit deflection to criteria indicated. Use rigid hangers at exterior soffits.

B. Space main carrying channels at maximum 72 inch on center, and not more than 6 inches from wall surfaces. Lap splice securely.

## 3.04 TOLERANCES

A. Maximum Variation From True Position: 1/8 inch in 10 feet.

B. Maximum Variation From Plumb: 1/8 inch in 10 feet.

**END OF SECTION**

**SECTION 093000**
**TILING**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Tile for floor applications.

B. Tile for wall applications.

C. Coated glass mat backer board as tile substrate.

D. Ceramic accessories.

E. Non-ceramic trim.

### 1.02 RELATED REQUIREMENTS

A. Section 079200 - Joint Sealants: Sealing joints between tile work and adjacent construction and fixtures.

B. Section 092116 - Gypsum Board Assemblies: Tile backer board.

### 1.03 REFERENCE STANDARDS

A. ANSI A108/A118/A136.1 - Specifications for the Installation of Ceramic Tile; 2020.

B. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2023.

C. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive; 2021.

D. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2023.

E. ANSI A118.6 - American National Standard Specifications for Standard Cement Grouts for Tile Installation; 2019.

F. ANSI A118.10 - American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2023.

G. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2014 (Reaffirmed 2019).

H. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2022.

I. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2018.

J. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2024.

### 1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by affected installers.

### 1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

C. Samples: Mount tile and apply grout on two plywood panels, minimum 18 by 18 inches in size illustrating pattern, color variations, and grout joint size variations.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Installer's Qualification Statement:

F. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Extra Tile: 5 percent of each size, color, and surface finish combination.

**1.06 QUALITY ASSURANCE**

A. Maintain one copy of and ANSI A108/A118/A136.1 and TCNA (HB) on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.

C. Installer Qualifications:
   1. Company specializing in performing tile installation, with minimum of five years of documented experience.

**1.07 MOCK-UP**

A. Construct tile mock-up where indicated on drawings, incorporating all components specified for the location.
   1. Approved mock-up may remain as part of the Work.

**1.08 DELIVERY, STORAGE, AND HANDLING**

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

**1.09 FIELD CONDITIONS**

A. Do not install solvent-based products in an unventilated environment.

B. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

**PART 2 PRODUCTS**

**2.01 TILE**

A. Manufacturers:
   1. Caesar Ceramics.
   2. Cermiche Keope.
   3. Ceramica Vogue
   4. Substitutions: See Section 016000 - Product Requirements.

B. Porcelain Floor & Wall Tile Type PT-1 & PT-2: ANSI A137.1, and as follows:
   1. Autore manufactured by Caesar Ceramics .
   2. Moisture Absorption: 0 to 0.5 percent.
   3. Size and Shape: See Finish Legend.
   4. Color(s): See Finish Schedule.
   5. Pattern: See Drawings.
   6. Products:
      a. Substitutions: See Section 016000 - Product Requirements.

C. Porcelain Floor & Wall Tile Type PT-3A & PT-3B: ANSI A137.1, and as follows:
   1. Ubik manufactured by Ceramiche Keope .
   2. Moisture Absorption: 0 to 0.5 percent.
   3. Size and Shape: See Finish Legend.
   4. Color(s): See Finish Schedule.
   5. Pattern: See Drawings.
   6. Products:
      a. Substitutions: See Section 016000 - Product Requirements.

D. Wall Tile Type PT-5A and PT-5B: ANSI A137.1, and as follows:
   1. Ghiaccio manufactured by Ceramica Vogue .
   2. Moisture Absorption: 0.5 to 3.0 percent.
   3. Size and Shape: See Finish Schedule.
   4. Surface Finish: See Finish Schedule.
   5. Color(s): See Finish Schedule.

6. Pattern: See Drawings.
7. Products:
    a. Substitutions: See Section 016000 - Product Requirements.

## 2.02 TRIM AND ACCESSORIES

A. Non-Ceramic Trim: See Finish Schedule for finish, style and dimensions to suit application, for setting using tile mortar or adhesive.
    1. Applications:
        a. Open edges of wall tile.
        b. Open edges of floor tile.
        c. Wall corners, outside and inside.
        d. Transition between floor finishes of different heights.
        e. Thresholds at door openings.
        f. Expansion and control joints, floor and wall as indicated on Drawings.
        g. Borders and other trim as indicated on drawings.
    2. Manufacturers:
        a. Schluter-Systems: www.schluter.com/#sle.
        b. Genesis APS International: www.genesis-aps.com/#sle.
        c. Substitutions: See Section 016000 - Product Requirements.

## 2.03 SETTING MATERIALS

A. Manufacturers:
    1. ARDEX Engineered Cements: www.ardexamericas.com/#sle.
    2. Bostik Inc: www.bostik-us.com/#sle.
    3. Custom Building Products: www.custombuildingproducts.com/#sle.
    4. LATICRETE International, Inc: www.laticrete.com/#sle.
    5. Merkrete, by Parex USA, Inc: www.merkrete.com/sle.
    6. ProSpec, an Oldcastle brand: www.prospec.com.

B. Provide setting materials made by the same manufacturer as grout.

C. Latex-Portland Cement Mortar Bond Coat:.
    1. Products:
        a. ARDEX Engineered Cements; ARDEX X 77 MICROTEC: www.ardexamericas.com.
        b. AVM Industries, Inc; Thin-Set 780: www.avmindustries.com.
        c. LATICRETE International, Inc; LATICRETE 254 Platinum: www.laticrete.com.
        d. Substitutions: See Section 016000 - Product Requirements.

## 2.04 GROUTS

A. Manufacturers:
    1. ARDEX Engineered Cements: www.ardexamericas.com/#sle.
    2. LATICRETE International, Inc; LATICRETE PERMACOLOR Grout: www.laticrete.com/#sle.
    3. Basis of Design: Mapei.
    4. Substitutions: See Section 016000 - Product Requirements.

B. Standard Grout: ANSI A118.6 standard cement grout.
    1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.
    2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
    3. Color(s): As indicated on drawings.
    4. Products:
        a. LATICRETE International, Inc; LATICRETE 1500 Sanded Grout: www.laticrete.com/#sle.

C. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.
    1. Color(s): As indicated on drawings.

2. Products:
    a. LATICRETE International, Inc; LATICRETE SPECTRALOCK PRO Premium Grout: www.laticrete.com/#sle.
    b. Substitutions: See Section 016000 - Product Requirements.

D. Grout Sealer: Liquid-applied, moisture and stain protection for existing or new Portland cement grout.
    1. Composition: Water-based colorless silicone.

**2.05 ACCESSORY MATERIALS**

A. Concrete Floor Slab Crack Isolation Membrane: Material complying with ANSI A118.12; not intended as waterproofing.
    1. Thickness: 20 mils, maximum.
    2. Crack Resistance: No failure at 1/16 inch gap, minimum.
    3. Fluid or Trowel Applied Type:
        a. Material: Synthetic rubber or Acrylic.
        b. Thickness: 20 mils, maximum.
        c. Products:
            1) LATICRETE International, Inc; LATICRETE Blue 92 Anti-Fracture Membrane: www.laticrete.com/#sle.
            2) Merkrete, by Parex USA, Inc; Merkrete Fracture Guard: www.merkrete.com/#sle.
            3) TEC, an H.B. Fuller Construction Products Brand; TEC HydraFlex Waterproofing Crack Isolation Membrane: www.tecspecialty.com/#sle.
            4) Substitutions: See Section 016000 - Product Requirements.

B. Waterproofing Membrane at Floors: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.
    1. Crack Resistance: No failure at 1/16 inch gap, minimum; comply with ANSI A118.12.
    2. Fluid or Trowel Applied Type:
        a. Material: Synthetic rubber or Acrylic.
        b. Thickness: 25 mils, minimum, dry film thickness.
        c. Products:
            1) ARDEX Engineered Cements; ARDEX 8+9: www.ardexamericas.com/#sle.
            2) Custom Building Products; RedGard Crack Prevention and Waterproofing Membrane: www.custombuildingproducts.com/#sle.
            3) TEC, an H.B. Fuller Construction Products Brand; TEC HydraFlex Waterproofing Crack Isolation Membrane: www.tecspecialty.com/#sle.
            4) LATICRETE International, Inc; LATICRETE HYDRO BAN: www.laticrete.com/#sle.
            5) Merkrete, by Parex USA, Inc; Merkrete Hydro Guard 2000: www.merkrete.com/#sle.
            6) Substitutions: See Section 016000 - Product Requirements.

C. Backer Board: Coated glass mat type complying with ASTM C1178/C1178M; inorganic fiberglass mat on both surfaces and integral acrylic coating vapor retarder.

D. Mesh Tape: 2 inch wide self-adhesive fiberglass mesh tape.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.

D. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.

E. Verify that required floor-mounted utilities are in correct location.

**3.02 PREPARATION**

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

**3.03 INSTALLATION - GENERAL**

A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.13, manufacturer's instructions, and TCNA (HB) recommendations.

B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

E. Form internal angles square and external angles bullnosed.

F. Install non-ceramic trim in accordance with manufacturer's instructions.

G. Sound tile after setting. Replace hollow sounding units.

H. Keep control and expansion joints free of mortar, grout, and adhesive.

I. Keep expansion joints free of adhesive or grout. Apply sealant to joints.

J. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

K. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.

L. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

M. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

**3.04 INSTALLATION - FLOORS - THIN-SET METHODS**

A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.
   1. Use uncoupling membrane under all tile unless other underlayment is indicated.
   2. Where waterproofing membrane is indicated, install in accordance with TCNA (HB) Method F122, with latex-Portland cement grout.

**3.05 INSTALLATION - WALL TILE**

A. Over coated glass mat backer board on studs, install in accordance with TCNA (HB) Method W245.

**3.06 CLEANING**

A. Clean tile and grout surfaces.

**3.07 PROTECTION**

A. Do not permit traffic over finished floor surface for 4 days after installation.

**END OF SECTION**

**SECTION 095100**
**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 Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2022.

B. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2019.

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; 2022.

D. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2023.

### 1.03 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Do not install acoustical units until after interior wet work is dry.

### 1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate grid layout and related dimensioning.

C. Product Data: Provide data on suspension system components.

D. Samples: Submit two samples 6 by 6 inch in size illustrating material and finish of acoustical units.

E. Samples: Submit one samples each, 6 inches long, of suspension system main runner.

F. Manufacturer's Installation Instructions: Indicate special procedures.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Extra Acoustical Units: Quantity equal to 5 percent of total installed.

### 1.05 QUALITY ASSURANCE

A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

### 1.06 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

## PART 2 PRODUCTS

### 2.01 ACOUSTICAL UNITS

A. Manufacturers: Basis of Design: Armstrong Ceiling Products
   1. Acoustic Ceiling Products, Inc.: www.acpideas.com.
   2. CertainTeed Corporation: www.certainteed.com.
   3. Hunter Douglas Contract: www.hunterdouglascontract.com.
   4. USG: www.usg.com.
   5. Substitutions: See Section 01 6000 - Product Requirements.

B. Acoustical Panels Type ACT-1: Painted mineral fiber,ASTM E1264 Type A, Form A2.2, Pattern E with the following characteristics:
   1. Size: 24 by 24 inches.
   2. Thickness: 3/4 inches.
   3. Composition: Formed Mineral Fiber.
   4. NRC: .70.
   5. CAC: 40.
   6. Edge: Tegular.
   7. Surface Color: White.
   8. Products:
      a. Basis of Design: Ultima Tegular by Armstrong.
      b. Substitutions: See Section 016000 - Product Requirements.
   9. Suspension System: Exposed grid.

**2.02 SUSPENSION SYSTEM(S)**

A. Manufacturers:
   1. Armstrong World Industries, Inc: www.armstrong.com.
   2. Acoustic Ceiling Products, Inc.: www.acpideas.com.
   3. CertainTeed Corporation: www.certainteed.com.
   4. Chicago Metallic Corporation: www.chicagometallic.com.
   5. Hunter Douglas Contract: www.hunterdouglascontract.com.
   6. USG: www.usg.com.
   7. Substitutions: See Section 01 6000 - Product Requirements.

B. Metal 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.

C. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled; heavy-duty.
   1. Profile: Tee; 15/16 inch wide face.
   2. Construction: Double web.
   3. Finish: White painted.
   4. Products:
      a. Basis of Design: Prelude by Armstrong.
      b. Substitutions: See Section 016000 - Product Requirements.

**2.03 ACCESSORIES**

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Hanger Wire: 12-gage 0.08 inch galvanized steel wire.

C. Perimeter Moldings: Same material and finish as grid.
   1. Size: As required for installation conditions and specified Seismic Design Category.

D. Touch-up Paint: Type and color to match acoustical and grid units.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

**3.02 PREPARATION**

A. Install after major above-ceiling work is complete.

B. Coordinate the location of hangers with other work.

**3.03 INSTALLATION - SUSPENSION SYSTEM**

A. Install suspension system in accordance with ASTM C636/C636M, 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. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.

D. 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.

E. 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.

F. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

G. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

H. Do not eccentrically load system or induce rotation of runners.

I. 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.

**3.04 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.

**3.05 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 095426**
**SUSPENDED WOOD CEILINGS**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Linear wood planks.

B. Metal suspension system.

### 1.02 RELATED REQUIREMENTS

A. Section 095100 - Acoustical Ceilings: Metal suspension systems.

### 1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

B. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2022.

C. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2019.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

E. 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; 2022.

F. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2023.

G. CISCA (WC) - Wood Ceilings Technical Guidelines; 2009.

### 1.04 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure ceilings are not installed until building is enclosed, dust generating activities have terminated, and overhead work is completed.

### 1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Shop Drawings: Indicate grid layout and related dimensioning, attachment of wood ceiling components to grid, accessory attachments, junctions with other ceiling finishes, and mechanical and electrical items installed in the ceiling.

C. Product Data: Provide data on wood ceiling components and suspension system components.

D. Samples: Submit two full size samples illustrating material and finish of wood ceiling components.

E. Test Reports: Certified test data from an independent test agency verifying that panels meet specified requirements for fire, acoustical, and seismic performance.

F. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

G. Manufacturer's qualification statement.

H. Installer's qualification statement.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements for additional provisions.

### 1.06 QUALITY ASSURANCE

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

### 1.07 MOCK-UPS

A. See Section 014000 - Quality Requirements for additional requirements.

B. Locate where directed.

C. Mock-up may remain as part of the work.

### 1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver wood ceiling components to project site in original, unopened packages.

B. Store in fully enclosed space, flat, level and off the floor.

### 1.09 FIELD CONDITIONS

A. Do not install suspended wood ceiling system until wet construction work is complete and permanent heat and air conditioning is installed and operating.

B. Maintain room temperature between 60 degrees F and 75 degrees F and relative humidity between 35 to 55 percent before, during, and after installation.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Suspended Wood Ceilings:
   1. Basis of Design: Grille with Backer & Dowel Ceiling System by ASI Architectural.
   2. Substitutions: See Section 016000 - Product Requirements.

### 2.02 SUSPENDED WOOD CEILING SYSTEM

A. Performance Requirements:
   1. Design for maximum deflection of 1/360 of span.

B. Linear Wood Planks SPEC-3: Solid wood.
   1. Type: Pre-assembled module of linear planks with battens attached perpendicularly to back of planks.
      a. Species: Hemlock.
      b. Module Size: 12 by 95 inches, nominal.
      c. Rail Thickness: 3/4 inch.
      d. Rail Width: 2.25 inch, nominal.
      e. Acoustical Backer: Fiberglass, 2 inch thick.
         1) Color: Black.

C. Metal Suspension System:
   1. General: Comply with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices as required.
      a. Materials:
         1) Steel Grid: ASTM A653/A653M, G30 coating, unless otherwise indicated.
   2. Exposed Suspension System: Hot-dipped galvanized steel grid and cap.
      a. Structural Classification: Heavy-duty, when tested in accordance with ASTM C635/C635M.
      b. Profile: Tee; 15/16 inch face width.
      c. Finish/Color: Baked enamel, black.
   3. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement.

D. Accessories: Manufacturer's standard accessories for installation method indicated, seismic requirements and above-ceiling accessibility.

### 2.03 FABRICATION

A. Shop fabricate wood ceiling components to the greatest extent possible.

B. Fabricate components to allow access to ceiling plenum as required.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Do not install ceiling until after interior wet work is dry.

## 3.02 PREPARATION

A. Coordinate the location of hangers with other work.

B. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.

C. Layout wood ceiling components in pattern according to reflected ceiling plan and as shown on shop drawings.

D. Acclimate wood ceiling materials by removing from packaging in installation area a minimum of 48 hours prior to installation.

## 3.03 INSTALLATION

A. General: Install suspended wood ceiling system in accordance with CISCA (WC).

B. Suspension System:
   1. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.
   2. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
   3. 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.
   4. 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.
   5. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
   6. Do not eccentrically load system or induce rotation of runners.

C. Wood Ceiling:
   1. Install wood ceilings in accordance with manufacturer's instructions.
   2. Fit wood components in place, free from damaged edges or other defects detrimental to appearance and function.
   3. Install components in uniform plane, and free from twist, warp, and dents.
   4. Cut to fit irregular grid and perimeter edge trim.
   5. Make field cut edges of same profile as factory edges, seal and finish according to manufacturer.
   6. Install acoustical backer above wood ceiling components; fit tight between grid members.

## 3.04 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

## 3.05 CLEANING

A. Clean and touch up minor finish damage. Remove and replace components that cannot be successfully cleaned and repaired.

**END OF SECTION**

**SECTION 096500**
**RESILIENT FLOORING**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Resilient sheet flooring.

B. Resilient tile flooring.

C. Resilient base.

D. Installation accessories.

### 1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors to receive adhesive-applied resilient flooring.

### 1.03 REFERENCE STANDARDS

A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2023.

B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2022.

C. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2023.

D. ASTM F1700 - Standard Specification for Solid Vinyl Floor Tile; 2020.

E. ASTM F1861 - Standard Specification for Resilient Wall Base; 2021.

F. ASTM F1913 - Standard Specification for Vinyl Sheet Floor Covering Without Backing; 2019.

G. ASTM F2169 - Standard Specification for Resilient Stair Treads; 2015 (Reapproved 2020).

H. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2023.

### 1.04 SUBMITTALS

A. See Section 013000 - 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 br 12 inch in size illustrating color and pattern for each resilient flooring product specified.

D. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Extra Stair Materials: Quantity equivalent to 5 percent of each type and color.

### 1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in installing specified flooring with minimum three years documented experience.

### 1.06 DELIVERY, STORAGE, AND HANDLING

A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, 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.

### 1.07 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 RSF-1 thru RSF-4: Homogeneous without backing, with color and pattern throughout full thickness.
   1. Manufacturers:
      a. Gerflor USA, Inc; Mipolam Symbioz: www.gerflorusa.com#sle.
      b. Substitutions: See Section 016000 - Product Requirements.
   2. Minimum Requirements: Comply with ASTM F1913.
   3. Thickness: 0.080 inch nominal.
   4. Sheet Width: 66 inch minimum.
   5. Seams: Heat welded.
   6. Color: As indicated on drawings.

B. 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 TILE FLOORING

A. Vinyl Tile - Type RFs-5: Printed film type, with transparent or translucent wear layer; acoustic interlayer or backing.
   1. Manufacturers:
      a. Gerflor USA, Inc; Creation Grovepoint: www.gerflorusa.com/#sle.
      b. Substitutions: See Section 016000 - Product Requirements.
   2. Minimum Requirements: Comply with ASTM F1700, Class III, Type B.
   3. Wear Layer Thickness: 22 mil.
   4. Total Thickness: 0.10 inch.
   5. Pattern: As scheduled.
   6. Color: As scheduled.

### 2.03 RESILIENT BASE

A. Resilient Base - Type VB-1: ASTM F1861, Type TP, rubber, thermoplastic; Style B, Cove.
   1. Manufacturers:
      a. Mohawk Group: www.mohawkgroup.com.
      b. Substitutions: See Section 016000 - Product Requirements.
   2. Height: 4 inches.
   3. Thickness: 0.080 inch.
   4. Finish: Satin.
   5. Color: As scheduled.

### 2.04 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.

B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.

## 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 PREPARATION

A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.

B. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.

C. Prohibit traffic until filler is fully cured.

D. Clean substrate.

### 3.03 INSTALLATION - GENERAL

A. Starting installation constitutes acceptance of subfloor conditions.

B. Install in accordance with manufacturer's written instructions.

### 3.04 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.

### 3.05 INSTALLATION - TILE FLOORING

A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.

B. Install square tile to the pattern shown. Allow minimum 1/2 full size tile width at room or area perimeter.

### 3.06 INSTALLATION - RESILIENT BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Miter internal corners. At external corners, 'V' cut back of base strip to 2/3 of its thickness and fold. At exposed ends, use premolded units.

C. Install base on solid backing. Bond tightly to wall and floor surfaces.

D. Scribe and fit to door frames and other interruptions.

### 3.07 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's written instructions.

### 3.08 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation.

**END OF SECTION**

**SECTION 097200**
**WALL COVERINGS**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Wall covering and borders.

### 1.02 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

B. ASTM F793/F793M - Standard Classification of Wall Coverings by Use Characteristics; 2020.

### 1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on wall covering and adhesive.

C. Samples: Submit two samples of wall covering, 12 x 12 inch in size illustrating color, finish, and texture.

D. Manufacturer's Installation Instructions: Indicate special procedures.

E. Maintenance Data: Submit data on cleaning, touch-up, and repair of covered surfaces.

### 1.04 QUALITY ASSURANCE

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

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

### 1.05 DELIVERY, STORAGE, AND HANDLING

A. Inspect roll materials at arrival on site, to verify acceptability.

B. Protect packaged adhesive from temperature cycling and cold temperatures.

C. Do not store roll goods on end.

### 1.06 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the adhesive or wall covering product manufacturer.

B. Maintain these conditions 24 hours before, during, and after installation of adhesive and wall covering.

## PART 2 PRODUCTS

### 2.01 WALL COVERINGS

A. General Requirements:
   1. Surface Burning Characteristics: Flame spread/Smoke developed index of 20/45, maximum, when tested in accordance with ASTM E84.

B. Wall Covering - Type WC-1: 10% Polyester, 40% Latex, 50% Cellulose fabric.
   1. Comply with ASTM F793/F793M, Category V, Type II.
   2. Style: Aksel Wall.
   3. Total Weight: 18.00 oz/lnyd.
   4. Color: Custum.
   5. Pattern: Straight hang.
   6. Pattern Match: Straight across
   7. Manufacturers:
      a. Designtex.
      b. Substitutions: See Section 016000 - Product Requirements.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify that substrate surfaces are prime painted and ready to receive work, and comply with requirements of wall covering manufacturer.

### 3.02 PREPARATION

A. Wash impervious surfaces with tetra-sodium phosphate, rinse and neutralize; wipe dry.

B. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.

C. Surfaces: Correct defects and clean surfaces that affect work of this section. Remove existing coatings that exhibit loose surface defects.

### 3.03 INSTALLATION

A. Apply adhesive and wall covering in accordance with manufacturer's instructions.

B. Apply adhesive to wall surface immediately prior to application of wall covering.

C. Razor trim edges on flat work table. Do not razor cut on gypsum board surfaces.

D. Apply wall covering smooth, without wrinkles, gaps or overlaps. Eliminate air pockets and ensure full bond to substrate surface.

E. Butt edges tightly.

F. Overlap adjacent panels as recommended by manufacturer.

G. Remove excess adhesive while wet from seam before proceeding to next wall covering sheet. Wipe clean with dry cloth.

### 3.04 CLEANING

A. Clean wall coverings of excess adhesive, dust, dirt, and other contaminants.

B. Reinstall wall plates and accessories removed prior to work of this section.

### 3.05 PROTECTION

A. Do not permit construction activities at or near finished wall covering areas.

**END OF SECTION**

**SECTION 099000**
**PAINTING AND COATING**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Scope: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
   1. Exposed surfaces of steel lintels and ledge angles.
   2. Mechanical and Electrical:
      a. In finished areas, paint all insulated and exposed pipes, unless otherwise indicated.

D. Do Not Paint or Finish the Following Items:
   1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
   5. Floors, unless specifically so indicated.
   6. Glass.
   7. Concealed pipes, ducts, and conduits.

### 1.02 RELATED REQUIREMENTS

A. Section 055000 - Metal Fabrications: Shop-primed items.

### 1.03 REFERENCE STANDARDS

A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2024.

### 1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of all products to be used, with the following information for each:
   1. Manufacturer's name, product name and/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. Samples: Submit two painted samples, illustrating selected colors and textures for each color and system selected with specified coats cascaded. Submit on aluminum sheet, 4 x 8 inch in size.

E. Manufacturer's Instructions: Indicate special surface preparation procedures.

F. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

### 1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

### 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. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

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

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.

B. Paints:
   1. Basis of Design: PPG Paints: www.ppgpaints.com/#sle.
   2. Scuffmaster: www.scuffmaster.com.
   3. Diamond Vogel Paints: www.diamondvogel.com/#sle.
   4. Duron, Inc: www.duron.com/#sle.
   5. Glidden Professional, a product of PPG Architectural Coatings: www.gliddenprofessional.com.
   6. Benjamin Moore & Co: www.benjaminmoore.com/#sle.
   7. PPG Paints: www.ppgpaints.com/#sle.
   8. Pratt & Lambert Paints: www.prattandlambert.com/#sle.

C. Primer Sealers: Same manufacturer as top coats.

D. Block Fillers: Same manufacturer as top coats.

E. Substitutions: See Section 016000 - Product Requirements.

### 2.02 PAINTS AND COATINGS - GENERAL

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

B. Primers: As follows unless other primer is required or recommended by manufacturer of top coats; where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

C. Flammability: Comply with applicable code for surface burning characteristics.

D. Colors: To be selected from manufacturer's full range of available colors.
   1. 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 - EXTERIOR

A. Paint ME-OP-2A - Ferrous Metals, Primed, Alkyd, 2 Coat:
   1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
   2. Semi-gloss: Two coats of alkyd enamel.

## 2.04 PAINT SYSTEMS - INTERIOR

A. Paint I-OP-DF - Dry Fall: Metals; exposed structure and overhead-mounted services in utilitarian spaces, including shop primed steel deck.
   1. Shop primer by others.
   2. Intermediate Coat: same as finish.
   3. Top Coat: Waterborne Acrylic Dryfall Flat: SW Pro Industrial B42W00181
   4. Flat: MPI gloss level 1; use this sheen at all locations.

B. Paint WI-OP-3L - Wood, Opaque, Institutional Low-Odor/VOC Latex System MPI INT 6.4R, 3 Coat:
   1. Prime Coat: Primer Latex, for interior wood, MPI #39.
   2. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
   3. Topcoat: Latex, interior, institutional low odor/VOC, flat (MPI Gloss Level 1), MPI #143 and Latex, interior, institutional low odor/VOC, eggshell (Gloss Level 2), MPI #144.

C. Paint MI-OP-2A - Ferrous Metals, Primed, Alkyd, 2 Coat:
   1. Touch-up with alkyd primer.
   2. Semi-gloss: Two coats of alkyd enamel.

D. Paint MgI-OP-3A - Galvanized Metals, Water-based light industrial coating over waterbourne primer system MPI INT 5.3K, 3 Coat:
   1. Prime Coat: Latex, fire-retardant, matching topcoat.
   2. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
   3. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss level 5), MPI #153.

E. Paint GI-OP-2L -[P-1 through P-14] Gypsum Board/Plaster, Latex, 2 Coat:
   1. Prime Coat: Primer sealer, interior, institutional low odor/VOC, ProMar 200 Zero V.O.C. Latex Primer.
   2. Semi-gloss: Two coats of latex; SW ProMar 200 Zero V.O.C. B31-2600.
   3. Eggshell: Two coats of latex; SW ProMar 200 Zero V.O.C. B41-2600.

F. Paint GI-OP-2HPC -[P-16 and P-17] Gypsum Board/Plaster, High Perfomance Coating, 2 Coat:
   1. Prime Coat: Primer sealer, interior, Scuffmaster Prime Master Primer/ Sealer.
   2. P-16: Two coats of Base Coat; Scuffmaster Premium Coat 200.
   3. P-17: Two coats of Base Coat; Scuffmaster ScrubTough Max.

## 2.05 ACCESSORY MATERIALS

A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

# PART 3 EXECUTION

## 3.01 EXAMINATION

A. Do not begin application of coatings until substrates have been properly prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

D. Test shop-applied primer for compatibility with subsequent cover materials.

E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
   1. Gypsum Wallboard: 12 percent.
   2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.

**3.02 PREPARATION**

A. Clean surfaces thoroughly and correct defects prior to coating application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

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. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

G. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.

H. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

I. Corroded Steel and Iron Surfaces to be Painted: Prepare using at least SSPC-SP 2 (hand tool cleaning) or SSPC-SP 3 (power tool cleaning) followed by SSPC-SP 1 (solvent cleaning).

J. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.

K. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.

**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 instructions.

C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

D. Apply each coat to uniform appearance.

E. Sand metal surfaces lightly between coats to achieve required finish.

F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

G. 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 finished coatings until completion of project.

B. Touch-up damaged coatings after Substantial Completion.

**END OF SECTION**

**SECTION 101400**
**SIGNAGE**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Room and door signs.

B. Dimensional Lettering

### 1.02 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

B. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

### 1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.

C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
   1. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
   2. When content of signs is indicated to be determined later, request such information from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
   3. Submit for approval by Owner through Architect prior to fabrication.

D. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.

E. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.

F. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

### 1.04 DELIVERY, STORAGE, AND HANDLING

A. Package signs as required to prevent damage before installation.

B. Package room and door signs in sequential order of installation, labeled by floor or building.

C. Store tape adhesive at normal room temperature.

### 1.05 FIELD CONDITIONS

A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.

B. Maintain this minimum temperature during and after installation of signs.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Flat Signs:
   1. Best Sign Systems, Inc: www.bestsigns.com/#sle.
   2. Cosco Industries (ADA signs): www.coscoarchitecturalsigns.com/#sle.
   3. Inpro; Aspen: www.inprocorp.com.
   4. Ford Signs.
   5. Substitutions: See Section 016000 - Product Requirements.

B. Dimensional Letter Signs:
   1. Cosco Industries; Cast Aluminum: www.coscoarchitecturalsigns.com/#sle.
   2. Inpro: www.inprocorp.com.
   3. Substitutions: See Section 016000 - Product Requirements.

**2.02 SIGNAGE APPLICATIONS**

A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.

B. Room and Door Signs: Provide a sign for new rooms tagged on drawings , whether it has a door or not, not including corridors, lobbies, and similar open areas.

C. Room and Door Signs with existing signage in adjacent areas of the building and with Owner.
   1. Sign Type: Flat signs with engraved panel media as specified.
   2. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.
   3. Character Height: 1 inch.
   4. Office Doors: Identify with room numbers to be determined later, not the numbers indicated on drawings; in addition, provide "window" section for replaceable occupant name.
   5. Conference and Meeting Rooms: Identify with room numbers to be determined later, not the numbers shown on the drawings; in addition, provide "window" section with sliding "In Use/Vacant" indicator.
   6. Service Rooms: Identify with room names and numbers to be determined later, not those shown on the drawings.
   7. Rest Rooms: Identify with pictograms, the names "MEN" and "WOMEN", room numbers to be determined later, and braille.
   8. Provide blank back panels for signs mounted to glass.

**2.03 SIGN TYPES**

A. Flat Signs: Signage media in aluminum frame.
   1. Corners: Square.
   2. Frame Finish: Natural (clear) anodized.
   3. Wall Mounting of One-Sided Signs: Tape adhesive.

B. Color and Font: Unless otherwise indicated:
   1. Character Font: Helvetica, Arial, or other sans serif font.
   2. Character Case: Upper case only.
   3. Background Color: Graphite, confirm with Owner and Architect before fabrication.
   4. Character Color: White color, confirm with Owner and Architect before fabrication.

**2.04 TACTILE SIGNAGE MEDIA**

A. Applied Character Panels: Acrylic plastic base, with applied acrylic plastic letters and braille.
   1. Total Thickness: 1/8 inch.
   2. Letter Thickness: 1/8 inch.
   3. Letter Edges: Square.

**2.05 DIMENSIONAL LETTERS**

A. Plastic Letters:
   1. Material: Aluminum casting.
   2. Thickness: 1/8 inch minimum.
   3. Letter Height: As indicated on drawings.
   4. Text and Typeface:
      a. Character Font: Helvetica.
   5. Finish: Natural Satin.
   6. Color: As selected from manufacturer's custom line.
   7. Mounting: Concealed screws.

## 2.06 ACCESSORIES

A. Concealed Screws: Stainless steel, galvanized steel, chrome plated, or other non-corroding metal.

B. Tape Adhesive: Double sided tape, permanent adhesive.

# PART 3 EXECUTION

## 3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

## 3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install neatly, with horizontal edges level.

C. Locate signs where indicated:
   1. Room and Door Signs: Locate on wall at latch side of door with centerline of sign at 60 inches above finished floor.
   2. If no location is indicated obtain Owner's instructions.

D. Protect from damage until Substantial Completion; repair or replace damaged items.

**END OF SECTION**

## SECTION 102113.19
## PLASTIC TOILET COMPARTMENTS

### PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Solid plastic toilet compartments.

B. Urinal screens.

### 1.02 REFERENCE STANDARDS

A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

### 1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the work with placement of support framing and anchors in walls and ceilings.

### 1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.

C. Product Data: Provide data on panel construction, hardware, and accessories.

D. Samples: Submit two samples of partition panels, 2 by 2 inch in size illustrating panel finish, color, and sheen.

### PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Solid Plastic Toilet Compartments: Basis of Design: Hiny Hiders by Scranton Products
   1. Ampco Products, Inc: www.ampco.com/#sle.
   2. Metpar Corp: www.metpar.com/#sle.
   3. Partition Systems International of South Carolina; PolyLife HDPE Toilet Partitions: www.psisc.com/#sle.
   4. Bradmar by Bradley Corporation.
   5. Substitutions: Section 016000 - Product Requirements.

### 2.02 PLASTIC TOILET COMPARTMENTS

A. Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid molded high density polyethylene (HDPE), floor-mounted headrail-braced.
   1. Color: To be selected from manufacturers standard range.

B. Doors:
   1. Thickness: 1 inch.
   2. Width: 24 inch. Out swinging
   3. Width for Handicapped Use: 36 inch, out-swinging.
   4. Height: 55 inch.

C. Panels:
   1. Thickness: 1 inch.
   2. Height: 55 inch.

D. Pilasters:
   1. Thickness: 1 inch.
   2. Width: As required to fit space; minimum 3 inch.

E. Screens: Without doors; to match compartments; mounted to wall with two panel brackets.

### 2.03 ACCESSORIES

A. Pilaster Shoes: Formed chromed steel with polished finish, 3 in high, concealing ceiling fastenings.

1. Provide ceiling attachment using two adjustable hanging studs, attached to above-ceiling framing.

B. Head Rails: Extruded aluminum, anti-grip profile.

C. Pilaster Brackets: Polished stainless steel.

D. Wall Brackets: Continuous type, polished stainless steel.

E. Attachments, Screws, and Bolts: Stainless steel , tamper proof type.
   1. For attaching panels and pilasters to brackets: Through-bolts and nuts ; tamper proof.

F. Hardware: Natural anodized aluminum:
   1. Pivot hinges, gravity type, adjustable for door close positioning; two per door.
   2. Door Latch: Slide type with exterior emergency access feature.
   3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
   4. Coat hook with rubber bumper; one per compartment, mounted on door.
   5. Provide door pull for outswinging doors.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify correct spacing of and between plumbing fixtures.

C. Verify correct location of built-in framing, anchorage, and bracing.

### 3.02 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.

B. Maintain 3/8 inch to 1/2 inch space between wall and panels and between wall and end pilasters.

C. Attach panel brackets securely to walls using anchor devices.

D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

E. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

### 3.03 TOLERANCES

A. Maximum Variation From True Position: 1/4 inch.

B. Maximum Variation From Plumb: 1/8 inch.

### 3.04 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.

B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.

C. Adjust adjacent components for consistency of line or plane.

**END OF SECTION**

## SECTION 102600
## WALL AND DOOR PROTECTION

### PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Corner guards.

### 1.02 RELATED REQUIREMENTS

A. Section 061000 - Rough Carpentry: Blocking for wall and corner guard anchors.

B. Section 092216 - Non-Structural Metal Framing: Placement of supports in stud wall construction.

### 1.03 REFERENCE STANDARDS

A. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics; 2023, with Editorial Revision.

B. ASTM D543 - Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents; 2021.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

D. ASTM F476 - Standard Test Methods for Security of Swinging Door Assemblies; 2023.

E. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).

### 1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Indicate physical dimensions, features, and anchorage details.

C. Samples: Submit samples illustrating component design, configurations, joinery, color and finish.

D. Manufacturer's Instructions: Indicate special procedures, perimeter conditions requiring special attention.

### 1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver wall and door protection items in original, undamaged protective packaging. Label items to designate installation locations.

B. Protect work from moisture damage.

C. Protect work from UV light damage.

D. Do not deliver products to project site until areas for storage and installation are fully enclosed, and interior temperature and humidity are in conformance with manufacturer's recommendations for each type of item.

E. Store products in either horizontal or vertical position, in conformance with manufacturer's instructions.

### 1.06 WARRANTY

A. See Section 017800 - 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 MANUFACTURERS

A. Corner Guards: Basis of Design: Acrovyn SM-20MN by Construction Specialties.
   1. Babcock-Davis: www.babcockdavis.com/#sle.
   2. Inpro: www.inprocorp.com/#sle.
   3. Nystrom, Inc: www.nystrom.com/#sle.
   4. Trim-Tex, Inc: www.trim-tex.com/#sle.

5. Substitutions: See Section 016000 - Product Requirements.

## 2.02 PRODUCT TYPES

A. Corner Guards - Surface Mounted:
   1. Material: High impact vinyl with full height extruded aluminum retainer.
   2. Performance: Resist lateral impact force of 100 lbs at any point without damage or permanent set.
   3. Surface Burning Characteristics: Provide assemblies with flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
   4. Width of Wings: 3 inches.
   5. Corner: Radiused. Odd-degree angles and 90 degree.
   6. Color: As selected from manufacturer's standard colors.
   7. Length: One piece.
   8. Preformed end caps.

## 2.03 FABRICATION

A. Fabricate components with tight joints, corners and seams.

B. Pre-drill holes for attachment.

C. Form end trim closure by capping and finishing smooth.

# PART 3 EXECUTION

## 3.01 EXAMINATION

A. Verify that field measurements are as indicated on drawings.

B. Verify that substrate surfaces for adhered items are clean and smooth.
   1. Test painted or wall covering surfaces for adhesion in inconspicuous area, as recommended by manufacturer. Follow adhesive manufacturer's recommendations for remedial measures at locations and/or application conditions where adhesion test's results are unsatisfactory.

C. Start of installation constitutes acceptance of project conditions.

## 3.02 INSTALLATION

A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to supporting construction.

B. Position corner guard 4 inches above finished floor to 48 inches high.

C. Position protective wall covering no less than 1 inch above finished floor to allow for floor level variation.
   1. Full-Height Installation: Establish a plumb line located at edge of starting point of first sheet to ensure following sheets will be installed plumb.
   2. Wainscot Installation: Establish a level line at the specified height for entire length of run. Install by aligning top of edge of covering with this line.
   3. Apply adhesive with 1/8 inch V-notch trowel to an area of wall surface that can be completed within cure time of the adhesive.
   4. Install trim pieces as required for a complete installation. Allow tolerance for thermal movement.
   5. At joints indicated to be caulked, allow for a minimum 1/16 inch wide gap between edges of sheets. Gaps are required to be of consistent width throughout the project.
   6. Use a roller to ensure maximum contact with adhesive.
   7. At inside and outside corners cut covering sheets to facilitate installation of trim pieces or corner guards.

## 3.03 TOLERANCES

A. Maximum Variation From Required Height: 1/4 inch.

B. Maximum Variation From Level or Plane For Visible Length: 1/4 inch.

### 3.04 CLEANING

A. Clean wall and door protection items of excess adhesive, dust, dirt, and other contaminants.

**END OF SECTION**

# SECTION 102800
# TOILET, BATH, AND LAUNDRY ACCESSORIES

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Commercial toilet accessories.

B. Accessories for toilet rooms and utility rooms.

C. Grab bars.

### 1.02 RELATED REQUIREMENTS

A. Section 102113.19 - Plastic Toilet Compartments.

### 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. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2022.

C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

D. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium; 2017 (Reapproved 2022).

E. ASTM C1036 - Standard Specification for Flat Glass; 2021.

F. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2024.

### 1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Commercial Toilet, Shower, and Bath Accessories: Basis of Design Bobrick Washroom Equipment, Inc.
   1. AJW Architectural Products: www.ajw.com.
   2. ASI - American Specialties, Inc: www.americanspecialties.com.
   3. Bradley Corporation: www.bradleycorp.com.
   4. Substitutions: Section 016000 - Product Requirements.

### 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. Keys: Provide 2 keys for each accessory to Owner; master key lockable accessories.

C. Stainless Steel Sheet: ASTM A666, Type 304.

D. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.

E. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.

F. Adhesive: Two component epoxy type, waterproof.

G. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

### 2.03 FINISHES

A. Stainless Steel: Satin finish, unless otherwise noted.

B. Chrome/Nickel Plating: ASTM B456, SC 2, polished finish, unless otherwise noted.

C. Baked Enamel: Pretreat to clean condition, apply one coat primer and minimum two coats epoxy baked enamel.

D. Shop Primed Ferrous Metals: Pretreat and clean, spray apply one coat primer and bake.

## 2.04 COMMERCIAL TOILET ACCESSORIES

A. Toilet Paper Dispenser: Double roll, surface-mounted, stainless steel unit with pivot hinge, tumbler lock.
   1. Products:
      a. Bobrick B-265.
      b. Substitutions: Section 016000 - Product Requirements.

B. Paper Towel Dispenser: Folded paper type, stainless steel, surface-mounted, with viewing slots on sides as refill indicator and tumbler lock.
   1. Capacity: 400 C-fold minimum.
   2. Products:
      a. Bobrick B-262.

C. Soap Dispenser: Liquid soap dispenser, wall-mounted, surface, with stainless steel cover and horizontal stainless steel tank and working parts; push type soap valve, check valve, and window gauge refill indicator, tumbler lock.
   1. Minimum Capacity: 40 ounces.
   2. Products:
      a. Bobrick B-2111.

D. Mirrors: 1/4 inch thick annealed float glass; ASTM C1036.
   1. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material.
   2. Products:
      a. Bobrick B-165.
      b. Substitutions: Section 016000 - Product Requirements.

E. Grab Bars: Stainless steel, smooth surface.
   1. Standard Duty Grab Bars:
      a. Push/Pull Point Load: 250 pound-force, minimum.
      b. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, exposed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
      c. Finish: Satin.
      d. Length and Configuration: As indicated on drawings.

F. Sanitary Napkin Disposal Unit: Stainless steel, surface-mounted, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.
   1. Products:
      a. Bobrick B-254.
      b. Substitutions: Section 016000 - Product Requirements.

G. Coat Hook: Heavy-duty stainless steel, single-prong, rectangular-shaped bracket and backplate for concealed attachment, satin finish.
   1. Products:
      a. Bobrick B-7671.
      b. Substitutions: Section 016000 - Product Requirements.

# PART 3 EXECUTION

## 3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

C. Verify that field measurements are as indicated on drawings.

## 3.02 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

## 3.03 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.

## 3.04 PROTECTION

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

**END OF SECTION**

## SECTION 104400
## FIRE PROTECTION SPECIALTIES

### PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Fire extinguishers.

B. Fire extinguisher cabinets.

C. Accessories.

### 1.02 RELATED REQUIREMENTS

A. Section 061000 - Rough Carpentry: Wood blocking product and execution requirements.

### 1.03 REFERENCE STANDARDS

A. FM (AG) - FM Approval Guide; Current Edition.

B. UL (DIR) - Online Certifications Directory; Current Edition.

### 1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.

C. Product Data: Provide extinguisher operational features.

D. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

### 1.05 FIELD CONDITIONS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

### PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Fire Extinguishers:
   1. Ansul, a Tyco Business; Cleanguard: www.ansul.com/#sle.
   2. Kidde, a unit of United Technologies Corp: www.kidde.com/#sle.
   3. Nystrom, Inc: www.nystrom.com/#sle.
   4. Potter-Roemer: www.potterroemer.com/#sle.
   5. Pyro-Chem, a Tyco Business: www.pyrochem.com/#sle.
   6. Strike First Corporation of America; Water Fire Extinguisher: www.strikefirstusa.com.
   7. Substitutions: See Section 016000 - Product Requirements.
   8. Ansul, a Tyco Business: www.ansul.com/#sle.
   9. JL Industries, Inc: www.jlindustries.com.
   10. Larsen's Manufacturing Co: www.larsensmfg.com/#sle.
   11. Potter-Roemer: www.potterroemer.com/#sle.
   12. Pyro-Chem, a Tyco Business: www.pyrochem.com/#sle.
   13. Strike First Corporation of America; EL-Elite Architectural Series Fire Extinguisher Cabinet, Non-Fire Rated: www.strikefirstusa.com.

### 2.02 FIRE EXTINGUISHERS

1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.

B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
   1. Class: A:B:C type.
   2. Size: 10 pound.
   3. Finish: Baked polyester powder coat Red color.
   4. Temperature range: Minus 40 degrees F to ___ degrees F.

### 2.03 FIRE EXTINGUISHER CABINETS

A. Metal: Formed aluminum.

B. Cabinet Configuration: Recessed type.
   1. Size to accommodate accessories.

C. Door: 0.036 inch metal thickness, reinforced for flatness and rigidity with nylon catch. Hinge doors for 180 degree opening with two butt hinge.

D. Door Glazing: Acrylic plastic, clear, 1/8 inch thick, flat shape and set in resilient channel glazing gasket.

E. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.

F. Weld, fill, and grind components smooth.

G. Finish of Cabinet Exterior Trim and Door: No. 4 - Brushed stainless steel.

H. Finish of Cabinet Interior: White colored enamel.

**2.04 ACCESSORIES**

A. Extinguisher Brackets: Formed steel, chrome-plated.

B. Cabinet Signage: FIRE EXTINGUISHER.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

**3.02 INSTALLATION**

A. Install in accordance with manufacturer's instructions.

B. Install cabinets plumb and level in wall openings, 40 inches from finished floor to inside bottom of cabinet.

C. Secure rigidly in place.

D. Place extinguishers in cabinets.

**END OF SECTION**

# SECTION 122400
# WINDOW SHADES

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Interior manual roller shades.

### 1.02 RELATED REQUIREMENTS

A. Section 061000 - Rough Carpentry: Concealed wood blocking for attachment of headrail brackets.

### 1.03 REFERENCE STANDARDS

A. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films; 2023, with Errata.

### 1.04 ADMINISTRATIVE REQUIREMENTS

A. Sequencing:
   1. Do not fabricate shades until field dimensions for each opening have been taken with field conditions in place.
   2. Do not install shades until final surface finishes and painting are complete.

### 1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets, including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.

C. Shop Drawings: Include shade schedule indicating size, location and keys to details.

D. Selection Samples: Include fabric samples in full range of available colors and patterns.

E. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation of product.

F. Operation and Maintenance Data: List of all components with part numbers, sources of supply, and operation and maintenance instructions; include copy of shop drawings.

### 1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in manufacturer's unopened packaging, labeled to identify each shade for each opening.

B. Handle and store shades in accordance with manufacturer's recommendations.

### 1.07 FIELD CONDITIONS

A. Do not install products under environmental conditions outside manufacturer's absolute limits.

### 1.08 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Provide manufacturer's warranty from Date of Substantial Completion, covering the following:
   1. Shade Hardware: 25 years.
   2. Fabric: One year.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Interior Manually Operated Roller Shades:
   1. Draper, Inc; Clutch Operated FlexShade: www.draperinc.com/#sle.

### 2.02 ROLLER SHADES

A. General:
   1. Provide shade system components that are easy to remove or adjust without removal of mounted shade brackets.

2. Provide shade system that operates smoothly when shades are raised or lowered.

B. Interior Roller Shades - Basis of Design: Draper, Inc; Clutch Operated FlexShade: www.draperinc.com/#sle.
   1. Description: Single roller, manually operated fabric window shade system complete with mounting brackets, roller tubes, hembars, hardware, and other components necessary for complete installation.
      a. Mounting: Window jamb mounted - inside, between jambs.
      b. Size: Verify existing opening size.
      c. Fabric: GreenScreen Revive 5%
   2. Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
   3. Roller Tubes: As required for type of shade operation; designed for removal without removing mounting hardware.
      a. Material: Extruded aluminum or steel, with wall thickness and material selected by manufacturer.
      b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
   4. Hembars: Designed to maintain bottom of shade straight and flat, selected from manufacturer's standard options.
   5. Manual Operation:
      a. Clutch Operator: Manufacturer's standard material and design, permanently lubricated.
      b. Drive Chain: Continuous loop stainless steel beaded ball chain, 95 lb minimum breaking strength. Provide upper and lower limit stops.
   6. Accessories:
      a. Fascia: Extruded aluminum, size as required to conceal shade mounting, attachable to mounting end caps, without exposed fasteners; clear anodized finish.
      b. Fasteners: Noncorrosive, and as recommended by shade manufacturer.

### 2.03 ROLLER SHADE FABRICATION

A. Field measure finished openings prior to ordering or fabrication.

B. Dimensional Tolerances: Fabricate shades to fit openings within specified tolerances.
   1. Vertical Dimensions: Fill openings from head to sill with 1/2 inch space between bottom bar and window stool.
   2. Horizontal Dimensions - Inside Mounting: Fill openings from jamb to jamb.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Examine finished openings for deficiencies that may preclude satisfactory installation.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Start of installation shall be considered acceptance of substrates.

### 3.02 PREPARATION

A. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under the project conditions.

B. Coordinate with window installation and placement of concealed blocking to support shades.

### 3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved shop drawings, using mounting devices as indicated.

B. Adjust level, projection, and shade centering from mounting bracket. Verify there is no telescoping of shade fabric. Ensure smooth shade operation.

### 3.04 CLEANING

A. Clean soiled shades and exposed components as recommended by manufacturer.

B. Replace shades that cannot be cleaned to "like new" condition.

### 3.05 PROTECTION

A. Protect installed products from subsequent construction operations.

B. Touch-up, repair, or replace damaged products before Substantial Completion.

**END OF SECTION**

# SECTION 123600
# COUNTERTOPS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Countertops for architectural cabinet work.

B. Wall-hung counters and vanity tops.

C. Window Sills.

### 1.02 RELATED REQUIREMENTS

A. Section 064100 - Architectural Wood Casework.

### 1.03 REFERENCE STANDARDS

A. ANSI A161.2 - Performance Standards for Fabricated High Pressure Decorative Laminate Countertops; 1998.

B. ANSI A208.1 - American National Standard for Particleboard; 2022.

C. ANSI A208.2 - Medium Density Fiberboard (MDF) for Interior Applications; 2022.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

E. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).

F. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.

G. IAPMO Z124 - Plastic Plumbing Fixtures; 2022, with Editorial Revision.

H. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.

I. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

J. PS 1 - Structural Plywood; 2023.

### 1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Specimen warranty.

C. Shop Drawings: Complete details of materials and installation ; combine with shop drawings of cabinets and casework specified in other sections.

D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, minimum size 6 inches square, representing actual product, color, and patterns.

F. Test Reports: Chemical resistance testing, showing compliance with specified requirements.

G. Installation Instructions: Manufacturer's installation instructions and recommendations.

H. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

### 1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.

B. Fabricator Qualifications: Same fabricator as for cabinets on which tops are to be installed.

### 1.06 DELIVERY, STORAGE, AND HANDLING

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

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

## 1.07 FIELD CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

# PART 2 PRODUCTS

## 2.01 COUNTERTOPS

A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

B. Plastic Laminate Countertops: High-pressure decorative laminate (HPDL) sheet bonded to substrate.
   1. Laminate Sheet: NEMA LD 3, Grade HGS, 0.048 inch nominal thickness.
      a. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
      b. Finish: Matte or suede, gloss rating of 5 to 20.
      c. Surface Color and Pattern: As indicated on drawings.
      d. Manufacturers:
         1) Basis of Design: Wilsonart.
         2) Substitutions: See Section 016000 - Product Requirements.
   2. Exposed Edge Treatment: Square, substrate built up to minimum 1-1/4 inch thick; covered with matching laminate.
   3. Back and End Splashes: Same material, same construction.

C. Solid Surfacing Countertops & Window Sills: Solid surfacing sheet or plastic resin casting over continuous substrate.
   1. Flat Sheet Thickness: 1/2 inch, minimum.
   2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
      a. Manufacturers: Basis of Design: Corian
         1) Substitutions: See Section 016000 - Product Requirements.
      b. Sinks and Bowls: Integral castings; minimum 3/4 inch wall thickness; comply with IAPMO Z124.
      c. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
      d. Color and Pattern: As indicated on drawings.
   3. Other Components Thickness: 3/4 inch, minimum.
   4. Exposed Edge Treatment: Built up to minimum 1-1/4 inch thick; square edge; use marine edge at sinks.
   5. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.
   6. Skirts: As indicated on drawings.

## 2.02 MATERIALS

A. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.

B. Particleboard for Supporting Substrate: ANSI A208.1 Grade 2-M-2, 45 pcf minimum density; minimum 3/4 inch thick; join lengths using metal splines.

C. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.

## 2.03 FABRICATION

A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
   1. Join lengths of tops using best method recommended by manufacturer.

2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.

B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
2. Height: 4 inches, unless otherwise indicated.

C. Solid Surfacing: Fabricate tops and wall panels up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.
1. Integral sinks: Shop-mount securely to countertop with adhesives, using flush configuration, as per manufacturer's instructions, and as detailed on drawings.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

### 3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

### 3.03 INSTALLATION

A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.

B. Attach plastic laminate countertops using screws with minimum penetration into substrate board of 5/8 inch.

C. Seal joint between back/end splashes and vertical surfaces.

### 3.04 TOLERANCES

A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.

B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.

C. Field Joints: 1/8 inch wide, maximum.

### 3.05 CLEANING

A. Clean countertops surfaces thoroughly.

### 3.06 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

**END OF SECTION**

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**FIRE PROTECTION WORK SHALL INCLUDE:**
SECTION 21 1000

**PLUMBING, & HYDRONICS WORK SHALL INCLUDE:**
SECTION 22 4000 & 23 2113
& SECTIONS 22 0500, 22 0510, 22 0700, 23 0500, 23 0510, & 23 0700 AS APPLIES

**VENTILATION AND AIR CONDITIONING WORK SHALL INCLUDE:**
SECTION 23 0593, 23 0900, & 23 7000
& SECTIONS 23 0500, 23 0510 & 23 0700 AS APPLIES

## SECTION 21 1000
## FIRE SUPPRESSION SYSTEMS

### PART 1 GENERAL

### 1.01 DEFINITIONS

A. Contractor – Defined as the Contractor, Subcontractor and/or Subcontractors which are responsible for all or any part of the fire suppression system installation specified in Division 21 and/or as shown on the Contract Drawings.

B. Wet Pipe Sprinkler System – A system in which automatic sprinklers are attached to piping filled with water allowing water to discharge immediately from sprinklers when activated. Sprinklers activate when heat bursts a frangible glass bulb or melts a fusible link. System activation or incidental flow is monitored by flow switches and/or alarm valves. Hose connections are included when required by code.

C. Dry Pipe Sprinkler System – A system in which automatic sprinklers are attached to piping filled with compressed air until the event that heat from a fire activates a sprinkler by bursting a frangible glass bulb or melting a fusible link. Air that escapes through the activated sprinkler will cause air pressure loss in the system signaling the dry valve to open then delivering water to the piping and corresponding sprinklers. System activation or incidental flow is monitored by pressure switches, flow switches and/or alarm valves.

### 1.02 SCOPE

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 shall apply to this section.

B. Where any requirements specified on the plans conflict with the specifications of this section, the specifications indicated on the plans shall govern.

C. The Contractor shall provide all items, articles, materials, operations or methods listed, mentioned or scheduled on the Drawings and/or herein specified, including all labor, materials, equipment, accessories, wiring and incidentals necessary to be installed in accordance with manufacturer's recommendations except as otherwise approved.

D. The fire protection system for the Surgical Technology Renovation area shall be a wet-pipe system consisting of the revision of the existing wet system zone as defined by the plans. The existing system is served by an existing 6” underground water service line located in Mech/Elec 101 that is to remain. The existing fire department connection located on the west side of Building 100 shall remain.

E. The systems in office, restroom, and classroom areas shall be designed for light hazardous classification. Mechanical, electrical, and light storage areas shall be designed for ordinary hazard, group 1 classification. Moderate storage and shop areas shall be designed for ordinary hazard, group 2 classification. System(s) will be supplied by the existing 6” underground combination service as described. The system(s) shall be complete with, but not limited to, sprinklers, piping, valves, alarm bell/horn, fire department connection, backflow preventer test connection, and controls necessary for a complete system

F. See the plans for water supply flow test information.

### 1.03 CONTRACTOR QUALIFICATIONS

A. The Contractor for the fire protection installation shall be a qualified Fire Protection Contractor licensed in the State of South Dakota that has been regularly engaged in the installation of similar Automatic Fire Sprinkler Systems and associated fire protection equipment for a minimum of 5 years.

### 1.04 PERMITS AND SERVICE CHARGES

A. All permits and service charges necessary for execution of the work under this Contract shall be obtained by and paid for by the Contractor. It shall be the responsibility of the Contractor to

determine the permit requirements of the local authorities and utility companies and the cost of required permits, service charges, tap fees and development fees shall be included in the Contractor's bid.

B. All work shall be executed in accordance with all local, state and national rules, regulations, codes, etc., which are applicable and shall be subject to inspection by the proper authorities.

**1.05 CODES AND STANDARDS**

A. All work performed and all equipment furnished under this Division of the Contract shall be manufactured and installed in strict accordance with the most recent editions of all applicable codes and standards, including the applicable provisions of the following codes and standards:
   1. Local and State Codes, Standards and Regulations
   2. National Fire Protection Association (NFPA)
      a. NFPA 13 –Installation of Sprinkler Systems
      b. NFPA 25 – Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems
   3. National Electric Code (NEC) (NFPA 70)
   4. International Fire Code (IFC)
   5. Underwriter's Laboratory (UL)
   6. Uniform Plumbing Code
   7. International Mechanical Code
   8. American Waterworks Association (AWWA)
   9. Williams-Steiger Occupational Safety and Health Act of 1970 (OSHA)
   10. International Building Code
   11. Americans with Disabilities Act (ADA)

B. Where specific requirements of any code vary with the requirements of another code, the higher standard as determined by the Architect/Engineer shall govern the installation.

C. All equipment manufactured in accordance with the provisions of the above codes and standards shall bear the label of the respective association bureau thereon.

D. All materials installed shall have composite fire and smoke hazard ratings as tested by procedures ASTM 84, NFPA 255 and UL 723 not to exceed 25 Flame Spread and 50 Smoke Developed.

**1.06 AUTHORITIES AND AGENCIES**

A. All work will be installed for the approval and acceptance of the following:
   1. Watertown Fire Marshal
   2. Owner’s Insurance Company
   3. Fire Protection Engineer

**1.07 DRAWINGS**

A. In general, the Drawings of the fire protection systems and equipment are to scale. However, to determine exact locations of walls and partitions, the Contractor shall consult the architectural and/or structural drawings which are dimensioned. Drawings shall not take precedence over field measurements.

B. Drawings of piping and sprinklers, although shown on scale drawings, are diagrammatic only. They are intended to indicate size and/or capacity where stipulated, approximate location and/or direction, and approximate general arrangement of one phase of work to another, but not the exact detail or exact arrangement of construction. If it is found, before installation of any or all construction phases, that a more convenient, suitable or workable arrangement of any or all phases of the project would result by varying or altering the arrangement indicated on the Drawings, the Architect/Engineer may require the Contractor to change the location or arrangement of the work without additional cost to the Owner. Such rearrangement shall be in accordance with directions from the Architect/Engineer.

C. Where discrepancies are discovered after certain portions or phases of the work have been installed, the Architect/Engineer reserves the right to require the Contractor to make changes in pipe, duct, fixture or equipment locations or arrangements to avoid conflicts with work at no additional cost to the Owner.

D. Because the Drawings are to a relatively small scale to show as large a portion as is practical, the fact that only certain features of the system are indicated does not mean that other similar or different features or details will not be required. The Contractor shall furnish all incidental labor, material or equipment for the systems so that each system is a complete and operating one unless otherwise specifically stipulated in the detailed body of the specifications.

E. The Contractor, Subcontractor's and their respective trades shall cooperate in laying out their work so it will fit properly into the space provided. Promptly report to the Architect/Engineer any delay or difficulties encountered in the installation of this work which might prevent prompt and proper installation, or make it unsuitable to connect with or receive the work of others. Failure to so report shall constitute an acceptance of the work of other trades as being fit and proper for the execution of this work.

**1.08 SHOP DRAWINGS**

A. Shop drawings to be submitted in electronic PDF format unless indicated otherwise in the General Conditions.

B. To the extent practical, complete sets of shop drawings for each specification section shall be submitted. In the case that a particular item is required to be expedited, that particular item may be submitted individually.

C. Submit shop drawings in electronic PDF format.

D. Furnish Shop Drawings as follows:
   1. For all major items of equipment or materials, regardless of whether the item is to be furnished as specified.
   2. For all equipment, systems or devices where Shop Drawings are specifically called for.
   3. For all minor items of equipment or materials where the Contractor proposes to deviate from the specified and/or scheduled manufacturer or material.

E. Shop Drawings will be reviewed by the Architect/Engineer, a review letter will be returned to the Contractor. Shop Drawings shall be submitted sufficiently in advance of the construction schedule to allow time for checking Drawings, resubmittal and rechecking when necessary.

F. Shop Drawings will be reviewed by the Architect/Engineer, and copies of Shop Drawings will be returned to the Contractor. Shop Drawings shall be submitted sufficiently in advance of the construction schedule to allow time for checking Drawings, resubmittal and rechecking when necessary.

G. Any equipment or material which is installed without authorization by properly processed Shop Drawings will be subject to removal by the Contractor and reinstallation as directed, without cost to the Owner. All cost for repair for damages as may be incurred to the structure as a result of the above correction shall be paid by this Contractor.

H. Shop drawing material quantities will not be checked by the Architect/Engineer, and review of Shop Drawings by the Architect/Engineer shall not be construed to be verification of the material quantities and sizes shown on the Shop Drawings. Quantities, sizes, dimensions and locations shown on the Drawings and as specified shall determine material requirements.

I. Hydraulic calculations proving the system is capable of providing the required design densities to accommodate the use and occupancy of each shall be performed by the contractor. The contractor is required to perform and submit hydraulic calculations as part of their submittal packages.

**1.09 COORDINATION**

A. The Contractor shall communicate with all other Contractors on this project and shall arrange his work in proper relation to the work of others. Work made necessary as a result of failure to

coordinate with other Contractors shall be the responsibility of this contractor and shall first be approved by the Architect/Engineer. The contractor shall coordinate with the General Contractor to maximize the efficiency of the onsite placement and to ensure the safe delivery and storage of the materials.

**1.10 EXISTING SERVICES**

A. The Contractor shall verify the exact location of all existing building services extended and/or relocated for this project. The Contractor shall also verify the exact location and take proper precautions to protect all services which may be encountered during construction.

B. All active services which are encountered shall be protected, braced and supported where required for proper execution of the work and without interruption of the service if possible.

C. All inactive services which are encountered shall be protected or removed as directed by the Architect/Engineer, Owner, Utility Company or Municipal Agency having jurisdiction. The service shall also be plugged or capped as directed.

D. When active services must be temporarily interrupted, the interruption shall be scheduled at night or at such time as approved by the Owner or authority having jurisdiction and so as to cause the minimum of interference with establishing operating routine. Arrangements shall be made to work continuously, including overtime if required, to assure that services will be interrupted only as long as actually required to complete necessary work.

**1.11 CLEANING**

A. The Contractor and/or Subcontractors for the various phases of the work shall clear away all debris, surplus materials, etc., resulting from their work or operations, leaving the job and equipment furnished under any or all contracts in a clean first-class condition.

**1.12 PAINTING**

A. Painting of materials and equipment furnished shall be as described in DIVISION 9. The contractor shall refinish and restore to the original condition and appearance, all equipment which has sustained damage to the manufacturer's prime and finish coats of enamel or paint. Materials and workmanship shall be equal to the requirements described in DIVISION 9.

B. Where sprinklers are installed on exposed piping and in other locations where sprinklers are susceptible to paint spray or over-spray, contractor shall cover sprinklers in preparation for painting.

**1.13 ACCESS TO EQUIPMENT**

A. Access shall be provided to all motors, valves, controls, specialties, etc., for maintenance purposes. All access doors, access panels, removable sections, etc., required for access shall be provided. The location of the access openings relative to the equipment shall be coordinated to assure proper access to the equipment. The door shall maintain any ratings of the wall, ceiling, etc. that it penetrates.

B. Access openings are required for valves and other devices requiring access and shall be provided in the housings, tanks, walls, ceilings, etc., under this portion of the Contract.

**1.14 INSPECTIONS, TESTING, CERTIFICATES, & WARRANTY**

A. All inspections, examinations and tests required by the authorities and agencies specified shall be arranged and paid for by the Fire Protection Contractor as necessary, to obtain complete and final acceptance of the Fire Protection System per the requirements of NFPA 13 and any other applicable codes. The Contractor shall provide a minimum 1-year warranty on the system effective starting the day of final system acceptance and also at that time be required to provide instruction to the owner or his representative to acquaint that person thoroughly with all system equipment.

B. After completion of the fire protection installation and at the start of the guaranteed year, the Fire Protection Contractor shall execute and file five (5) copies of the "Contractor's Material and Test Certificate, Sprinkler systems - Water Spray Systems" with the Architect/Engineer.

## 1.15 RECORD DRAWINGS

A. The Contractor shall keep a complete set of all drawings in the jobsite office for the purpose of showing the installation of mechanical systems and equipment. This set of drawings shall be used for no other purpose. Where any equipment or system components are installed different from that shown on the Architect/Engineer's drawings, such differences shall be clearly and neatly shown on this set of drawings using ink or indelible pencil. At the completion of the project, the record set of drawings shall be turned over to the Architect/Engineer and shall become his property. Record drawings may be inspected by the Architect/Engineer on site visits.

## 1.16 OPERATING INSTRUCTIONS

A. The Contractor shall furnish the Owner two (2) sets of complete catalog data, manufacturer's literature and detailed manuals covering the operation and maintenance of all equipment specified under this Section. All such literature shall be bound in an amply sized three-ring binder and submitted to the Architect/Engineer for approval and for eventual transmittal to the Owner. The manual shall have a Table of Contents at the front of the manual. In addition to a hard copy of the operating instruction, provide an electronic copy in PDF format to the Owner.

B. The Contractor shall also supervise the initial operation of all equipment and instruct the operator selected by the Owner in such operation as required to acquaint him thoroughly with the equipment.

# PART 2 - PRODUCTS

## 2.01 PRODUCT OPTIONS

A. Materials or equipment specified by name of manufacturer, brand, trade name or catalog reference, shall be furnished under the contract unless changed by Addenda or a Contract modification.

B. Where two (2) or more materials are named, the choice of these shall be limited to the items named. Where the material or equipment named is followed by the phrase "or equal" the required function, dimension, appearance and quality to be met by any proposed substitute is all that is intended to be established.

C. Proposed substitutions for any named items shall be submitted to the Fire Protection Engineer for approval. No substitution shall be made without the approval of the Fire Protection Engineer. Any proposed substitution requests shall be submitted at least 10 days prior to bid to the Architect/Engineer for approval. Bidders shall not rely upon substitutions made in any other manner.

D. Should a proposed substitution wish to be made within 10 days of bid the Contractor shall attach his proposed substitution along with the appropriate add or deduct to the Contract amount, should the substitution be accepted. Substitutions proposed by the Contractor will not be considered in the award of the Contract.

E. All products shall be new and listed for fire protection use and be rated in excess of the maximum expected pressure that will be present in the systems.

## 2.02 SPRINKLERS

A. Except where designated otherwise on the drawings, sprinklers shall be as follows:
   1. Sprinklers shall be standard semi-recessed white-plated pendant type in all locations where piping is concealed above ceilings.
   2. Sprinklers shall be standard upright type where piping is installed exposed in storage, garage and other locations as indicated on the Drawings. Upright sprinklers shall be plain brass finish.
   3. Sidewall sprinklers, where permitted, shall be white-plated semi-recessed in finished rooms, plain brass elsewhere.

B. Temperature rating of sprinklers shall be in accordance with requirements of approving authorities, as noted on the Drawings, and per the requirements of NFPA 13.

C. Sprinklers shall be installed centered in square ceiling tile and in the narrow dimension of rectangular ceiling tile. In rectangular tiles sprinklers shall be centered or at the quarter points along the longer dimension of the tile.

D. Sprinklers installed in areas where damage may occur, such as gymnasiums, shall have head guards and as otherwise designated on the drawings. Sprinklers installed at elevations below 7'-0" shall have head guards.

E. Concealed brass sprinklers with flush white-plated concealer plate shall be installed where noted on the Drawings. Sprinklers shall be Tyco, Reliable, Victaulic, Viking, or equal.

**2.03 ESCUTCHEONS**

A. Escutcheons shall be installed as designated on the drawings and shall be the same make as the sprinkler head that is used.

B. Escutcheons shall be Tyco, Reliable, Victaulic, Viking, or equal.

**2.04 PIPE AND PIPE FITTINGS**

A. Furnish and install where shown on the Drawings and required for a complete system, pipe and fittings of type and material for the various services as noted below.

B. Piping not shown on the Drawings, which is obviously necessary for complete systems, shall be provided and shall be amply sized in accordance with applicable codes and standards.

C. Wet fire sprinkler system (water-filled) and deluge system (open-type) piping shall be ASTM A-135 standard-weight, black, Schedule 40 with factory or field formed threaded ends for sizes up to 2 inch size. Fittings used on threaded end piping shall be ASME B16.3 Class 150, ductile iron threaded fittings with NPT threads that conform to ANSI B1.20.1. Wet fire sprinkler piping shall be ASTM A-135 Schedule 10, black with factory or field formed roll-grooved ends for sizes 1-1/4" and greater. Grooved fittings shall be standard or short radius ASTM A-536, Grade 65-45-12, ductile iron fittings with cut-grooved ends and non-lead orange enamel coated. Grooved couplings shall include ductile iron, ASTM A-536, Grade 65-45-12, housings with non-lead orange enamel coatings, ASTM A-449 and ASTM A-183 bolts and nuts, and Grade "E" EPDM Type A gaskets. Grooved pipe outlets shall be tee-let, ASTM A-53, ANSI B1.20.1 threaded or cut groove, factory welded outlet fittings. Field installed outlets shall be permitted to be mechanical "T", bolted, ASTM A-536, orange enamel coated ductile iron, with ANSI B1.20.1 threaded or cut groove outlets, Grade "E" EPDM gaskets, and ASTM A-449 and ASTM A-183 bolts and nuts.

D. Dry fire sprinkler system (compressed air-filled) piping and drain piping shall be ASTM A-135 standard-weight, Schedule 40 with factory or field formed threaded ends for sizes up to 2 inch size. Fittings used on threaded end piping shall be ASME B16.3 Class 150 ductile iron threaded fittings with NPT threads that conform to ANSI B1.20.1. Dry fire sprinkler piping shall be ASTM A-135 Schedule 40 standard-weight with factory or field formed roll-grooved ends for sizes 1-1/4" and greater. Grooved fittings shall be standard or short radius ASTM A-536, Grade 65-45-12, ductile iron fittings with cut-grooved ends. Grooved couplings shall include ductile iron, ASTM A-536, Grade 65-45-12, housings, ASTM A-449 and ASTM A-183 bolts and nuts, and Grade "E" EPDM gaskets. Grooved pipe outlets shall be tee-let, ASTM A-53 ductile iron, and ANSI B1.20.1 threaded or cut groove factory welded outlet fittings. Factory or field installed outlets shall be permitted to be mechanical "T", bolted, ASTM A-536 ductile iron, ASTM A-153, with ANSI B1.20.1 threaded or cut groove outlets, Grade "E" EPDM gaskets, and ASTM A-449 and ASTM A-183 bolts and nuts.

E. All piping that penetrates an exterior wall shall be galvanized Schedule 40 minimum.

F. Plastic CPVC Schedule 80 piping and fittings are not allowed for this installation.

G. Copper piping shall be installed where designated on the drawings and as per its listing. Copper piping shall be soldered when installed concealed and brazed when installed exposed. Piping shall be Type M Mueller, Cerro, or equal.

H. Flexible piping is allowed for this project where approved by its listing.

I. All wet and dry system grooved pipe fittings and couplings shall be Victaulic, Anvil Gruvlok, Tyco, Star or equal. Grooved pipe fittings and couplings shall be ductile iron with an orange enamel coating. All components shall be supplied by one manufacturer. Pipe fittings and couplings shall be standard or short radius.

J. All threaded fittings shall be black ductile iron. Threaded fittings shall be supplied by Tyco, Star, Anvil, or equal.

K. All welded outlet fittings shall be Merit, Island, or equal.

L. All flanged fittings shall be ductile iron per ASTM A536. Flanged fittings shall be Anvil, Star, or equal.

M. Plastic CPVC fittings are not allowed for this installation.

N. Copper fittings shall be installed where designated on the drawings and as per its listing.

O. All pipe ends shall be smooth and burr free and cleaned of any loose debris or pipe hole cutouts prior to installation.

**2.05 HANGERS AND ATTACHMENTS**

A. All piping 1/2” through 8” shall be hung through the use of galvanized ring style band hangers with a knurled swivel nut. Hangers, spacing, and rod diameters shall be per NFPA 13 requirements.

B. 3/8” all thread rod shall be used to attach the ring to the structural attachment device for pipe sizes 1/2” through 4”, 1/2” all thread rod shall be used for pipe sizes 6” through 8”, and 5/8” all thread rod shall be used for pipe sizes 10” through 12”.

C. Rings shall be Tolco, Hilti, Anvil, or equal.

D. Structural Attachments shall be Sammy, Tolco, Hilti, or equal.

**2.06 FIRESTOPPING**

A. Firestopping materials shall be 3M, Hilti, MetaCaulk, Nelson or equal. Firestopping material shall have a rating resistance rating equal to or greater than the wall in the penetration exists that will be sealed with said firestopping.

**2.07 WALL, FLOOR AND CEILING PLATES**

A. Furnish and install chrome-plated wall, floor and ceiling plates on all exposed pipes where they pass through walls, floors, or ceilings in finished areas. Finished areas shall be those areas which are painted or have special finishes within the room. The wall plates shall be a minimum of 3/32 inch thickness and shall have set screws or spring locks for clamping to the piping. Flush valves shall have set screw type wall plates. The plates shall be chrome-plated steel, cast iron or brass and shall set tight against the wall.

**2.08 CONTROL VALVES**

A. All valves shall be new and listed for fire protection use.

B. Furnish and install valves in piping where so indicated on the Drawings.

C. Of the several manufacturers listed, the Contractor is to standardize on one make as much as practical but not to the extent of sacrificing quality listed. Valves shall be Tyco, Milwaukee, Victaulic, Ames, Watts, Wilkins, or equal.

D. Butterfly valves shall be of the indicating type with two sets of factory installed internal supervisory switches. Valves shall be ductile iron conforming to ASTM A-395 with Grade EPDM “E” encapsulated rubber disc seals. Valves shall be Tyco, Victaulic, or Equal.

E. Outside Screw and Yoke (OS&Y) gate valves shall be ductile iron, raised face with bolted bonnets. Valve shall be Kennedy, Mueller, Nibco, Watts, or equal.

F. Ball Valves 1-1/2” and smaller shall be standard port, end entry valves with a brass valve body. The ball shall be chrome plated brass with a stainless steel stem. Valves shall be Watts, Nibco, Milwaukee, Victaulic, or equal.

## 2.09 AUTOMATIC AIR VENT

A. Furnish and install an automatic air vent for each wet zone. Automatic air vent shall be located near a high point in the wet system that allows for the maximum amount of air removal from that system. Automatic air vent shall have a minimum connection size of ½“and a minimum pressure rating of 175 psi.

B. The device shall meet the requirements of UL 2573.

C. Automatic air vent shall be Tyco, Viking, Reliable, or equal.

## 2.10 PRESSURE GAUGES

A. Furnish and install U.S. Gauge Model 5105 or equal pressure gauges in pipelines and on equipment as indicated herein and/or where shown on the Drawings. Gauges shall have phosphor bronze bourdon tube with brass movement.

B. Gauges shall be compound, pressure or vacuum as required with 4-1/2 inch diameter dial. Each gauge shall be complete with Trerice No. 872 pressure snubbers, and brass ball valves.

C. The normal operating pressure of each gauge shall be 50-70 percent of full scale. The range of the scale shall be suitable for the application.

D. The gauges shall be located and mounted such that they can be conveniently read by a person standing on the equipment room floor. Accuracy shall be Grade "A". Case shall be aluminum.

E. Pressure gauges shall be U.S. Gauge, Trerice, Weksler, Ashcroft, Weiss or equal.

# PART 3 - EXECUTION

## 3.01 PIPING CONNECTIONS

A. Pipe connection shall be through the use of grooved couplings attached to roll or cut grooves on the piping, female threaded fittings screwed on to threaded end pipe, and flanged fittings with bolts, nuts and rubber gaskets. Mechanical joint couplings may be used only with the approval of the Fire Protection Engineer.

## 3.02 PIPE HANGERS, SUPPORTS AND ANCHORS

A. Anchors and other attachments to the building structure shall be installed where designated and as detailed on the Drawings and specified herein and/or as required. The hangers shall adequately support the piping system. They shall be located near or at changes in piping direction and as otherwise required by NFPA 13. They shall provide vertical adjustment to maintain pitch required for proper drainage. They shall allow for expansion and contraction of the piping. Hangers shall bear directly on piping.

B. Pipe hangers shall not be attached to the roof deck. Hangers shall be attached to the structure with beam clamps, beam attachment and brackets bolted to joists and beams, wood lag bolts, steel self tapping screws, and any other approved means of attachment that is rated to support five time the weight of the water filled pipe plus 250 lbs of additional load.

C. Hanging from one pipe to another is prohibited.

## 3.03 PIPING INSTALLATION

A. All pipes shall be round and straight, of required size. Cutting shall be done with proper tools and pipes shall be reamed to full size after cutting.

B. Piping shall be properly enclosed, supported, guided, anchored, sway braced, connected, tested, cleaned and flushed out and shall be properly insulated and protected where required.

C. All pipes shall be run with proper grade to provide for easy draining and in group runs where applicable and in a neat and orderly manner, to the satisfaction of the Architect/Engineer. Lines required to be enclosed in ceiling, chase ways or similar spaces shall be installed to permit such enclosure as intended. All pipe runs shall be carefully laid out and scheduled to avoid necessary interferences with other work. If shown, pipe sizes on the Drawings are nominal pipe sizes and not outside diameters.

D. Pipes shall be run substantially as indicated on the Drawings. However, the Architect/Engineer reserves the right to require this Contractor to make changes in pipe locations where conflicts occur with other trades. Such changes shall be made without extra cost to the Owner.

E. Piping shall be installed with ample provisions for expansion and contraction to prevent injury to the same and to the building construction. Such provision shall be made by means of piping offsets, changes in direction, expansion loops and/or suitable expansion joints. Suitable anchors and guides shall be provided to permit proper deflection and compression of offset loops and expansion joints. Expansion joints shall not be used in lieu of offsets, changes in direction or loops, except where specified and/or indicated on the Drawings or where otherwise obviously necessary.

F. Exposed piping shall be installed in a sanitary manner for ease in cleaning. Pipe shall be cut and threaded to fit the installation. Wherever possible, rough-in exposed pipe connections at the wall rather than the floor for ease in cleaning.

**3.04 SLEEVES**

A. Any pipe passing through building construction including walls, floors, roofs or masonry partitions or as noted on the Drawings shall be encompassed with sleeves. Piping passing through any fire rated barrier, walls, or floor shall be installed as follows:
   1. Sleeves shall have an inside diameter 1/2 inch greater than the outside diameter of pipe passing through. All sleeves shall be fabricated from new Schedule 40 steel pipe material cut square and reamed.
   2. Sleeves shall be provided in all masonry partition walls including locations above suspended ceilings where masonry partition walls extend from floor slab to slab above. Sleeves shall be Schedule 40 steel pipe finishing flush with the wall surface.
   3. Sleeves through exterior building walls shall be Schedule 40 steel pipe with welded flange in the middle of the sleeve and ends finishing flush with finished surfaces. Space between pipe and sleeve shall be packed to provide a watertight joint.
   4. Sleeves through roof slabs and floor slabs in concealed locations shall be Schedule 40 galvanized steel or linear polyethylene. Concealed sleeves shall be considered as pipe sleeves in shafts, pipe chases and within walls and partitions.
   5. Sleeves through floor slabs in exposed areas shall be Schedule 40 steel pipe and sleeves shall extend 1/4 inch above the finished floor surface. For slabs in equipment rooms and in other wet areas, sleeves shall be Schedule 40 steel pipe and shall extend 2 inches above finished floor surface.
   6. Floor sleeves in membraned floors shall be furnished with flashing rings and clamps.
   7. All sleeves in exposed locations, except equipment rooms, shall be set so plates specified will cover the sleeves.
   8. All pipe sleeves where wet conditions exist, except sleeves through exterior walls, shall be caulked with a plastic caulking, including sleeves in concealed locations. The space between the pipe and the sleeves shall be caulked in both ends of sleeve, even with the ends of the sleeve. The sealer shall be suitable for temperatures from minus 50 degrees to 300 degrees, suitable for painting, non-corrosive and have good adhesion.

B. Sleeves in fire rated construction, equipment rooms, and/or where designated on the Drawings shall consist of schedule 40 steel pipe. Seal sleeves with a fire retardant sealant. When applied according to manufacturer's recommendations, sealant shall have a 3-hour U.L. fire rating.

C. All sleeves shall be set and maintained in place by this Contractor during the progress of the work. This Contractor shall be responsible for locating all sleeves at the proper location.

D. Sleeves are not required for core drilled masonry wall and floor holes, masonry wall and floor holes formed by polyethylene plastic (removable) sleeves, or for masonry holes made in another neat manner except in equipment rooms and other wet areas.

E. Sleeves are not required in metal or wood stud wall construction. Rated systems shall be provided as required to provide the necessary rating of the penetration.

## 3.05 DRAINS

A. Drains shall be located and piped to discharge to the locations designated on the plans. Where required drains are not noted on the plans system drains shall be piped to a floor drain or mop sink where said drains or sinks are capable of accepting full system flow without excessive deflection of discharging water. Drain shall be piped through the wall of the building to atmosphere when a floor drain or mop sink is not available and where piping through the wall of the building to atmosphere is most convenient and has been approved by the Architect/Engineer.

**END OF SECTION**

# SECTION 22 0500
# GENERAL PLUMBING REQUIREMENTS

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. The mechanical contractor shall perform all work and furnish all materials as indicated in the mechanical plans and specifications as necessary for the successful completion of this project.

### 1.3 PERMITS AND SERVICES

A. The mechanical contractor shall obtain all permits and arrange all inspections, give notices and pay all fees as required by the Authority Having Jurisdiction.

B. This contractor shall coordinate any necessary site utilities including water, natural gas, and sewer work with local utility, owner, and other contractors to minimize disruption and downtime. ANY AND ALL CHARGES ASSESSED BY THE UTILITY OR CITY OF WATERTOWN TO ACCOMMODATE THE REQUIREMENTS OF THIS PROJECT ARE THE SOLE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR. VERIFY ALL CHARGES AND COORDINATE ALL EQUIPMENT NECESSARY WITH THE UTILITY BEFORE SUBMITTING BID.

### 1.4 DRAWINGS AND MEASUREMENTS

A. Verify all dimensions and conditions with Architectural and Structural drawings. The small scale of the drawings prohibits the indication of all offsets, fittings and accessories necessary and shall be furnished by this Contractor and required for complete and proper operation.

B. “Existing Conditions” shown on drawings are based on existing plans and limited field investigation. The field survey was conducted to verify, as much as possible, the accuracy of the locations shown. The Contractor shall verify the accuracy of the “Existing Conditions” as shown on the drawings. As the demolition work progresses perform modifications and additions as necessary to correct for these hidden conditions and allow for the completion of the new work.

C. The general arrangement of the mechanical systems shall be as shown on the drawings. Field changes shall have the written acceptance of the Engineer.

D. Consult the drawings and specifications of all other trades. Layout work and coordinate with other trades, before installing any equipment, to avoid interfering with these trades or conflicting with applicable codes.

E. The mechanical contractor shall bear full responsibility for coordinating his work with other trades to avoid conflicts in space requirements, clearances, etc. Problems arising due to lack of coordination will be the responsibility of the mechanical contractor to resolve. Extra work and/or equipment as a result of not coordinating work shall be the responsibility of the installing contractor and at no cost to the Owner.

### 1.5 INSPECTION OF SITE AND DOCUMENTS

A. Before submitting a proposal on the work contemplated, the bidder shall thoroughly familiarize himself with the contract documents, the site, and all existing conditions and limitations that may affect the performance of his work. Any conflict noted shall be brought to the attention of the Engineer before bidding. If there is not sufficient time prior to bidding, the Contractor shall bid the larger quantity or better quality of work.

B. No extra compensation will be allowed, because of misunderstanding the amount of work involved or the bidder’s lack of knowledge, for obvious conflicts which could have been discovered or reasonably anticipated prior to bidding.

### 1.6 REGULATIONS AND CODES

A. All work, materials, and equipment in this contract shall comply with all applicable local, city, state and federal ordinances, regulations, and codes.

### 1.7 INSTRUCTIONS

A. Furnish verbal and engineer approved written instructions to Owner on all systems. Instruction shall include operating procedures, adjustments, and periodic maintenance. Furnish a copy of the written instructions and attach a letter to the Engineer, prior to final inspection, signed by Owner, attesting to date and satisfaction of instructions.

### 1.8 OPERATING AND MAINTENANCE MANUALS (3 Hard Copies & 1 Electronic Submittal via Submittal Exchange)

A. PRIOR TO FINAL INSPECTION, The mechanical contractor shall furnish (3) hard copies (including 1 USB drive containing electronic copy) and (1) electronic submittal via Submittal Exchange of the O&M Manuals to the Engineer, containing all pertinent data to the mechanical systems. Information shall be indexed and labeled per system and shall include catalog cuts, installation manuals, maintenance manuals, manufacturer's names, replacement parts list. Include balancing reports as specified. Include written instructions and warranty info as specified.

B. The first section shall be indexed/labeled "WRITTEN INSTRUCTIONS & TRAINING" noting written instructions with company service contact info and shall include a list of filters for each unit. Also include document with owners signature attesting to date and satisfaction of training.

C. The second section shall be indexed/labeled "WARRANTY INFO" and shall include a statement of guarantee on the contractors company letter head and shall include warranty statements of all equipment provided/installed under his contract with specific dates. This will note any longer/special warranties.

### 1.9 AS-CONSTRUCTED DRAWINGS (Red Lined on Plans & USB Drive containing scanned PDF)

A. During construction, each trade shall keep track of the major changes in the rerouting of piping and equipment, and shall note these in red on one set of drawings. This set of drawings shall be submitted with the Operation and Maintenance Manuals along with a USB drive containing a single PDF file with these same red line plans in electronic form. Most printing shops will be able to scan your trade's large plan sheets into electronic form. Contact the engineer's office if there are any questions.

### 1.10 WORKMANSHIP

A. Qualified individuals that are properly licensed to perform the work involved shall perform all mechanical work.

### 1.11 CUTTING AND PATCHING

A. This Contractor shall be responsible for all cutting and patching of holes required for passage of piping, equipment, and ducts. This also applies to the removal or installation of new equipment.

B. All cutting of existing construction required to install or join new work, except where otherwise indicated on the plans, shall be the responsibility of this Contractor and coordinated with the Construction Manager. Before making any cuts, verify exact locations and sizes with the Construction Manager to confirm that no structural members will be cut. Contractor shall make every effort to minimize extent of cutting existing construction.

C. The mechanical contractor shall be responsible for patching any openings left in floors, walls, and ceilings that were caused by his/her actions. Patching shall match existing surface in color, texture and quality so that patch is indistinguishable from original surface.

### 1.12 PAINTING

A. Any equipment which becomes rusted or damaged during construction shall be repaired, cleaned, and repainted by this Contractor. Painting shall always be applied in two coats, one primer and one finish.

### 1.13 EQUIPMENT AND PIPE SUPPORTS

A. Provide all structural supporting frames, steel stands, concrete bases, and hangers as required for mechanical equipment. All floor equipment shall be set on 4" high concrete bases furnished by this Contractor, unless otherwise noted.

B. Paint all unprotected metal, except galvanized and copper, with metal protective paint.

***C. Hangers for piping shall be large enough to encompass insulation. It shall not be acceptable for insulation to envelope hangers/saddles, or for insulation to stop on either side of hangers.***

D. Provide saddles at all hangers or supports of insulated piping. Saddles for 4" and larger piping shall be fabricated of 14 gauge galvanized iron, and for smaller piping shall be fabricated of 16 gauge galvanized iron. Saddles shall be one-half the circumference of the pipe insulation and 4" shorter than the insulation inserts.

E. Under no condition shall any pipe or duct structure be used to support another.

### 1.14 ACCESS TO EQUIPMENT

A. Access shall be provided to all motors, valves, dampers, controls, specialties, etc., for maintenance purposes. All access doors, access panels, removable sections, etc., required for access shall be provided. The location of the access openings relative to the mechanical equipment shall be coordinated to assure proper access to the equipment.

B. Access openings are required for manual, motorized, fire, and smoke dampers and other devices requiring access and shall be provided in the ductwork, plenums, housings, tanks, etc., under this portion of the contract.

### 1.15 EXCAVATING AND BACKFILLING

A. When work to be completed by this contractor requires trenching, digging, etc. this contractor shall be responsible for properly protecting open trenches in accordance with required safety procedures. Backfill shall be placed in horizontal layers, not exceeding 9 inches in thickness. Moisten and hand or machine compact to 95% of standard proctor density. Bring fill to elevations indicated. If backfill fails the proctor density test in accordance with ASTM D-2049 and conducted by an independent testing laboratory retained by the owner, Contractor shall recompact and retest until satisfactory density is reached. This contractor shall restore the surface (whether grass, asphalt, concrete, etc.) to its original condition. Grass shall be seeded to match surrounding turf.

B. When work is in public street, paving repairs shall be equal to and comply with municipal agency requirements. If repairs are done by municipal agency, make necessary arrangement with such agency to make the repairs. Contractor shall include cost for permits, inspection fees, work, etc. in Mechanical Bid.

### 1.16 TESTING AND ADJUSTING

A. At the completion of work, all parts of the installation under Division 22 shall be cleaned, lubricated, tested, and adjusted for proper operation.

B. All piping and ductwork shall be tested and cleaned as required, by all local, state and federal codes. Tests shall be performed in the presence of the authority having jurisdiction. Written notification of test, date, and results shall be furnished to the Engineer before concealing or covering the installation.

C. All controls shall be tested and adjusted for proper operation. Adjustments shall be made when all systems are operating which may affect the control system.

D. An Independent Testing & Balancing Agent shall test and balance all mechanical systems as specified in Section 23 0593.

### 1.17 GUARANTEE

A. Warranty: The mechanical contractor shall warrant his work against failure and workmanship for a period of at least one year from the date of substantial completion, for all new work. Any work that is defective within that one-year period shall be replaced by the Contractor without

charge. If longer/special warranties are noted elsewhere in the specifications, those warranties shall apply.

**1.18 EQUIPMENT IDENTIFICATION**

A. Major mechanical equipment, rooftop units, energy recovery ventilators, electric duct heaters, heat pumps, exhaust fans, etc. shall be provided with identification as designated on the plans. Labels shall be black laminate three-layer plastic with engraved 1/2 inch white letters, adhered, screwed, or riveted to the equipment. Manufactured by Brady, Champion America/Seton.

B. Piping shall be identified as to contents and flow direction with plastic, color coded, snap-on or adhesive labels. Manufactured by Brady, Champion America/Seton.
   1. Labeling shall be located:
      a. Adjacent to each valve.
      b. At each side of and at each obstruction.
      c. At each branch.
      d. At each cap for future.
      e. At each takeoff.
      f. At each side of penetration of structure or enclosure.
      g. At each equipment connection.
      h. At all access doors.
      i. A maximum of every 40 feet on straight runs of piping including rises and drops.
      j. Minimum one label per room/space.

C. Valve tags shall be brass with stamped letters, tag size 1-1/2" minimum in diameter.
   1. Provide typed valve lists in each O&M binder. Valve lists shall include the valve number, location, and purpose of each valve, and any other necessary information such as the required opening or closing of another valve when one valve is to be opened or closed.

D. Color coded indicators shall be installed on the ceiling grid or access door to hard lid areas to indicate all valves and other ceiling mounted equipment requiring service (example – VAV's). Each trade shall be responsible for equipment provided under their respectable trade.
   1. Each ceiling label shall be color coded laminated engraved plastic, 1/16" thick, 2.5" wide by 0.75" tall, with white lettering centered on each label. Label to be adhered to the acoustic ceiling tile grid. Seton Style AV0175 or similar.

**1.19 MECHANICAL SUBMITTAL**

A. All equipment shall be as listed on the equipment schedules or approved equal.

B. Prior Approval: Manufacturers whose product is not specified or specifically listed on the plans or in the specifications are allowed to submit information on a product that they would like to be considered as an equal to those specified or listed. By submitting this information for consideration, the product representative is indicating that the product being presented for consideration equals or exceeds the specified product in quality, performance and operating parameters. Proof of equality rests with the party making the request. The procedure for this submittal is listed below.

C. Submit literature on product that is to be considered for prior approval. This literature shall include catalog cuts with all pertinent technical specifications, dimensions and pictures of the product.

D. Final approval of all equipment shall be contingent on shop drawing acceptance, compliance with the specifications and performance criteria as required. General approval to bid a product does not relieve the supplier or contractor of meeting specific specification requirements.

E. The Mechanical Contractor shall pay, provide, install and be responsible for any extra materials required due to his use of alternate accepted equipment which has installation requirements different than the specified equipment. This includes paying other trades for any extra work they are involved in due to this substitution of equipment.

F. Literature shall be submitted so that the engineer receives it no later than 7 days prior to bid date.

G. All approvals will be in the form of an addendum issued to all plan holders.

H. List of Acceptable Substitutions:
   1. All Drains (Roof & Floor): Wade, Zurn, Smith, Josam, Ancon, Watts.
   2. Valves: Crane, Hammond, Watts, Rockwell, Milwaukee Valve Co., Mueller.
   3. Plumbing Fixtures: American Standard, Kohler, Crane, Elkay, Just, Zurn, Fiat Products, Gerber, Bradley, Stingray
   4. Fixture Brass: American Standard, Kohler, Zurn, Sloan, T & S Brass, Chicago, Bradley, Swan, Woodford Mfg.
   5. Flush Valves: Zurn AquaVantage, Sloan, American Standard
   6. Lav Premolded Insulation Kit: Plumberex, Truebro, Proflo
   7. Toilet Seats: Kohler, Church, Beneke, Bemis, Olsonite, Zurn, Proflo
   8. Thermostatic Mixing Valves Under Lavs: Lawler, Powers, Watts
   9. Thermostatic Recirculation Automatic Balancing Valve: Circuit Solver by ThermOmegaTech

**1.20 SHOP DRAWINGS**

A. Before ordering any item, Contractor shall review, stamp with his approval and submit shop drawings of equipment as to be furnished under this contract.
   1. Electronic submittals are REQUIRED. Electronic submittals can be one combined .pdf. for each of the following mechanical trades: Fire Sprinkler Drawings, Fire Sprinkler Calcs, Fire Sprinkler Materials, Temperature Controls, HVAC, Plumbing, and Hydronics.

B. Where the contractor is submitting shop drawings that differ from the plans and specifications, the contractor must notify the engineer in writing each variance from the plans and specifications and the Mechanical Contractor shall pay, provide, install and be responsible for any extra materials required due to his use of alternate accepted equipment which has installation requirements different than the specified equipment. This includes paying other trades for any extra work they are involved in due to this substitution of equipment.

C. Product Data shall include, but are not limited to, the following: Manufacturer's product specifications, Manufacturer's installation instructions, standard color charts, catalog cuts, roughing-in diagrams and templates, and standard wiring diagrams.

**1.21 TEMPORARY HEAT**

A. Temporary heating of the building during construction will be provided as specified in the General Conditions and Supplemental General Conditions. Under no circumstance shall the proposed HVAC equipment be brought into service as temporary heating prior to project completion without written permission from the mechanical engineer & owner.

**1.22 EXECUTION**

A. Remove equipment as indicated. Demolition work shall be coordinated with the Owner. Should questions arise regarding the removal of equipment, confer with the owner before such equipment is demolished.

B. Materials removed by demolition shall remain the property of the Owner unless specifically noted. Material the Owner does not wish to retain shall be removed and properly disposed of by the Contractor.

C. The existing building will be in use during this construction. Schedule and carry out the work in such a manner as to cause the Owner a minimum of inconvenience due to service interruptions. Temporary services shall be installed if one area or phase of construction disrupts service to another area of the building or if equipment has to be relocated to allow construction to progress. Service interruptions shall be confined to the smallest area possible at any one time and interruptions shall be scheduled with the Owners site representative. After service has been restored following an interruption, inspect areas affected by the interruption and be responsible for returning automatically controlled equipment to the same operating condition that existed prior to the interruption.

D. Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final

location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing.

E. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

F. Coordinate mechanical equipment and materials installation with other building components. Verify all dimensions by field measurements. Arrange for chases, slots, and openings in other building components to allow for mechanical installations.

G. Final locations of equipment may differ slightly from those shown on these plans. Coordinate exact location of equipment with equipment supplier, structural members, furniture layout and other trades before rough in and adjust accordingly. Pricing shall allow for a minimum of 10 ft. of difference in the actual location of items as compared to the location shown on the drawings.

H. All penetrations for piping, ductwork, etc. which penetrate floors, fire and/or smoke walls, roofs, full height partitions and similar structures shall be sealed by the mechanical contractor with a UL system specifically approved for the application. This system must maintain the required fire rating.

I. All mechanical systems shall be tested and cleaned as required by Authority Having Jurisdiction.

J. The mechanical contractor shall have the full responsibility of ensuring that his/her work is performed in a safe manner and shall bear all liability associated with his/her job site safety.

K. Upon completion of the work, the Contractor shall notify the A/E and make arrangements for a final inspection. Contactor shall provide A/E with copy of all required balance reports prior to the final inspection.

L. After the final inspection is made, the Contractor will receive a list of items requiring adjustment, correction, replacement, or completion.

M. The Contractor shall comply completely with all listed requirements within (40) days of receipt of list. Should the Contractor fail to perform within this time limit, the A/E and/or Owner reserves the right to have the work completed by others and the cost deducted from the contract price.

**END OF SECTION 22 0500**

# SECTION 22 0510
# BASIC PLUMBING MATERIALS AND METHODS

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This section includes the following basic mechanical materials and methods to complement other Division 22 Sections.
   1. Piping materials and installation instructions common to most piping systems.
   2. Dielectric fittings.
   3. Mechanical sleeve seals.
   4. Sleeves.
   5. Escutcheons.
   6. Grout.
   7. Mechanical Demolition.
   8. Installation requirements common to equipment specification sections.

### 1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

### 1.4 QUALITY ASSURANCE

A. All piping shall be specified in this section. Material and installation shall also be subject to state, local codes and ordinances of the area encompassing this project.

B. Welder’s Qualifications: All welder shall be qualified in accordance with ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

C. Potable-water piping and components shall comply with NSF 14 and NSF 61 Annex G. Plastic piping components shall be marked with "NSF-pw."

D. Uninsulated plastic waste, vent and roof drain piping is not allowed above any ceiling in a return air plenum.

E. Electrical Characteristics for Mechanical Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

## PART 2 - PRODUCTS

### 2.1 PIPE, TUBE, AND FITTINGS

A. Provide piping and factory fabricated fittings as indicated for each service and pipe size. Fitting sizes and types shall match piping or equipment connections. Where not indicated, comply with governing regulations or manufacturer's recommendations.

### 2.2 SANITARY WASTE, VENTING, AND STORM DRAIN PIPING

A. Below Grade: Extra heavy weight, coated cast iron soil pipe, hub-&-spigot, ASTM A 74, with TY-seal double seal, premolded one piece Neoprene compression type gasket, ASTM C 564, or lead/oakum joint materials, FSQQ-C-40.
   1. Service weight "No-Hub" cast iron soil pipe, FS WW-P-401, with Neoprene gasket, ASTM C564, and stainless steel drawband.
   2. Where permitted by plumbing and building codes, schedule 40 Polyvinyl Chloride sewer pipe (PVC), ASTM D 2729, with sewer fittings ASTM D 2729, and solvent cement, ASTM D 2564.

B. Above Grade: Service weight cast iron soil pipe, Hub-&-Spigot, ASTM A 74, with premolded one piece Neoprene compression type gasket, ASTM C 564, or lead/oakum joint materials, FS QQ-C-40.
   1. Service weight "No-Hub" cast iron soil pipe, CISPI standard 301, or FS WW-P-401, with Neoprene gasket, ASTM C564, and stainless steel drawband, comforming to CISPI standard 310.
   2. Where permitted by plumbing and building codes, schedule 40 Polyvinyl Chloride (PVC), type DWV, ASTM D 2665; with schedule 40 DWV fittings, ASTM D 2665 and patterns conforming to ASTM D 3311. Solvent cement, ASTM D 3138.
      **a. <u>All waste and vent piping routed through air plenums shall be cast iron pipe only. PVC is not allowed.</u>**
      b. Storm drain piping may be insulated PVC piping where allowed by plumbing and building codes.

C. Provide a copy of the plot plan showing exact locations of all underground services direct to the engineer with accurate dimensions from the building such that all the underground service can be located.

D. Before building footings are formed, this contractor shall start excavating for sewer services and shall confirm that depth of existing sewer is such that the building sewer services will drain into it by gravity. If existing sewer is not deep enough, the contractor shall notify the engineer at once.

### 2.3 DOMESTIC WATER (COLD, HOT, & RECIRCULATING HOT WATER) IN BUILDING ABOVE GROUND

A. Piping shall by Type "L" hard drawn copper water tube. Fittings wrought copper, solder joints. Joints 95-5 or lead free solder.

B. Uponor PEX-A potable water piping system with Uponor expandable F1960 fittings (no crimp fittings to be accepted) provided the contractor is trained and following all manufacturer's recommendations thus fulfilling all available Uponor warranty coverage.

### 2.4 COMPRESSED AIR PIPING

A. Compressed air piping shall by Type "L" hard drawn copper water tube. Fittings shall be wrought copper, solder joints. Joints 95-5 or lead free solder. Press fittings and PEX not allowed.

### 2.5 DIELECTRIC FITTINGS

A. General: Assembly or fitting with insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion.

B. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

C. Insulating Material: Suitable for system fluid, pressure, and temperature.

D. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.

F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

### 2.6 MECHANICAL SLEEVE SEALS

A. Description: Modular design, with interlocking rubber links shaped to continuously fill annular space between pipe and sleeve. Include connecting bolts and pressure plates.

### 2.7 SLEEVES

A. The following materials are for wall, floor, slab, and roof penetrations:
   1. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
   2. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
   3. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
   4. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

### 2.8 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Cast-Brass Type: With set screw.
   1. Finish: Polished chrome-plated.

C. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
   1. Finish: Polished chrome-plated.

### 2.9 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
   1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
   2. Design Mix: 5000-psi, 28-day compressive strength.
   3. Packaging: Premixed and factory packaged.

## PART 3 - EXECUTION

### 3.1 MECHANICAL DEMOLITION

A. Refer to Division 1 Sections "Cutting and Patching" and "Selective Demolition" for general demolition requirements and procedures.

B. Disconnect, demolish, and remove mechanical systems, equipment, and components indicated to be removed.
   1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
   2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
   3. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
   4. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
   5. Equipment to Be Removed: Disconnect and cap services and remove equipment.

6. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
7. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

**3.2 PIPING SYSTEMS - COMMON REQUIREMENTS**

A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.

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

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Do not run piping through electrical or electronic equipment spaces and enclosures unless unavoidable. Install drip pan under piping that must be run through electrical spaces, if approved by local authority.

E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

G. Install piping to permit valve servicing.

H. Install piping to allow maximum possible headroom unless specific mounting heights or slopes are indicated.

I. Install piping at indicated slopes, or level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

J. Install piping free of sags and bends.

K. Install fittings for changes in direction and branch connections.

L. Install piping to allow application of insulation.

M. Select system components with pressure rating equal to or greater than system operating pressure.

N. Install escutcheons for penetrations of walls, ceilings, and floors.

O. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

P. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Install steel pipe for sleeves smaller than 6 inches in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

Q. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
   1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

R. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials conforming to the 25/50 flame spread and smoke developed rating.

S. Verify final equipment locations for roughing-in.

T. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

## 3.3 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

**END OF SECTION 22 0510**

# SECTION 22 0700
# PLUMBING SYSTEMS INSULATION

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. The work in this section of the specification and the accompanying drawings consists of performing all labor, equipment, accessories, and materials and in performing all operations necessary for the installation of all insulation for the plumbing, circulating hot water heating piping systems, and sealing of sleeves.

B. Work to be insulated includes the following:
   1. All domestic cold water piping, valves, and fittings.
   2. All domestic hot & recirculating hot water piping, valves, and fittings.
   3. All roof drain bodies, vertical and horizontal storm drainage and rainleader piping completely down to connection at underground piping or downspout outlet.
   4. All sleeves.

C. All insulation work shall be installed in a workmanlike manner by skilled workmen engaged in this type of work.

D. Fire-Test-Response Characteristics: Provide products with flame-spread and smoke-developed indices of 25 and 50, respectively, according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction.

### 1.3 SUMITTALS

A. Shop drawings/product data as specified in Section 22 0500 shall include the following:
   1. Product Data: Identify thermal conductivity, thickness, and jackets (both factory installed and field applied, if any), for each type of product indicated.

### 1.4 COORDINATION

A. Coordinate clearance requirements with duct Installer for insulation application.

B. Coordinate clearance requirements with piping Installer for insulation application.

C. Coordinate size and location of supports, hangers, and insulation shields.
   1. All hangers and insulation shields for piping shall be large enough to encompass insulation without penetrating vapor barrier.
   2. It shall not be acceptable for insulation to envelope hangers/saddles.
   3. It shall not be acceptable for insulation to terminate on either side of hangers not properly sized to encompass insulation.

## PART 2 - PRODUCTS

### 2.1 NEW DOMESTIC COLD, HOT, & RECIRCULATING WATER PIPING INSULATION

A. All piping in concealed and exposed areas shall be insulated with fiberglass pipe insulation with all service jacket. Jacket shall be factory-applied, and, where specified, with white foil scrim-kraft vapor barrier. Insulation shall be Johns-Manville Micro-Lok 850 APT, or accepted equal.

B. For pipe sizes 1” and less – insulation thickness shall be ½”. For pipe sizes of 1-1/4”-2” – insulation thickness shall be 1”. For pipe sizes of 2-1/2” and larger – insulation thickness shall be 1-1/2”.

C. Fittings, valves, flanges, etc. shall be insulated with fiberglass blanket, Johns-Manville Microlite or pre-cut mitered sections for elbows, J-M Micro-Lok (1lb/cu. ft. density).

D. Encase pipe fitting insulation with one piece pre-molded PVC fitting covers having flame spread index of 25 or less, and smoke developed index of 50 or less, as tested by ASTM E84 (NFPA 255) method.

E. Provide sheet metal insulation shields at all hanger locations.

**2.2 NEW STORM PIPING AND ROOF DRAIN BODIES**

A. All piping in concealed and exposed areas shall be insulated with fiberglass pipe insulation with all service jacket. Jacket shall be factory-applied, and, where specified, with white foil scrim-kraft vapor barrier. Insulation shall be Johns-Manville Micro-Lok 850 HP, or accepted equal.

B. For all pipe sizes and drain bodies – insulation thickness shall be 1" and be fully vapor sealed.

C. Fittings, valves, flanges, etc. shall be insulated with fiberglass blanket, Johns-Manville Microlite or pre-cut mitered sections for elbows, J-M Micro-Lok (1lb/cu. ft. density).

D. Encase pipe fitting insulation with one piece pre-molded Zeston 2000 PVC fitting covers having flame spread index of 25 or less, and smoke developed index of 50 or less, as tested by ASTM E84 (NFPA 255) method.

E. Provide sheet metal insulation shields at all hanger locations.

***F. Hangers for piping shall be large enough to encompass insulation. It shall not be acceptable for insulation to envelope hangers/saddles, or for insulation to stop on either side of hangers.***

**PART 3 - EXECUTION**

**3.1 GENERAL APPLICATION**

A. All insulation shall be applied on clean, dry surfaces. All joints shall be snugly butted against the adjoining piece and all joints, seams, voids, flat spots, etc., shall be filled with insulation cement. Do not use cut pieces or scraps abutting each other.

B. Where double layers are installed, the first layer shall be fastened with binding wire. All joints shall be staggered between the two layers.

C. Insulation on all cold surfaces must be applied in a continuous, unbroken vapor seal. Hangers, supports, anchors, etc., that are secured directly to cold surfaces must be adequately insulated and vapor sealed to prevent condensation.

D. All surface finishes shall be extended to protect all surfaces, ends, and raw edges of insulation.

E. All insulation materials shall be installed in strict accordance with manufacturer's instructions, using recommended adhesives, mastics and coatings applied at specific coverage per gallon and temperature conditions.

F. Extend insulation without interruption through walls, floors and similar penetrations, except where otherwise indicated.

G. Maintain integrity of vapor-barrier jackets on insulation, and protect to prevent puncture or other damage.

H. Do not apply insulation to equipment, breechings, or stacks while hot.

I. Do not insulate boiler manholes, handholes, cleanouts, ASME stamp, and manufacturer's nameplate. Provide neatly beveled edge at interruptions of insulation.

J. Provide removable insulation sections to cover parts of equipment, which must be opened periodically for maintenance; include metal vessel covers, fasteners, flanges, frames and accessories.

K. Repair damaged sections of existing mechanical insulation, both previously damaged or damaged during this construction period. Use insulation of same thickness as existing insulation, install new jacket lapping and sealed over existing.

L. Insulation installer shall advise Contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.

**3.2 MINERAL-FIBER PIPE INSULATION APPLICATION**

A. Fittings, valves, and flange insulation shall be wrapped firmly under compression (minimum 2:1) to a thickness equal to the adjoining insulation, secured with No. 20 gauge galvanized annealed

steel wire, and finished with a smoothing coat of mastic, Johns-Manville No. 375 Insulating and Finishing Cement or equal.

B. Cold Fittings, Valves, Flanges, etc., shall be additionally sealed with a layer of resin coated glass mesh, such as Johns-Manville Duramesh 207 glass cloth, embedded between two 1/16" thick coats of vapor barrier coating, Benjamin Foster 30-35 or equal. Lap the sealed glass cloth at least 2" on itself and the adjoining insulation.

C. Premolded Insulation Valve and Fitting Covers shall be installed by tack fastening, banding, or taping as required by manufacturer.

D. Expansion Joints: For expansion joints, a tube of pipe insulation shall be fabricated that will allow the expansion joint to move within the tube. The insulating tube shall be fastened at one end of the pipe or equipment and the other end shall be free to slide over the adjacent insulated piping. Provide an aluminum jacket over the insulated pipe to provide a smooth surface on which the insulated tube may slide.

E. Insulation Under Hangers: Pipe hangers shall encompass the insulation and shall have sheet metal saddles furnished by the Mechanical Contractor.

F. Inserts shall be installed at all hanger locations. Inserts between the pipe and pipe hangers shall consist of 13lb/cubic foot hydrous calcium silicate pipe insulation, or wood blocking, of thickness equal to the adjoining insulation and shall be provided with vapor barriers where required. Insulation inserts shall not be less than the following lengths:

| | | |
|---|---|---|
| 1. | ½" to 1-1/2" pipe size | 10" long |
| 2. | 3" to 6" pipe size | 12" long |
| 3. | 8" and larger pipe size | 16" long |

G. On all piping the full thickness of insulation and jacket shall run continuously under the sheet metal pipe saddle and through the pipe hanger (pipe hanger shall be large enough to permit full insulation thickness.)

### 3.3 SEALING OF SLEEVES

A. All sleeves for pipes, ductwork, etc., furnished under Division 22 of specifications, penetrating floors, fire and/or smoke walls and full height partitions, including chase walls, shall be sealed in accordance with the following:

1. All insulated services shall have the specified insulation terminated on either side of sleeve. Services which require a vapor barrier jacket shall have segment through sleeve insulated with calcium silicate having a minimum thickness same as specified for service. Vapor barrier jacket shall be uninterrupted. Entire void space between inside of sleeve and outside of duct, pipe, and/or calcium silicate insulation shall be packed with fiber insulation, conforming to HHI-521E Type 3 or HHI-558B Form A and having an ASTM fire class E-84 with fiber melt point in excess of 2000 degrees F., to a point 1/8 inch from ends of pipe sleeve. After void is packed with fiber insulation, services which are specified to be insulated shall have a section of insulation installed on each side of sleeve, insulation to be fitted tight to sleeve insulation. Balance of space in sleeve to be filled with nonhardening silicone conforming to TTS-00230 and of type which will allow 50 percent movement in one direction.
2. Contractor is herein given the option to provide Pipe Shield, Inc., fire rated wall and floor sleeves for insulated and noninsulated piping in lieu of sealing sleeves as outlined above. Shields shall be installed in strict accordance with manufacturer's recommendations.

**END OF SECTION 22 0700**

# SECTION 22 4000
# PLUMBING

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. The work in this specification and the accompanying drawings consists of performing all labor and furnishing of all material and equipment necessary to install complete systems listed below, including minor items obviously necessary for complete and operating systems.
   1. Plumbing Fixtures
   2. Soil, Waste, Sanitary Drainage, and Vent Piping
   3. Storm Drainage System
   4. Compressed Air Piping

B. The plumbing work shall be installed in strict accordance with all applicable local, state, national plumbing regulations, and authority having jurisdiction.

### 1.3 SUBMITTALS

A. Shop drawings as specified in Section 22 0500 shall include the following:
   1. Domestic Water System Piping, Valves, and Fittings
   2. Sanitary Waste & Vent System Piping and Fittings
   3. Storm Sewer System Piping and Fittings
   4. Compressed Air Piping & Fittings
   5. Compressed Air Vacuum Generating Fittings
   6. Plumbing Fixtures
   7. Interior Cleanouts
   8. Floor Drains
   9. Roof Drains
   10. Water Hammer Arrestors & Mfgr's Recommended Locations to be Installed
   11. Domestic Hot Water Recirc Self-Actuating Thermostatic Balance Valves (TRV's)
   12. Drain Valves with Chained Caps

## PART 2 - PRODUCTS

### 2.1 GENERAL

A. Before proceeding with this part of the work, the Contractor shall carefully survey the existing conditions, and, if necessary, modify the service installation, in order to avoid unforeseen obstructions such as in the floor ductwork, etc. This Contractor shall include all costs for this work, including saw cutting & patching, permits, etc., in his bid.

### 2.2 PLUMBING FIXTURES

A. Furnish and install plumbing fixtures where shown on the Drawings. Type, size, and performance shall be as tabulated in the schedule and on the drawings.

B. Where indicated on the drawings to be a future fixture, this contractor shall provide all waste, vent, and water supplies as indicated on the drawings and according to local code.

C. Exposed flush, waste, and supply pipes at the fixtures shall be chromium plated brass pipe, iron pipe size. Fittings for brass pipe shall be cast brass, chromium plated.

D. Install chromium plated wall or floor plates (escutcheons) with set-screw where piping passes through walls or floors.

E. All handicap lavoratories supply pipe and drain pipe will be fitted with removable safety covers that comply with handicap code requirements.

F. All fixtures fitted to the walls or floors shall be ground and true and be sealed with a non-hardening white silicone caulk bead.

G. All plumbing fixtures shall be supported per manufacturer's recommendations.

**2.3 FLOOR DRAINS**

A. Furnish and install floor drains where shown on the Drawings. Type, size, and performance shall be as tabulated in the schedule and on the drawings. Connect outlet of drain to "P" trap. Venting installation requirements of floor drains whether or not shown on plans shall be according to code and approved by the code official.

B. Furnish and install any floor drains required by the authority having jurisdiction to meet the Uniform Plumbing Code 2009 704.3.

**2.4 CLEANOUTS (INTERIOR ONLY)**

A. Furnish and install clean outs where shown on the Drawings. Type, size, and performance shall be as tabulated in the schedule and on the drawings. Install proper traffic rating and floor pattern shape for intended use.

B. Cleanouts shall be provided at the base of all vertical stacks with the cleanout plug located approximately 12" above the floor and extended to wall access cover. Cleanouts in floors on grade shall be located as shown on plans and at changes in direction of pipe run and shall consist of Y fittings and eighth bends. Cleanouts must be provided in accordance with the local code and as shown on the drawings.

C. Floor cleanouts – frame and cover threaded for 2" vertical adjustment, threads protected with shield to be removed when concrete is set. Covers-nickel bronze round frame and cover, deep flange tractor type. Extra heavy type in heavy traffic areas, and with carpet cleanout marker for carpeted floors.

D. Wall Cleanouts – access covers shall be stainless steel.

**2.5 ROOF DRAINS**

A. Furnish and install roof drains where shown on the Drawings. Type, size, and performance shall be as tabulated in the schedule and on the drawings

B. Roof drains shall be cast iron body, cast iron dome, sump receiver, underdeck clamp, and no-hub outlet.

C. Installation shall be as per manufacturer's recommendations.

**2.6 ROOF JACKET**

A. Roof extension from soil, waste, and vent pipes shall be extended at least 18 inches above the roof, and must be encased in frostproof jackets, each having an air space at least 1" between the outside surface of the pipe and a cap over the top of the pipe so that it will be unnecessary otherwise to plug the inside of the vent pipes at the top when the test is made. These plugs must be of a type readily seen until removed. Remove them at once after the piping system has been tested and approved.

**2.7 WATER HAMMER ARRESTORS**

A. Piping shall be installed with proper safeguards to prevent water hammer. This will be done by installing a sufficient number of shock absorbers. Shock absorbers shall be Watts or equal. Install with sizes and locations as per manufacturer's instructions and as per code.

B. Contractor to indicate installed locations on as-built drawings.

**2.8 DOMESTIC HOT WATER RECIRC SELF-ACTUATING THERMOSTATIC BALANCE VALVES (TRV'S)**

A. Furnish and install Domestic Hot Water Recirc Self-Actuating Thermostatic Balance Valves where indicated on the plans, a thermostatically controlled recirculation valve (TRV) in the domestic hot water piping. TRV shall be self-contained and fully automatic without additional piping or control mechanisms. Valve shall be a Circuit Solver™ TRV as manufactured by Therm-Omega-Tech, Inc., or equivalent.

1. TRV shall regulate the flow of recirculated domestic hot water based on water temperature entering the TRV regardless of system operating pressure.

a. When fully closed the TRV shall bypass a minimum of 0.1 GPM hot water to maintain dynamic control of the recirculating loop.
b. TRV shall be factory adjustable from 105 F (40.5 C) to 140 F (60 C) as required by project conditions.
1) Fully open TRV shall modulate towards a minimum closed position upon sensing a water temperature above 3 F of set point.
c. TRV shall be available in sizes ranging from ½ inch NPT to 2" NPT.

2. TRV body and all internal components shall be constructed of stainless steel with major components constructed of type 303 stainless steel.
3. TRV sizes ½ inch through 2 inches shall be rated to 200 PSIG maximum working pressure.
a. All TRV shall be standard tapered female thread, NPT.
4. All TRV shall be rated to 300 F (148.9 C) maximum working temperature.
5. TRV shall be ANSI/AWWA C800 compliant.
6. All TRV shall be NSF-61 certified for use in all domestic water systems.
7. Thermal actuator shall be spring operated and self-cleaning, delivering closing thrust sufficient to keep orifice opening free of scale deposits.
a. Thermal actuator shall be rated for a minimum of 200,000 cycles.

B. Installation of TRV shall be made by qualified tradesmen. Install TRV in each domestic hot water return piping branch beyond last hot water device in that branch.
1. Provide suitable line size isolation valves, unions, and strainer as indicated in piping detail shown on the drawings.

C. Provide suitable access panel as required in non-accessible ceilings and walls.

## 2.9 COMPRESSED AIR SYSTEMS

A. Medical Simulation Air Connections
1. Compressed air vacuum generating fittings – contractor to provide & install all pneumatic vacuum fittings required for Owner's vacuum termination in simulation equipment. Install all required pneumatic tubing between pneumatic vacuum fittings and simulation equipment terminations.
a. Basis of design fitting to be SMC model ZH07B, box type vacuum ejector with integral silencer.
2. Connect to all owner's simulation equipment compressed air and simulated med gas (compressed air) connections. See sheets A101 and A110.

## 2.10 MISCELLANEOUS CONNECTIONS

A. Make all domestic water, waste, vent, gas, air, etc., connections to all equipment in this building whether or not such equipment is furnished under this section or under other sections of the specification. This includes furnishing piping, traps (if required) and shut-off valves on branches to and from each piece of equipment from mains or branch mains.

B. Make all plumbing connections to existing piping and to all equipment shown on the plans as requiring same. If specific piping details are not shown, the equipment shall be roughed in for and connected in accordance with the manufacturer's recommendations. It will be this contractor's responsibility to obtain shop drawings from whomever furnishes the equipment.

## 2.11 TESTING/CLEANING

A. The mechanical contractor is responsible for the testing & cleaning of each respective system in accordance with applicable state and local codes. Tests shall be repeated until each system is proven acceptable.

**END OF SECTION 22 4000**

# SECTION 23 0500
# GENERAL HVAC REQUIREMENTS

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. The mechanical contractor shall perform all work and furnish all materials as indicated in the mechanical plans and specifications as necessary for the successful completion of this project.

### 1.3 PERMITS AND SERVICES

A. The mechanical contractor shall obtain all permits and arrange all inspections, give notices and pay all fees as required by the Authority Having Jurisdiction.

B. This contractor shall coordinate any necessary site utilities including water, natural gas, and sewer work with local utility, owner, and other contractors to minimize disruption and downtime. ANY AND ALL CHARGES ASSESSED BY THE UTILITY OR CITY OF WATERTOWN TO ACCOMMODATE THE REQUIREMENTS OF THIS PROJECT ARE THE SOLE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR. VERIFY ALL CHARGES AND COORDINATE ALL EQUIPMENT NECESSARY WITH THE UTILITY BEFORE SUBMITTING BID.

### 1.4 DRAWINGS AND MEASUREMENTS

A. Verify all dimensions and conditions with Architectural and Structural drawings. The small scale of the drawings prohibits the indication of all offsets, fittings and accessories necessary and shall be furnished by this Contractor and required for complete and proper operation.

B. “Existing Conditions” shown on drawings are based on existing plans and limited field investigation. The field survey was conducted to verify, as much as possible, the accuracy of the locations shown. The Contractor shall verify the accuracy of the “Existing Conditions” as shown on the drawings. As the demolition work progresses perform modifications and additions as necessary to correct for these hidden conditions and allow for the completion of the new work.

C. The general arrangement of the mechanical systems shall be as shown on the drawings. Field changes shall have the written acceptance of the Engineer.

D. Consult the drawings and specifications of all other trades. Layout work and coordinate with other trades, before installing any equipment, to avoid interfering with these trades or conflicting with applicable codes.

E. The mechanical contractor shall bear full responsibility for coordinating his work with other trades to avoid conflicts in space requirements, clearances, etc. Problems arising due to lack of coordination will be the responsibility of the mechanical contractor to resolve. Extra work and/or equipment as a result of not coordinating work shall be the responsibility of the installing contractor and at no cost to the Owner.

### 1.5 INSPECTION OF SITE AND DOCUMENTS

A. Before submitting a proposal on the work contemplated, the bidder shall thoroughly familiarize himself with the contract documents, the site, and all existing conditions and limitations that may affect the performance of his work. Any conflict noted shall be brought to the attention of the Engineer before bidding. If there is not sufficient time prior to bidding, the Contractor shall bid the larger quantity or better quality of work.

B. No extra compensation will be allowed, because of misunderstanding the amount of work involved or the bidder’s lack of knowledge, for obvious conflicts which could have been discovered or reasonably anticipated prior to bidding.

### 1.6 REGULATIONS AND CODES

A. All work, materials, and equipment in this contract shall comply with all applicable local, city, state and federal ordinances, regulations, and codes.

### 1.7 INSTRUCTIONS

A. Furnish verbal and engineer approved written instructions to Owner on all systems. Instruction shall include operating procedures, adjustments, and periodic maintenance. Furnish a copy of the written instructions and attach a letter to the Engineer, prior to final inspection, signed by Owner, attesting to date and satisfaction of instructions.

### 1.8 OPERATING AND MAINTENANCE MANUALS (3 Hard Copies & 1 Electronic Submittal via Submittal Exchange)

A. PRIOR TO FINAL INSPECTION, The mechanical contractor shall furnish (3) hard copies (including 1 USB drive containing electronic copy) and (1) electronic submittal via Submittal Exchange of the O&M Manuals to the Engineer, containing all pertinent data to the mechanical systems. Information shall be indexed and labeled per system and shall include catalog cuts, installation manuals, maintenance manuals, manufacturer's names, replacement parts list. Include balancing reports as specified. Include written instructions and warranty info as specified.

B. The first section shall be indexed/labeled "WRITTEN INSTRUCTIONS & TRAINING" noting written instructions with company service contact info and shall include a list of filters for each unit. Also include document with owners signature attesting to date and satisfaction of training.

C. The second section shall be indexed/labeled "WARRANTY INFO" and shall include a statement of guarantee on the contractors company letter head and shall include warranty statements of all equipment provided/installed under his contract with specific dates. This will note any longer/special warranties.

### 1.9 AS-CONSTRUCTED DRAWINGS (Red Lined on Plans & USB Drive containing scanned PDF)

A. During construction, each trade shall keep track of the major changes in the rerouting of piping and equipment, and shall note these in red on one set of drawings. This set of drawings shall be submitted with the Operation and Maintenance Manuals along with a USB drive containing a single PDF file with these same red line plans in electronic form. Most printing shops will be able to scan your trade's large plan sheets into electronic form. Contact the engineer's office if there are any questions.

### 1.10 WORKMANSHIP

A. Qualified individuals that are properly licensed to perform the work involved shall perform all mechanical work.

### 1.11 CUTTING AND PATCHING

A. This Contractor shall be responsible for all cutting and patching of holes required for passage of piping, equipment, and ducts. This also applies to the removal or installation of new equipment.

B. All cutting of existing construction required to install or join new work, except where otherwise indicated on the plans, shall be the responsibility of this Contractor and coordinated with the Construction Manager. Before making any cuts, verify exact locations and sizes with the Construction Manager to confirm that no structural members will be cut. Contractor shall make every effort to minimize extent of cutting existing construction.

C. The mechanical contractor shall be responsible for patching any openings left in floors, walls, and ceilings that were caused by his/her actions. Patching shall match existing surface in color, texture and quality so that patch is indistinguishable from original surface.

### 1.12 PAINTING

A. Any equipment which becomes rusted or damaged during construction shall be repaired, cleaned, and repainted by this Contractor. Painting shall always be applied in two coats, one primer and one finish.

**1.13 EQUIPMENT AND PIPE SUPPORTS**

A. Provide all structural supporting frames, steel stands, concrete bases, and hangers as required for mechanical equipment. All floor equipment shall be set on 4" high concrete bases furnished by this Contractor, unless otherwise noted.

B. Paint all unprotected metal, except galvanized and copper, with metal protective paint.

***C. Hangers for piping shall be large enough to encompass insulation. It shall not be acceptable for insulation to envelope hangers/saddles, or for insulation to stop on either side of hangers.***

D. Provide saddles at all hangers or supports of insulated piping. Saddles for 4" and larger piping shall be fabricated of 14 gauge galvanized iron, and for smaller piping shall be fabricated of 16 gauge galvanized iron. Saddles shall be one-half the circumference of the pipe insulation and 4" shorter than the insulation inserts.

E. Under no condition shall any pipe or duct structure be used to support another.

**1.14 ACCESS TO EQUIPMENT**

A. Access shall be provided to all motors, valves, dampers, controls, specialties, etc., for maintenance purposes. All access doors, access panels, removable sections, etc., required for access shall be provided. The location of the access openings relative to the mechanical equipment shall be coordinated to assure proper access to the equipment.

B. Access openings are required for manual, motorized, fire, and smoke dampers and other devices requiring access and shall be provided in the ductwork, plenums, housings, tanks, etc., under this portion of the contract.

**1.15 EXCAVATING AND BACKFILLING**

A. When work to be completed by this contractor requires trenching, digging, etc. this contractor shall be responsible for properly protecting open trenches in accordance with required safety procedures. Backfill shall be placed in horizontal layers, not exceeding 9 inches in thickness. Moisten and hand or machine compact to 95% of standard proctor density. Bring fill to elevations indicated. If backfill fails the proctor density test in accordance with ASTM D-2049 and conducted by an independent testing laboratory retained by the owner, Contractor shall recompact and retest until satisfactory density is reached. This contractor shall restore the surface (whether grass, asphalt, concrete, etc.) to its original condition. Grass shall be seeded to match surrounding turf.

B. When work is in public street, paving repairs shall be equal to and comply with municipal agency requirements. If repairs are done by municipal agency, make necessary arrangement with such agency to make the repairs. Contractor shall include cost for permits, inspection fees, work, etc. in Mechanical Bid.

**1.16 TESTING AND ADJUSTING**

A. At the completion of work, all parts of the installation under Division 23 shall be cleaned, lubricated, tested, and adjusted for proper operation.

B. All piping and ductwork shall be tested and cleaned as required, by all local, state and federal codes. Tests shall be performed in the presence of the authority having jurisdiction. Written notification of test, date, and results shall be furnished to the Engineer before concealing or covering the installation.

C. All controls shall be tested and adjusted for proper operation. Adjustments shall be made when all systems are operating which may affect the control system.

D. An Independent Testing & Balancing Agent shall test and balance all mechanical systems as specified in Section 23 0593.

**1.17 GUARANTEE**

A. Warranty: The mechanical contractor shall warrant his work against failure and workmanship for a period of at least one year from the date of substantial completion, for all new work. Any work that is defective within that one-year period shall be replaced by the Contractor without

charge. If longer/special warranties are noted elsewhere in the specifications, those warranties shall apply.

## 1.18 EQUIPMENT IDENTIFICATION

A. Major mechanical equipment, rooftop units, energy recovery ventilators, electric duct heaters, heat pumps, exhaust fans, etc. shall be provided with identification as designated on the plans. Labels shall be black laminate three-layer plastic with engraved 1/2 inch white letters, adhered, screwed, or riveted to the equipment. Manufactured by Brady, Champion America/Seton.

B. Piping shall be identified as to contents and flow direction with plastic, color coded, snap-on or adhesive labels. Manufactured by Brady, Champion America/Seton.
   1. Labeling shall be located:
      a. Adjacent to each valve.
      b. At each side of and at each obstruction.
      c. At each branch.
      d. At each cap for future.
      e. At each takeoff.
      f. At each side of penetration of structure or enclosure.
      g. At each equipment connection.
      h. At all access doors.
      i. A maximum of every 40 feet on straight runs of piping including rises and drops.
      j. Minimum one label per room/space.

C. Valve tags shall be brass with stamped letters, tag size 1-1/2” minimum in diameter.
   1. Provide typed valve lists in each O&M binder. Valve lists shall include the valve number, location, and purpose of each valve, and any other necessary information such as the required opening or closing of another valve when one valve is to be opened or closed.

D. Color coded indicators shall be installed on the ceiling grid or access door to hard lid areas to indicate all valves and other ceiling mounted equipment requiring service (example – VAV’s). Each trade shall be responsible for equipment provided under their respectable trade.
   1. Each ceiling label shall be color coded laminated engraved plastic, 1/16” thick, 2.5” wide by 0.75” tall, with white lettering centered on each label. Label to be adhered to the acoustic ceiling tile grid. Seton Style AV0175 or similar.

## 1.19 MECHANICAL SUBMITTAL

A. All equipment shall be as listed on the equipment schedules or approved equal.

B. Prior Approval: Manufacturers whose product is not specified or specifically listed on the plans or in the specifications are allowed to submit information on a product that they would like to be considered as an equal to those specified or listed. By submitting this information for consideration, the product representative is indicating that the product being presented for consideration equals or exceeds the specified product in quality, performance and operating parameters. Proof of equality rests with the party making the request. The procedure for this submittal is listed below.

C. Submit literature on product that is to be considered for prior approval. This literature shall include catalog cuts with all pertinent technical specifications, dimensions and pictures of the product.

D. Final approval of all equipment shall be contingent on shop drawing acceptance, compliance with the specifications and performance criteria as required. General approval to bid a product does not relieve the supplier or contractor of meeting specific specification requirements.

E. The Mechanical Contractor shall pay, provide, install and be responsible for any extra materials required due to his use of alternate accepted equipment which has installation requirements different than the specified equipment. This includes paying other trades for any extra work they are involved in due to this substitution of equipment.

F. Literature shall be submitted so that the engineer receives it no later than 7 days prior to bid date.

G. All approvals will be in the form of an addendum issued to all plan holders.

H. List of Acceptable Substitutions:
   1. Equipment Identification, Pipe Labeling, Valve Tags, Ceiling Grid Labeling: Seton, Brady Corporation, Marking Services Incorporated
   2. Shutoff VAV Terminal Units: Carrier, Price, Krueger, Nailor, Trane, Tuttle & Bailey, Titus, JCI, Greenheck
   3. Registers, Grilles, & Diffusers: Metalaire, Price, Tuttle & Bailey, Krueger, Nailor, Hart & Cooley, Anemostat, Nailor, J & J Register, Air Specialties Express/Carnes, Titus
   4. Aluminum Safe Propylene Glycol: Rhogard, no substitutions, contractor to confirm
   5. Pressure-compensating Flow Control and Strainer Valves: Pro Hydronics, Griswold, Autoflow, B&G, Nexus, Flow Design, IMI Flow Design
   6. DDC Temperature Controls (BACnet): Invensys by Johnson Controls Inc., no substitutions.

**1.20 SHOP DRAWINGS**

A. Before ordering any item, Contractor shall review, stamp with his approval and submit shop drawings of equipment as to be furnished under this contract.
   1. Electronic submittals are REQUIRED. Electronic submittals can be one combined .pdf. for each of the following mechanical trades: Fire Sprinkler Drawings, Fire Sprinkler Calcs, Fire Sprinkler Materials, Temperature Controls, HVAC, Plumbing, and Hydronics.

B. Where the contractor is submitting shop drawings that differ from the plans and specifications, the contractor must notify the engineer in writing each variance from the plans and specifications and the Mechanical Contractor shall pay, provide, install and be responsible for any extra materials required due to his use of alternate accepted equipment which has installation requirements different than the specified equipment. This includes paying other trades for any extra work they are involved in due to this substitution of equipment.

C. Product Data shall include, but are not limited to, the following: Manufacturer's product specifications, Manufacturer's installation instructions, standard color charts, catalog cuts, roughing-in diagrams and templates, and standard wiring diagrams.

**1.21 TEMPORARY HEAT**

A. Temporary heating of the building during construction will be provided as specified in the General Conditions and Supplemental General Conditions. Under no circumstance shall the proposed HVAC equipment be brought into service as temporary heating prior to project completion without written permission from the mechanical engineer & owner.

**1.22 EXECUTION**

A. Remove equipment as indicated. Demolition work shall be coordinated with the Owner. Should questions arise regarding the removal of equipment, confer with the owner before such equipment is demolished.

B. Materials removed by demolition shall remain the property of the Owner unless specifically noted. Material the Owner does not wish to retain shall be removed and properly disposed of by the Contractor.

C. The existing building will be in use during this construction. Schedule and carry out the work in such a manner as to cause the Owner a minimum of inconvenience due to service interruptions. Temporary services shall be installed if one area or phase of construction disrupts service to another area of the building or if equipment has to be relocated to allow construction to progress. Service interruptions shall be confined to the smallest area possible at any one time and interruptions shall be scheduled with the Owners site representative. After service has been restored following an interruption, inspect areas affected by the interruption and be responsible for returning automatically controlled equipment to the same operating condition that existed prior to the interruption.

D. Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final

location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing.

E. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

F. Coordinate mechanical equipment and materials installation with other building components. Verify all dimensions by field measurements. Arrange for chases, slots, and openings in other building components to allow for mechanical installations.

G. Final locations of equipment may differ slightly from those shown on these plans. Coordinate exact location of equipment with equipment supplier, structural members, furniture layout and other trades before rough in and adjust accordingly. Pricing shall allow for a minimum of 10 ft. of difference in the actual location of items as compared to the location shown on the drawings.

H. All penetrations for piping, ductwork, etc. which penetrate floors, fire and/or smoke walls, roofs, full height partitions and similar structures shall be sealed by the mechanical contractor with a UL system specifically approved for the application. This system must maintain the required fire rating.

I. All mechanical systems shall be tested and cleaned as required by Authority Having Jurisdiction.

J. The mechanical contractor shall have the full responsibility of ensuring that his/her work is performed in a safe manner and shall bear all liability associated with his/her job site safety.

K. Upon completion of the work, the Contractor shall notify the A/E and make arrangements for a final inspection. Contactor shall provide A/E with copy of all required balance reports prior to the final inspection.

L. After the final inspection is made, the Contractor will receive a list of items requiring adjustment, correction, replacement, or completion.

M. The Contractor shall comply completely with all listed requirements within (40) days of receipt of list. Should the Contractor fail to perform within this time limit, the A/E and/or Owner reserves the right to have the work completed by others and the cost deducted from the contract price.

**END OF SECTION 23 0500**

# SECTION 23 0510
# BASIC HVAC MATERIALS AND METHODS

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This section includes the following basic mechanical materials and methods to complement other Division 23 Sections.
   1. Piping materials and installation instructions common to most piping systems.
   2. Dielectric fittings.
   3. Mechanical sleeve seals.
   4. Sleeves.
   5. Escutcheons.
   6. Grout.
   7. Mechanical Demolition.
   8. Installation requirements common to equipment specification sections.

### 1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

### 1.4 QUALITY ASSURANCE

A. All piping shall be specified in this section. Material and installation shall also be subject to state, local codes and ordinances of the area encompassing this project.

B. Welder’s Qualifications: All welder shall be qualified in accordance with ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

C. Potable-water piping and components shall comply with NSF 14 and NSF 61 Annex G. Plastic piping components shall be marked with "NSF-pw."

D. Electrical Characteristics for Mechanical Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

## PART 2 - PRODUCTS

### 2.1 PIPE, TUBE, AND FITTINGS

A. Provide piping and factory fabricated fittings as indicated for each service and pipe size. Fitting sizes and types shall match piping or equipment connections. Where not indicated, comply with governing regulations or manufacturer’s recommendations.

## 2.2 SLEEVES

A. The following materials are for wall, floor, slab, and roof penetrations:
   1. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
   2. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
   3. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
   4. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

## 2.3 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Cast-Brass Type: With set screw.
   1. Finish: Polished chrome-plated.

C. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
   1. Finish: Polished chrome-plated.

## 2.4 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
   1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
   2. Design Mix: 5000-psi, 28-day compressive strength.
   3. Packaging: Premixed and factory packaged.

# PART 3 - EXECUTION

## 3.1 MECHANICAL DEMOLITION

A. Refer to Division 1 Sections "Cutting and Patching" and "Selective Demolition" for general demolition requirements and procedures.

B. Disconnect, demolish, and remove mechanical systems, equipment, and components indicated to be removed.
   1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
   2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
   3. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
   4. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
   5. Equipment to Be Removed: Disconnect and cap services and remove equipment.
   6. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
   7. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

## 3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.

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

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Do not run piping through electrical or electronic equipment spaces and enclosures unless unavoidable. Install drip pan under piping that must be run through electrical spaces, if approved by local authority.

E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

G. Install piping to permit valve servicing.

H. Install piping to allow maximum possible headroom unless specific mounting heights or slopes are indicated.

I. Install piping at indicated slopes, or level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

J. Install piping free of sags and bends.

K. Install fittings for changes in direction and branch connections.

L. Install piping to allow application of insulation.

M. Select system components with pressure rating equal to or greater than system operating pressure.

N. Install escutcheons for penetrations of walls, ceilings, and floors.

O. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

P. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
   1. Install steel pipe for sleeves smaller than 6 inches in diameter.
   2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
   3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

Q. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
   1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

R. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials conforming to the 25/50 flame spread and smoke developed rating.

S. Verify final equipment locations for roughing-in.

T. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

### 3.3 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

**END OF SECTION 23 0510**

# SECTION 23 0593
# TESTING, ADJUSTING, AND BALANCING

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This Section includes testing, adjusting, and balancing HVAC systems to produce design objectives, including the following:
   1. Balancing AIRFLOW and WATER flow within distribution systems, including submains, branches, and terminals, to indicated quantities according to specified tolerances.
   2. Adjusting total HVAC systems to provide indicated quantities.
   3. Verifying that automatic control devices are functioning properly.
   4. Reporting results of activities and procedures specified in this Section.
   5. ***Scope of work to include new systems, AND existing systems where CFM's are indicated in dark text on plans.***

### 1.3 DEFINITIONS

A. Retain acronyms and abbreviations that remain after this Section has been edited for Project.

B. AABC: Associated Air Balance Council.

C. AMCA: Air Movement and Control Association.

D. NEBB: National Environmental Balancing Bureau.

E. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.

### 1.4 SUBMITTALS

A. Certified Testing, Adjusting, and Balancing Reports: Prepared on approved forms certified by the testing, adjusting, and balancing Agent.

### 1.5 QUALITY ASSURANCE

A. Agent Qualifications: Engage a testing, adjusting, and balancing agent certified by AABC or NEBB or Engineer's approved equal.

B. Certification of Testing, Adjusting, and Balancing Reports: Certify testing, adjusting, and balancing field data reports. This certification includes the following:
   1. Review field data reports to validate accuracy of data and to prepare certified testing, adjusting, and balancing reports.
   2. Certify that testing, adjusting, and balancing team complied with approved testing, adjusting, and balancing plan and procedures specified and referenced in this Specification.

C. Testing, Adjusting, and Balancing Reports: Use standard forms approved by the Engineer.

D. Instrumentation Type, Quantity, and Accuracy: As described in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems," Section II, "Required Instrumentation for NEBB Certification."

E. Instrumentation Calibration: Calibrate instruments at least every six months or more frequently if required by the instrument manufacturer.

### 1.6 PROJECT CONDITIONS

A. Partial Owner Occupancy: The Owner may occupy completed areas of the building before Substantial Completion. Cooperate with the Owner during testing, adjusting, and balancing operations to minimize conflicts with the Owner's operations.

### 1.7 COORDINATION

A. Coordinate efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist testing, adjusting, and balancing activities.

B. Provide 7 day's advance notice for each test including scheduled test dates and times.

C. Perform testing, adjusting, and balancing after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

## PART 2 - PRODUCTS (Not Applicable)

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine approved submittal data of HVAC systems and equipment.

B. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Specification Sections have been performed.

C. Examine system and equipment test reports.

D. Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are properly installed, and their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.

E. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.

F. Examine air-handling equipment to ensure clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

G. Examine strainers for clean screens and proper perforations.

H. Examine hydronic equipment for correct piping connections and for clean and straight fins.

I. Examine equipment for installation and for properly operating safety interlocks and controls.

J. Examine automatic temperature system components to verify the following:
   1. Dampers, valves, and other controlled devices operate by the intended controller.
   2. Verify dampers and valves are in the position indicated by the controller.
   3. Integrity of valves and dampers for free and full operation and for tightness of fully closed and fully open positions. This includes dampers in multizone units, mixing boxes, and variable-air-volume terminals.
   4. Automatic modulating and shutoff valves, including two-way valves and three-way mixing and diverting valves, are properly connected.
   5. Sensors are located to sense only intended conditions.
   6. Sequence of operation for control modes is according to the Contract Documents.
   7. Controller set points are set at design values. Observe and record system reactions to changes in conditions. Record default set points if different from design values.
   8. Interlocked systems are operating.

K. Report to the Engineer deficiencies discovered before and during performance of testing, adjusting, and balancing procedures.

### 3.2 TESTING AND BALANCING PROCEDURES

A. Perform testing and balancing procedures on each system according to procedures contained in AABC national standards.

B. Perform testing and balancing procedures on each system according to procedures contained in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."

C. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to the insulation Specifications for this Project.

D. Mark equipment settings with paint or other suitable, permanent identification material, including damper-control positions, valve indicators, fan-speed-control levers, and similar controls and devices, to show final settings.

## 3.3 TOLERANCES

A. Set HVAC system airflow and water flow rates within the following tolerances:
   1. Supply, Return, and Exhaust Fans: Plus 10 to minus 10 percent.
   2. Air Outlets and Inlets: Plus 10 to minus 10 percent.
   3. Water Flow Rate: 0 to minus 10 percent.

## 3.4 REPORTS

A. Status Reports: As Work progresses, prepare reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

B. Final Report: Typewritten, or computer printout in letter-quality font, on standard bond paper, bound in three-ring, loose-leaf binder, and tabulated and divided into sections by tested and balanced systems.
   1. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing agent.
   2. Include a list of instruments used for procedures, along with proof of calibration.
   3. Final Report Contents: In addition to certified field report data, include the following:
      a. Pump curves.
      b. Fan curves.
      c. Manufacturers' test data.
      d. Field quality-control test reports prepared by system and equipment installers.
      e. Other information relative to equipment performance, but do not include approved Shop Drawings and Product Data.
   4. General Report Data: In addition to form titles and entries, include the following data in the final report, as applicable:
      f. Title page.
      g. Name and address of testing, adjusting, and balancing Agent.
      h. Project name.
      i. Project location.
      j. Architect's name and address.
      k. Engineer's name and address.
      l. Contractor's name and address.
      m. Report date.
      n. Signature of testing, adjusting, and balancing Agent who certifies the report.

## 3.5 ADDITIONAL TESTS

A. Within 90 days of completing testing, adjusting, and balancing, perform additional testing and balancing to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial testing, adjusting, and balancing procedures were not performed during near-peak summer and winter conditions, perform additional inspections, testing, and adjusting during near-peak summer and winter conditions.

**END OF SECTION 23 0593**

# SECTION 23 0700
# HVAC SYSTEMS INSULATION

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. The work in this section of the specification and the accompanying drawings consists of performing all labor, equipment, accessories, and materials and in performing all operations necessary for the installation of all insulation for the duct systems and sealing of sleeves.

B. Work to be insulated includes the following:
   1. All supply air, return air, transfer air, and exhaust air ducts.
   2. All circulating above ground hot water heat piping, valves, and fittings.
   3. All sleeves.

C. All insulation work shall be installed in a workmanlike manner by skilled workmen engaged in this type of work.

D. Fire-Test-Response Characteristics: Provide products with flame-spread and smoke-developed indices of 25 and 50, respectively, according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction.

### 1.3 SUBMITTALS

A. Shop drawings/product data as specified in Section 23 0500 shall include the following:
   1. Product Data: Identify thermal conductivity, thickness, and jackets (both factory installed and field applied, if any), for each type of product indicated.

### 1.4 COORDINATION

A. Coordinate clearance requirements with duct Installer for insulation application.

B. Coordinate clearance requirements with piping Installer for insulation application.

C. Coordinate size and location of supports, hangers, and insulation shields.
   1. All hangers and insulation shields for piping shall be large enough to encompass insulation without penetrating vapor barrier.
   2. It shall not be acceptable for insulation to envelope hangers/saddles.
   3. It shall not be acceptable for insulation to terminate on either side of hangers not properly sized to encompass insulation.

## PART 2 - PRODUCTS

### 2.1 DUCTWORK INSULATION

A. RIGID BOARD DUCT INSULATION
   1. Rigid Board shall be fiberglass, CertainTeed type IB with FSK reinforced foil scrim-kraft jacket or accepted equal. Board density shall be 3 lb/cubic foot with thermal conductivity of .23 at 75 degrees F mean temperature. ASTM C 612, Class 1.

B. FLEXIBLE DUCT INSULATION
   1. Flexible insulation shall be fiberglass, CertainTeed standard duct wrap with FSK reinforced foil scrim-kraft jacket or accepted equal. Flexible insulation density shall be 1-1/2 lb/cubic foot with thermal conductivity of .24 at 75 degrees F mean temperature. ASTM C 553, Type I, Class B-4.

C. DUCTWORK INSULATION ACCESSORIES
   1. Provide staples, bands, wires, tape, anchors, comer angles and similar accessories as recommended by insulation manufacturer for applications indicated.

D. DUCTWORK INSULATION COMPOUNDS
   1. Provide cements, adhesives, coatings, sealers, protective finishes and similar compounds as recommended by insulation manufacturer for applications indicated.

E. INSULATION THICKNESS FOR DUCTWORK: All ducts are to be insulated unless otherwise noted. Insulation thickness and type shall be as follows:
   1. Rectangular Supply duct insulation before the VAV shall be exterior and 1-1/2" thick.
   2. Round Supply duct insulation before the VAV shall be exterior and 1-1/2" thick.
   3. Rectangular Supply duct insulation after the VAV shall be interior and ½" thick.
   4. Round Supply duct insulation after the VAV shall be exterior and 1-1/2" thick.
   5. Rectangular Return Duct Insulation shall be interior and ½" thick.
   6. Transfer Duct Insulation shall be interior and ½" thick.
   7. Transfer Sleeves Insulation shall be interior and ½" thick.
   8. Exhaust Air Duct Insulation shall be exterior and 1-1/2" thick within 15' of exterior termination.
   9. Concealed ducts may be insulated with rigid or flexible fiberglass insulation.
   10. Ductwork to be paint grip:
      a. See plans for paint grip duct locations.
      **b. <u>Paint grip ductwork insulation shall be interior and ½" thick.</u>**
   11. Exposed ducts shall be insulated with rigid fiberglass insulation only, including ducts exposed above slotted ceilings.
      a. Protective Coating: Portions of insulated duct, 84 inches or less above the floor, shall be additionally protected by the application of a layer of 20 x 20 mesh Johns-Manville "Duramesh" coated with Benjamin Foster mastic #30-36.

## 2.2 CIRCULATING ABOVE GROUND HEATING PIPING INSULATION

A. All piping in concealed and exposed areas shall be insulated with fiberglass pipe insulation with all service jacket. Jacket shall be factory-applied, and, where specified, with white foil scrim-kraft vapor barrier. Insulation shall be Johns-Manville Micro-Lok 850 HP, or accepted equal.

B. For pipe sizes to individual terminal units 1" and less – insulation thickness shall be ½". For pipe sizes of 1-1/4" thru 2" – insulation thickness shall be 1". For pipe sizes of 2-1/2" and larger – insulation thickness shall be 1-1/2".

C. Fittings, valves, flanges, etc. shall be insulated with fiberglass blanket, Johns-Manville Microlite or pre-cut mitered sections for elbows, J-M Micro-Lok (1lb/cu. ft. density).

D. Encase pipe fitting insulation with one piece pre-molded Zeston 2000 PVC fitting covers having flame spread index of 25 or less, and smoke developed index of 50 or less, as tested by ASTM E84 (NFPA 255) method.

E. Provide sheet metal insulation shields at all hanger locations.

# PART 3 - EXECUTION

## 3.1 GENERAL APPLICATION

A. All insulation shall be applied on clean, dry surfaces. All joints shall be snugly butted against the adjoining piece and all joints, seams, voids, flat spots, etc., shall be filled with insulation cement. Do not use cut pieces or scraps abutting each other.

B. Where double layers are installed, the first layer shall be fastened with binding wire. All joints shall be staggered between the two layers.

C. Insulation on all cold surfaces must be applied in a continuous, unbroken vapor seal. Hangers, supports, anchors, etc., that are secured directly to cold surfaces must be adequately insulated and vapor sealed to prevent condensation.

D. All surface finishes shall be extended to protect all surfaces, ends, and raw edges of insulation.

E. All insulation materials shall be installed in strict accordance with manufacturer's instructions, using recommended adhesives, mastics and coatings applied at specific coverage per gallon and temperature conditions.

F. Extend insulation without interruption through walls, floors and similar penetrations, except where otherwise indicated.

G. Maintain integrity of vapor-barrier jackets on insulation, and protect to prevent puncture or other damage.

H. Do not apply insulation to equipment, breechings, or stacks while hot.

I. Do not insulate boiler manholes, handholes, cleanouts, ASME stamp, and manufacturer's nameplate. Provide neatly beveled edge at interruptions of insulation.

J. Provide removable insulation sections to cover parts of equipment, which must be opened periodically for maintenance; include metal vessel covers, fasteners, flanges, frames and accessories.

K. Repair damaged sections of existing mechanical insulation, both previously damaged or damaged during this construction period. Use insulation of same thickness as existing insulation, install new jacket lapping and sealed over existing.

L. Insulation installer shall advise Contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.

**3.2 DUCT APPLICATION**

A. Rigid Insulation shall be secured to duct or sheet metal work by impaling over pin anchors space no more than 12” centers and secured with washers and clips. Pins shall be spot welded to the duct surface by a welding procedure which will not distort the sheet metal or burn through or mar interior finish of the duct plenums of casings but which develop full strength of the pin. Pin sizes and diameters shall be as recommended by manufacturer for type and thickness of insulation specified. Insulation on the underside of all horizontal or sloping ducts shall be additionally secured with 3M Insulation Adhesive 35.

B. Insulation shall be applied with all joints tightly butted and all points of impalement shall be pointed up and sealed with approved mastic before positioning clips. Where vapor barrier is specified, all joints, breaks, punctures and voids shall be filled with vapor barrier coating compound and covered with vapor seal material identical to the surrounding material.

C. All joints, duct attachments, and junctions (including those caused by ducts entering walls, projections such as hanger, etc.) shall be pointed and sealed with approved mastic and taped. Where no further finish is required over the vapor barrier, taping shall be carefully done to obtain a neat finished appearance.

D. Flexible Insulation shall be adhered to duct with fire-retardant adhesive in sufficient quantities to prevent sagging. Ducts with a width over 30” shall be further secured on the underside with mechanical fasteners on 12” maximum centers. Insulation shall be butted with facing overlapping all joints at least 2” and sealed with fire-retardant vapor barrier adhesive. Seal all breaks and punctures with vapor barrier tape and same type of fire retardant adhesive.

**3.3 MINERAL-FIBER PIPE INSULATION APPLICATION:**

A. Fittings, valves, and flange insulation shall be wrapped firmly under compression (minimum 2:1) to a thickness equal to the adjoining insulation, secured with No. 20 gauge galvanized annealed steel wire, and finished with a smoothing coat of mastic, Johns-Manville No. 375 Insulating and Finishing Cement or equal.

B. Cold Fittings, Valves, Flanges, etc., shall be additionally sealed with a layer of resin coated glass mesh, such as Johns-Manville Duramesh 207 glass cloth, embedded between two 1/16” thick coats of vapor barrier coating, Benjamin Foster 30-35 or equal. Lap the sealed glass cloth at least 2” on itself and the adjoining insulation.

C. Premolded Insulation Valve and Fitting Covers shall be installed by tack fastening, banding, or taping as required by manufacturer.

D. Expansion Joints: For expansion joints, a tube of pipe insulation shall be fabricated that will allow the expansion joint to move within the tube. The insulating tube shall be fastened at one end of the pipe or equipment and the other end shall be free to slide over the adjacent insulated piping. Provide an aluminum jacket over the insulated pipe to provide a smooth surface on which the insulated tube may slide.

E. Insulation Under Hangers: Pipe hangers shall encompass the insulation and shall have sheet metal saddles furnished by the Mechanical Contractor.

F. Inserts shall be installed at all hanger locations. Inserts between the pipe and pipe hangers shall consist of 13lb/cubic foot hydrous calcium silicate pipe insulation, or wood blocking, of thickness equal to the adjoining insulation and shall be provided with vapor barriers where required. Insulation inserts shall not be less than the following lengths:

| | | |
|---|---|---|
| 1. | ½" to 1-1/2" pipe size | 10" long |
| 2. | 3" to 6" pipe size | 12" long |
| 3. | 8" and larger pipe size | 16" long |

G. On all piping the full thickness of insulation and jacket shall run continuously under the sheet metal pipe saddle and through the pipe hanger (pipe hanger shall be large enough to permit full insulation thickness.)

**3.4 SEALING OF SLEEVES**

A. All sleeves for pipes, ductwork, etc., furnished under Division 23 of specifications, penetrating floors, fire and/or smoke walls and full height partitions, including chase walls, shall be sealed in accordance with the following:

1. All insulated services shall have the specified insulation terminated on either side of sleeve. Services which require a vapor barrier jacket shall have segment through sleeve insulated with calcium silicate having a minimum thickness same as specified for service. Vapor barrier jacket shall be uninterrupted. Entire void space between inside of sleeve and outside of duct, pipe, and/or calcium silicate insulation shall be packed with fiber insulation, conforming to HHI-521E Type 3 or HHI-558B Form A and having an ASTM fire class E-84 with fiber melt point in excess of 2000 degrees F., to a point 1/8 inch from ends of pipe sleeve. After void is packed with fiber insulation, services which are specified to be insulated shall have a section of insulation installed on each side of sleeve, insulation to be fitted tight to sleeve insulation. Balance of space in sleeve to be filled with nonhardening silicone conforming to TTS-00230 and of type which will allow 50 percent movement in one direction.
2. Contractor is herein given the option to provide Pipe Shield, Inc., fire rated wall and floor sleeves for insulated and noninsulated piping in lieu of sealing sleeves as outlined above. Shields shall be installed in strict accordance with manufacturer's recommendations.

**END OF SECTION 23 0700**

**SECTION 23 0900**
**CONTROLS & CONTROL SEQUENCES**

***(THIS TEMPERATURE CONTROL WORK WILL BE THE RESPONSIBILITY OF THE HVAC CONTRACTOR AND SHALL BE AN EXTENSION OF THE EXISTING DDC SYSTEM, & BE BY JOHNSON CONTROLS INC. CONTACT GREG HINTGEN AT 605-362-5315)***

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. THIS TEMPERATURE CONTROL WORK WILL BE THE RESPONSIBILITY OF THE HVAC CONTRACTOR.

B. ALL TEMPERATURE CONTROLS INSTALLED BY THIS CONTRACTOR SHALL BE FIELD INSTALLED. If there are any discrepancies, contact the engineer's office at least 7 days prior to bidding.

C. THIS SYSTEM SHALL BE AN EXTENSION OF THE EXISTING DDC CONTROLS. THIS NEW DDC SYSTEM MUST BE FULLY INTEGRATED INTO THE EXISTING DDC SYSTEM FOR COMPLETE OPERATOR ACCESS AND CONTROL THROUGH THE EXISTING COLOR GRAPHIC WORKSTATION. CUSTOM GRAPHICAL DISPLAYS FOR THE PROPOSED FLOOR PLAN & ALL PROPOSED EQUIPMENT SHALL BE GENERATED AT THE EXISTING WORKSTATION.

D. Exact thermostats or space sensors &/OR PROTECTIVE COVERS to be located in the space shall be SUBMITTED TO & APPROVED BY SICHMELLER ENGINEERING & OWNER. Digital display thermostats with adjustable ranges are to be used in all areas.

E. This Section includes controls & control sequences for HVAC systems, subsystems, and equipment.

F. The work in this section of the specification and the accompanying drawings consists of performing all labor and furnishing of all material and equipment necessary to install a complete Automatic Temperature Control System for the heating, ventilating, and air conditioning systems as indicated on drawings and specified herein, including minor items obviously necessary for complete and operating systems. Automatic Temperature Control System shall provide the "Sequence of Operation" as described in this section.

G. The control system shall consist of all room sensors, floor sensors, thermostats, valves, damper operators and other accessories to fulfill the intent of the specifications. The temperature control system shall be installed by trained mechanics regularly employed by the manufacturer of the temperature control system.

H. Each microprocessor based digital controller will be able to maintain its programmed memory in a non-volatile state during power failures without the use of batteries. All components and related temperature control components such as sensors, control valves, actuators, thermostats, control panels, etc. shall be manufactured by the same vendor.

### 1.3 QUALITY ASSURANCE

A. Agent Qualifications: An Independent Engineer Approved Temperature Control Contractor shall provide and install all temperature controls and control sequences as specified in this section.

### 1.4 PROJECT CONDITIONS

A. Partial Owner Occupancy: The Owner may occupy completed areas of the building before Substantial Completion. Cooperate with the trades and HVAC contractor to minimize conflicts with the Owner's operations.

### 1.5 BALANCING OF SYSTEMS

A. The Temperature Controls Contractor shall cooperate and work with the mechanical contractors to properly balance out all mechanical systems to obtain a satisfactory working system.

### 1.6 ADJUSTMENT AND CALIBRATION OF SYSTEMS

A. After the system is completely installed, the Temperature Controls Contractor with the presence of the mechanical engineer shall verify the various temperature control cycles as herein specified to the satisfaction of the engineer. The Temperature Controls Contractor shall submit direct to the engineer, a tabulation of all outdoor air, mixed air, discharge air, and all room temperatures for each unit. All thermostats and their thermometers shall be calibrated after installation.

### 1.7 SUBMITTALS

A. Shop drawings as specified in Section 230500 shall include the following:
   1. All control devices, valves, dampers and auxiliary devices to be used.
   2. Written descriptions and diagrams to describe the operational sequences.
   3. Room thermostat schedule.

### 1.8 CONTROLLERS & WEB-ACCESSED SYSTEM WITH CUSTOM COLOR GRAPHICS

A. Provide BACnet Controllers that are BACnet Testing Laboratory Listed. Network communication protocol used throughout entire DDC system shall be native BACnet Communication certified by the BTL open to Owner and available to other companies for use in making future modifications to DDC system.

B. Unless otherwise specified, all equipment described below shall be controlled and monitored via a Web-accessed system. The Web-accessed system shall allow for any owner's designated personnel to change schedules and setpoints through a PC user on the Local Area Network or remotely via the Internet. This system shall provide complete custom color graphics and password protection. This system shall allow for remote monitoring, control, and troubleshooting via the Internet.

C. Custom Graphics of Floor Plan: Display the following data:
   1. Equipment Designation/Label.
   2. Outside-Air Temperature Indication.
   3. Cooling or Heating/Economizer System Mode Indication.
   4. Zone temperature indication and setpoints.
   5. Alarms (as recommended by T.C.C.).

## PART 2 - CONTROL SEQUENCES

### 2.1 EXISTING COOLING ONLY PACKAGED ROOFTOP UNIT FOR VAV APPLICATION (EXG RTU-1)

A. The existing operating sequences for the existing Rooftop Units (RTU's) shall be maintained and utilized, except for modifications necessary for operations described in this section.

B. New smoke detector shutdowns installed by EC, signals alarm, stops fans, and closes smoke dampers when products of combustion are detected in airstream.

C. Operator's Workstation shall display the following:
   1. Equipment Designation/Label.
   2. System occupied/unoccupied mode.
   3. Room/Area Served.
   4. Room/Area Temperature.
   5. Room/Area Temperature Setpoint, Occupied.
   6. Room/Area Temperature Setpoint, Unoccupied.
   7. Building Pressure Sensor Indication and Location.
   8. System on-off indication.
   9. Return air damper position.
   10. Return Air relative humidity indication.

11. Return Air relative humidity setpoint.
12. Outside Air Damper Position.
13. Outside Air Temperature and Relative Humidity.
14. Mixed-air temperature indication.
15. Mixed-air temperature set-point.
16. Economizer Mixed Air Temperature Set-Point.
17. Economizer Status.
18. Supply Fan Status.
19. Supply Fan On-Off Command.
20. Supply Fan High Static Shutdown.
21. Return Fan Status
22. Return Fan On-Off Command
23. Supply Air Discharge Air-Temperature Indication.
24. Supply Air Discharge Air-Temperature Set-Point.
25. Supply Air Discharge Relative Humidity Indication.
26. Each Compressor Stage on-off indication.
27. Alarm Status (alarms as recommended by the T.C.C.).

## 2.2 VARIABLE AIR VOLUME (VAV's) TERMINAL UNIT CONTROL

A. VAV UNITS WITH HYDRONIC CONTROLS
   1. The VAVs will be controlled by the space temperature sensor to vary the primary air flow to the space to provide cooling or heating whenever the air handling unit is operational. On a call for cooling in the space, the primary damper will be modulated open beyond the minimum position to meet the cooling demand. On a call for heating in the space the primary air damper will be modulated to the heating position (adj.) as scheduled and the HW 2-way modulating normally open control valve will modulate open as necessary (0-100%) to provide heat to the space. 2-way valve normal (fail) to open position.
   2. All VAV Units shall operate in either the occupied or unoccupied mode and the space sensor with adjustable setpoint shall have an over-ride button on the face to return the terminal unit to its occupied mode of operation if the terminal unit is in "Unoccupied" mode.

B. Operator's Workstation shall display the following:
   1. Equipment Designation/Label.
   2. Room/area served.
   3. Room occupied/unoccupied.
   4. Room temperature.
   5. Room temperature set point, occupied.
   6. Room temperature set point, unoccupied.
   7. Actual Air Temperature Delivered to the VAV.
   8. Mode indication, heating/cooling/satisfied.
   9. Entering Hot Water Temperature
   10. 2-way Modulating hot water valve position as percent open.
   11. Air-damper position as percent open
   12. Supply airflow rate, target.
   13. Supply airflow rate, actual.
   14. VAV Discharge Air Temperature.
   15. Alarm Status (Alarms as recommended by T.C.C.).

## 2.3 RELOCATED RADIANT CEILING PANEL CONTROL

A. Where radiation is being used as supplemental heat, radiation shall be the first stage of heat for that zone with VAV reheat as the second stage.

B. The radiation will be controlled by the space temperature sensor. On a call for heat, the electric heat shall be enabled as necessary to meet the heating demand.

C. The controller monitors the room temperature sensor and enables the panel to maintain the space temperature at occupied set point.

1. Operator Workstation: Display the following data:
   a. Equipment Designation
   b. Room/area served.
   c. Room occupied/unoccupied.
   d. Room temperature.
   e. Room temperature set point, occupied.
   f. Room temperature set point, unoccupied.
   g. Electric Radiant Ceiling Panel enable status.

D. Alarm Status (alarms as recommended by T.C.C.).

**2.4 EXHAUST FAN CONTROL (EF-X)**

A. The existing operating sequences for the existing exhaust fans (EF's) shall be maintained and utilized, except for modifications necessary for operations described in this section.

B. Add BAS control to the existing exhaust fans listed blow.

C. EXG EF-7 –Mens 136, and Lockers/Tool Storage 137 Exhaust – shall operate during occupied hours as determined by the BAS System.
   1. D.D.C. controls shall prevent fan operation during Unoccupied Operation (as determined by the BAS).

D. EXG EF-8 – Unisex 113, Janitor E133 Exhaust – shall operate during occupied hours as determined by the BAS System.
   1. D.D.C. controls shall prevent fan operation during Unoccupied Operation (as determined by the BAS).

E. EXG EF-9 – Womens 140, Existing Office Exhaust – shall operate during occupied hours as determined by the BAS System.
   1. D.D.C. controls shall prevent fan operation during Unoccupied Operation (as determined by the BAS).

2.5 TRAINING

A. The Temperature Control Contractor shall provide (8) hours of training to the owner's representative.

**2.6 WARRANTY**

A. The entire control system shall be warranted for a period of 1 year from the date of beneficial use of the system.

**PART 3 - PRODUCTS**

1. N/A.

**PART 4 - EXECUTION**

**4.1 INSTALLATION**

A. All devices in mechanical rooms shall be panel mounted whenever possible. Wiring to remote mounted devices in mechanical rooms and inaccessible spaces shall be run in conduit. Wiring in accessible ceilings may be run with plenum rated cable providing it is securely fastened to the structural members at 4' intervals. In general, all wiring in conjunction with the automatic temperature control system shall be furnished by the Temperature Control Contractor under this section of the specifications in accordance with Division 26 of the specifications.

B. All automatic valves shall be furnished by the Temperature Control Contractor and installed under his supervision by the Heating Contractor. All automatic dampers, not furnished with the equipment, shall be furnished by the Temperature Control Contractor and installed under his supervision by the Sheet Metal Contractor.

C. **Room thermostats and remote sensors shall be wall mounted type and shall be mounted to match installation height of adjacent switches/sensors by EC, or where there are no adjacent switches/sensors, 46" on center above finished floor. Coordinate mounting**

**location with EC to locate t-stats/sensors and wall switches. Thermostats and sensors shall not be mounted on outside walls.**

### 4.2 PROJECT COMPLETION AND ACCEPTANCE

A. Upon completion of this project, it will be this Contractors responsibility to insure that the control system is functioning properly. The Contractor shall also insure that the control diagrams for the project are brought up to date and that they reflect the control system “as built”. These control diagrams and screen shots of the various screens of the color graphics system shall be included in the Operation and Maintenance Manuals, which shall be turned over to the Owner following the acceptance of the above procedure by the A/E.

### 4.3 ON-SITE ASSISTANCE

A. **ON-SITE Adjustments: Within one year of date of Substantial Completion, provide 4 hours EVERY OTHER MONTH to adjust and calibrate components and to assist Owner's personnel in making program changes and in adjusting sensors and controls to suit actual conditions and improve efficiency. Certain off-site adjustments may be acceptable if owner and engineer approved.**

**END OF SECTION 23 0900**

# SECTION 23 2113
# HYDRONIC PIPING SYSTEMS

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. The work in this specification and the accompanying drawings consists of performing all labor and furnishing of all material and equipment necessary to install complete systems listed below, including minor items obviously necessary for complete and operating systems. Piping materials and equipment specified in this Section include the following:
   1. All new hot water hydronic piping systems
   2. Pipes, fittings, and specialties.
   3. Special-duty valves.
   4. Meters and gages.
   5. Hydronic specialties.

B. See Division 23 Section "Basic HVAC Materials and Methods" for general piping installation requirements.

C. Also included is the work involved to remove existing associated equipment, remodeling of existing systems, including connections between new and existing systems.

### 1.3 SUBMITTALS

A. Shop Drawings: Shop drawings as specified in Section 230500 shall include the following:
   1. Hydronic Specialties
   2. Hot Water Heating Hydronic Pipe, Valves, and Fittings
   3. Flow Control and Strainer Valves
   4. Aluminum Safe Propylene Glycol to Match Existing – 30% Solution
   5. Heating Water Glycol Solution Analysis & Water-Treatment Program: Independent analysis of proposed and existing heating water solutions before and after work is complete to confirm proper glycol % and treatment. If solution analysis is not satisfactory, make adjustments as recommended by glycol supplier.

B. Product Data: For each type of special-duty valve indicated. Include flow and pressure drop curves based on manufacturer's testing for diverting fittings, calibrated balancing valves, and automatic flow-control valves.

C. Shop Drawings: Detail fabrication of pipe anchors, hangers, special pipe support assemblies, alignment guides, expansion joints and loops, and their attachment to the building structure.

D. Detail location of anchors, alignment guides, and expansion joints and loops.

E. Field quality-control test reports.

F. Operation and maintenance data.

### 1.4 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work shall be as specified in Section 23 0510.

### 1.5 QUALITY ASSURANCE

A. Welding: Qualify processes and operators according to the ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

B. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.

C. Uponor PEX-a tube and fitting systems must be installed by a trained installer. Installer must be able to provide verification from the manufacturer that the training has been completed.

### 1.6 COORDINATION

A. Coordinate pipe sleeve installations for foundation wall penetrations.

B. Coordinate layout and installation of piping with equipment and with other installations.

C. Coordinate pipe fitting pressure classes with products specified in related Sections.

D. Coordinate with requirements for firestopping for fire and smoke wall and floor assemblies.

**PART 2 - PRODUCTS**

**2.1 PIPES, TUBES, AND FITTINGS**

A. Copper Tube and Fittings:
   1. Drawn-Temper Copper Tubing: ASTM B 88, Type L.
   2. Annealed-Temper Copper Tubing: ASTM B 88, Type K.
   3. Wrought-Copper Fittings: ASME B16.22.
   4. Wrought-Copper Unions: ASME B16.22.
   5. Solder Filler Metals: ASTM B 32, 95-5 tin antimony.
   6. At the contractor's option, Nibco Press System or Viega may be used on domestic or hydronic water in lieu of soldered copper fittings. Fittings shall be suitable for working pressures to 200 psig CWP and maximum operating temperatures to +230 degrees F. The fitting manufacturer's factory trained representative shall provide on-site training for contractor's field personnel in the use of tools, marking and preparation of pipe, and installation of products. The representative shall periodically visit the job site and review contractor's installation and verify the correct procedures are being followed.

B. Steel Pipe and Fittings:
   1. Steel Pipe, NPS 2 and Smaller: ASTM A 53, Type S (seamless), Grade A, Schedule 40, black steel, plain ends.
   2. Steel Pipe, NPS 2-1/2 through NPS 12: ASTM A 53, Type E (electric-resistance welded), Grade A, Schedule 40, black steel, plain ends.
   3. Steel Pipe Nipples: ASTM A 733, made of ASTM A 53, Schedule 40, black steel; seamless for NPS 2 and smaller and electric-resistance welded for NPS 2-1/2 and larger.
   4. Cast-Iron Threaded Fittings: ASME B16.4; Classes 125 and 250.
   5. Malleable-Iron Threaded Fittings: ASME B16.3, Classes 150 and 300.
   6. Malleable-Iron Unions: ASME B16.39; Classes 150, 250, and 300.
   7. Cast-Iron Pipe Flanges and Flanged Fittings: ASME B16.1, 125, and 250; raised ground face, and bolt holes spot faced.
   8. Wrought-Steel Fittings: ASTM A 234 (ASTM A 234M), Standard Weight.
   9. Wrought-Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
      a. Material Group: 1.1.
      b. End Connections: Butt welding.
      c. Facings: Raised face.
   10. Grooved Mechanical-Joint Fittings: ASTM A 536, Grade 65-45-12 ductile iron; ASTM A 47, Grade 32510 malleable iron; ASTM A 53, Type F, E, or S, Grade B fabricated steel; or ASTM A 106, Grade B steel fittings with grooves or shoulders designed to accept grooved end couplings.
   11. Grooved Mechanical-Joint Couplings: Ductile- or malleable-iron housing and synthetic rubber gasket of central cavity pressure-responsive design; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.
   12. Spherical, Rubber, Flexible Connectors: Fiber-reinforced rubber body, steel flanges drilled to align with Classes 150 and 300 steel flanges; operating temperatures up to 220 deg. F and pressures up to 150 psig.
   13. Gasket Material: Thickness, material, and type suitable for fluid to be handled; and design temperatures and pressures.

C. Polyethylene PEX Pipe and Fittings:
   1. 2" and smaller Cross linked Polyethylene Uponor PEX a Pipe: ASTM 877, SDR 9 with oxygen diffusion penetration per DIN 4726. Fittings consisting of Engineered polymer ASTM F 1960 Cold expansion fitting with reinforcing ring. Two piece compression fitting ASTM 877 with cold expansion fitting with reinforcing ring.
   2. Groove Fittings for PEX Tube: One-piece brass F1960 cold-expansion fitting and groove fitting CSAB242-05.

**2.2 VALVES**

A. General-Duty Valves, NPS 2 and Smaller: Bronze body, ball type, threaded ends, unless otherwise indicated. Valve pressure and temperature ratings not less than indicated and as required for system pressures and temperatures. Valve size shall be the same size as

upstream pipe, unless otherwise indicated. Quarter-turn lever handle valve actuators. Extended valve stems on insulated valves.

B. Safety Valves: Diaphragm-operated, bronze or brass body with brass and rubber, wetted, internal working parts; shall suit system pressure and heat capacity and shall comply with the ASME Boiler and Pressure Vessel Code, Section IV.

C. Pump Discharge Valves: 175-psig maximum working pressure, 250 deg F maximum operating temperature, cast-iron or ductile iron body, replaceable bronze disc with EPDM seat insert, bronze seat, stainless steel stem and spring, and “Teflon” packing. Valves shall have NPT, grooved or flanged connections and straight or angle pattern. Features shall include non-slam check valve with spring-loaded weighted disc, pressure taps, and calibrated adjustment feature to permit regulation of pump discharge flow, shutoff and valve design to permit repacking under full system pressure.

## 2.3 METERS AND GAGES

A. Liquid-In-Glass Thermometers
   1. Description: ASTM E 1.
   2. Range: Temperature range of 40 to 240 deg F, with 2-degree scale divisions (minus 18 to plus 70 deg C, with 1-degree scale divisions). Accuracy shall be plus or minus 1 percent of range span or plus or minus one scale division to maximum of 1.5 percent of range span.
   3. Case: Die cast and aluminum finished in baked-epoxy enamel, glass front, spring secured, 9 inches long.
   4. Adjustable Joint: Finish to match case, 180-degree adjustment in vertical plane, 360-degree adjustment in horizontal plane, with locking device.
   5. Tube: Red or blue reading, organic-liquid filled with magnifying lens.
   6. Scale: Satin-faced nonreflective aluminum with permanently etched markings.
   7. Stem: Copper-plated steel, aluminum, or brass for separable socket; of length to suit installation.

B. Bimetal Dial Thermometers
   1. ASME B40.3; direct-mounting, universal-angle dial type.
   2. Case: Stainless steel with 5-inch diameter lens.
   3. Adjustable Joint: Finish to match case, 180-degree adjustment in vertical plane, 360-degree adjustment in horizontal plane, with locking device.
   4. Element: Bimetal coil.
   5. Scale: Satin-faced nonreflective aluminum with permanently etched markings.
   6. Stem: Stainless steel for separable socket, of length to suit installation.

C. Thermometer Wells
   1. Description: Fitting with protective well for installation in threaded pipe fitting to hold test thermometer.
   2. Material: Brass, for use in copper piping.
   3. Material: Stainless steel, for use in steel piping.
   4. Extension-Neck Length: Nominal thickness of 2 inches, but not less than thickness of insulation. Omit extension neck for wells for piping not insulated.
   5. Insertion Length: To extend 2 inches into pipe.
   6. Cap: Threaded, with chain permanently fastened to socket.

D. Pressure Gages
   1. Description: ASME B40.1, phosphor-bronze bourdon-tube type with bottom connection; dry type, unless liquid-filled-case type is indicated.
   2. Case: Drawn steel, brass, or aluminum with 4 ½” diameter, glass lens.
   3. Connector: Brass, NPS ¼.
   4. Scale: White-coated aluminum with permanently etched markings
   5. Accuracy: Grade A, plus or minimum 1 percent of middle 50 percent of scale.
   6. Range: Comply with the following:
      a. Fluids under Pressure: Two times the operating pressure.

E. Pressure Gage Fittings
   1. Hydronic Indicator: Brass body with four inlets and valves by Flow Conditioning Corp. (314) 878-7898 or equal.

2. Valves: NPS ¼ brass or stainless-steel needle type
3. Syphons: NPS ¼ coil of brass tubing with threaded ends.
4. Snubbers: ASME B40.5, NPS ¼ brass bushing with corrosion-resistant porous-metal disc of material suitable for system fluid and working pressure.

F. Test Plugs
1. Description: Nickel-plated, brass –body test plug in NPS ½ fitting.
2. Body: Length as required to extend beyond insulation.
3. Pressure Rating: 500 psig minimum.
4. Core Inserts: Two self-sealing valves, suitable for inserting 1/8-inch OD probe from dial-type thermometer or pressure gage.
5. Core Material for Air, Water, and Gas: 20 to 200 deg F (Minus 7 to plus 93 deg C), chlorosulfonated polyethylene synthetic rubber.
6. Test-Plug Cap: Gasketed and threaded cap, with retention chain or strap.
7. Test Kit: Pressure gage and adapted with probe, two bimetal dial thermometers, and carrying case.

G. Pressure Gage and Thermometer Ranges: Approximately two times the system's operating conditions.

## 2.4 HYDRONIC SPECIALTIES

A. Manual Air Vent: Bronze body and nonferrous internal parts; 150-psig working pressure; 225 deg F operating temperature; manually operated 1/2" full port ball valve with gooseneck down; with NPS 1/2 discharge connection and NPS 1/2 inlet connection, and chained cap hose connection.

B. Automatic Air Vent: Designed to vent automatically with float principle; bronze body and nonferrous internal parts; 150-psig working pressure; 240 deg F operating temperature; with NPS 1/4 discharge connection and NPS 1/2 inlet connection.

C. Y-Pattern Strainers: 125-psig working pressure; cast-iron body (ASTM A 126, Class B), flanged ends for NPS 2-1/2 and larger, threaded connections for NPS 2 and smaller, bolted cover, perforated stainless-steel basket, and bottom drain connection.

D. Aluminum & Stainless Steel Safe Propylene Glycol (contractor to confirm existing glycol manufacturer and type): Industrially inhibited aluminum and stainless steel safe propylene glycol-based heat transfer fluid, RhoGard with Inhibitor and Deionized Water to match existing, with the following features:
1. Industrially inhibited propylene glycol (phosphate-based).
2. Dyed (bright yellow) to facilitate leak detection.
3. Easily analyzed for glycol concentration and inhibitor level.
4. For systems containing more than 250 gallons of fluid, annual analysis must be provided free of charge by the fluid manufacturer.
5. Fluid must pass ASTM D1384 (less than 0.5 mils penetration per year for all systems metals).
6. Reserve alkalinity of the fluid must be at least 15 to provide long-term resistance to acidic pH.
7. Glycol shall be premixed with water from manufacturer/supplier.

## 2.5 FLOW CONTROL AND STRAINER VALVES

A. Furnish and install pressure-compensating flow control valves in a union (or flanges)/flow-control-device/ball-valve configuration. One piece configuration for valves 3" and smaller. Valves are to be installed where indicated on plans and in hot water heating piping systems, serving hot water coils. Flow control valves will be installed in the return line. All valves shall have access capability to allow field-exchange of internal components without removing valve body from pipeline. All valves shall be permanently marked to show direction of flow, flow rate, and pressure range.

B. Furnish and install an in-line strainer for each flow control valve furnished that is 2" and smaller. Strainer to be in a union/strainer/ball valve configuration.

C. Furnish and install as part of each flow control valve and strainer valve a Pete's plug ¼" MPT fitting to receive either a temperature or pressure probe. Fitting shall be solid brass.

D. Flow control valve shall be Autoflow FV Series, Griswold Controls, or approved equal.

E. Strainer valves shall be Autoflow SV Series, Griswold Controls, or approved equal.

F. If any flow controls are found to be installed backwards when balancing is performed, entire autoflow valve shall be replaced by this contractor.

**PART 3 - EXECUTION**

**3.1 PIPING APPLICATIONS**

A. Coordinate applications below with materials specified in this Section. Pipe sizes at which joining methods change are between NPS 2 and NPS 2-1/2 (DN 50 and DN 65). Adjust this change point to suit personal preference. Soldered joints for pipes larger than NPS 2 (DN 50) may not meet system pressures.

B. Chilled Water and Hot Water Heat Piping Systems: Type L drawn-temper copper tubing with soldered joints.

C. Chilled Water and Hot Water Heat Piping Systems: Schedule 40 steel pipe with threaded joints and fittings for 2 inch and smaller, and with welded joints and fittings for 2-1/2 inch and larger.

D. Chilled Water and Hot Water Heat Piping Systems: Schedule 40 steel pipe with mechanical couplings.

E. Chilled Water and Hot Water Heat Piping Systems: Type L drawn-temper copper tubing with mechanical couplings.

F. Chilled Water and Hot Water Piping Systems: Uponor SDR 9 PEX-A tubing with Uponor one-piece cold expansion F1960 fittings. Crimp ring fittings shall not be acceptable. Uponor fittings must be used with Uponor pipe and must meet all requirements to achieve full warranty coverage.

**3.2 VALVE APPLICATIONS**

A. Unless otherwise indicated, use the following general-duty valve types for applications indicated:
   1. Shutoff Duty: Ball, and butterfly valves.
   2. Throttling Duty: Ball, and butterfly valves.

B. Install shutoff duty valves at each branch connection to supply mains, at supply connection to each piece of equipment, and elsewhere as indicated.

C. Install throttling duty valves at each branch connection to return mains, at return connections to each piece of equipment, and elsewhere as indicated.

D. Install calibrated plug or automatic flow control valves on the outlet of each heating or cooling element and elsewhere as indicated to facilitate system balancing.

E. Install drain valves at low points in mains, risers, branch lines, and elsewhere as required for system drainage.

F. Install check valves at each pump discharge and elsewhere as required to control flow direction.

G. Install safety relief valves on hot-water generators and elsewhere as required by the ASME Boiler and Pressure Vessel Code. Install safety-valve discharge piping, without valves, to floor. Comply with the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, for installation requirements.

**3.3 METER AND GAGE INSTALLATION**

A. Calibrate and install meters, gages, and accessories according to manufacturer's written instructions for applications where used.

B. Thermometer Installation
   1. Install thermometers and adjust vertical and tilted positions.
   2. Install in the following locations:
      a. As shown on piping details of plans.
   3. Install remote–reading dial thermometers in control panels with tubing connecting panel and thermometer bulb supported to prevent kinks. Use minimum tubing length.
   4. Install thermometer wells in vertical position in piping tees where test thermometers are indicated.
      a. Install with stem extending a minimum of 2 inches into fluid.
      b. Fill wells with oil or graphite and secure caps.

C. Pressure Gage Installation
   1. Install pressure gages in piping tees with pressure-gage valve located on pipe at most readable position.
   2. Install dry-type pressure gages in the following locations:

a. As shown on piping details of plans.

3. Install liquid-filled-type pressure gages at suction and discharge of each pump.

D. Install pressure-gage needle valve and snubber in piping to pressure gages.

## 3.4 HYDRONIC PIPING INSTALLATIONS

A. Install piping according to Section 23 0510 “Basic Mechanical Materials and Methods.”

B. Locate groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

C. Install drains, consisting of a tee fitting, NPS 3/4 ball valve, and short NPS 3/4 threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

D. Install piping at a uniform grade of 0.2 percent upward in direction of flow. Install condensate piping at a uniform grade of ¼ inch per foot downward in direction of flow.

E. Reduce pipe sizes using eccentric reducer fitting installed with level side up.

F. Install branch connections to mains using tee fittings in main pipe, with the takeoff coming out the bottom of the main pipe. For up-feed risers, install the takeoff coming out the top of the main pipe.

G. Install unions in pipes 2-inch NPS (DN50) and smaller, adjacent to each valve, at final connections of each piece of equipment, and elsewhere as indicated. Unions are not required at flanged connections.

H. Install flanges on valves, apparatus, and equipment having 2-1/2-inch NPS (DN65) and larger connections.

I. Install flexible connectors at inlet and discharge connections to pumps (except in-line pumps) and other vibration-producing equipment.

J. Install strainers on supply side of each control valve, pressure-reducing valve, solenoid valve, in-line pump, and elsewhere as indicated. Install NPS 3/4 nipple and ball valve in blowdown connection of strainers NPS 2 and larger.

K. Anchor piping for proper direction of expansion and contraction.

L. Uponor PEX-a piping with F1960 expandable fittings shall be installed in accordance with Uponor’s Hydronic Piping Design Assistance Manual to ensure a 25 year system warranty.

M. Install in floor heat tubing as shown on plans and per manufacturer’s requirements.

## 3.5 HANGERS AND SUPPORTS

A. Piping support must account for expansion and contraction, vibration, and dead load of piping and its contents, and seismic bracing requirements.

B. Hanger, support, and anchor devices shall comply with requirements below for maximum spacing of supports. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet long.
2. Adjustable roller hangers and spring hangers for individual horizontal piping 20 feet or longer.
3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet or longer, supported on a trapeze.
4. Spring hangers to support vertical runs.
5. Install hangers for steel piping with the following maximum spacing and minimum rod sizes:
   a. NPS 3/4: Maximum span, 7 feet; minimum rod size, 1/4 inch.
   b. NPS 1: Maximum span, 7 feet; minimum rod size, 1/4 inch.
   c. NPS 1-1/2: Maximum span, 9 feet; minimum rod size, 3/8 inch.
   d. NPS 2: Maximum span, 10 feet; minimum rod size, 3/8 inch.
   e. NPS 2-1/2: Maximum span, 11 feet; minimum rod size, 3/8 inch.
   f. NPS 3: Maximum span, 12 feet; minimum rod size, 3/8 inch.
6. Install hangers for drawn-temper copper piping with the following maximum spacing and minimum rod sizes:
   a. NPS 3/4: Maximum span, 5 feet; minimum rod size, 1/4 inch.
   b. NPS 1: Maximum span, 6 feet; minimum rod size, 1/4 inch.
   c. NPS 1-1/2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
   d. NPS 2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
   e. NPS 2-1/2: Maximum span, 9 feet; minimum rod size, 3/8 inch.
   f. NPS 3: Maximum span, 10 feet; minimum rod size, 3/8 inch.

7. Support vertical runs at roof, at each floor, and at 10-foot intervals between floors.
8. PEX-a Piping Hanger Spacing: Install hangers for PEX-a piping with the following maximum spacing:
   a. 1 inch and below: Maximum span, 32 inches.
   b. 1-1/2 inch and above: Maximum span, 48 inches.
9. PEX-a Piping Hanger Spacing with PEX-a Support Channel: Install hangers for PEX-a piping with horizontal support channel in accordance with local jurisdiction and manufacturer's recommendations, with the following maximum spacing:
   a. Maximum span, 8 feet.
10. PEX-a Riser Supports: Install CTS riser clamps at the base of each floor and at the top of every other floor. Install mid-story guides between each floor.
11. Pipe Joint Connections: Install per manufacturer's recommendations. Use manufacturer-recommended cold-expansion tool for F1960 connections.

**3.6 PIPE JOINT CONSTRUCTION**

A. Refer to Division 23 Section "Basic HVAC Materials and Methods" for joint construction requirements for soldered and brazed joints in copper tubing; threaded, welded, and flanged joints in steel piping.
B. Mechanical Joints: Assemble joints according to fitting manufacturer’s written instructions.

**3.7 HYDRONIC SPECIALTIES INSTALLATION**

A. Install manual (not automatic) full port ball valve operated air vents at high points in piping, at heat-transfer coils, and elsewhere as required for system air venting. Install ball isolation valves with chained caps.
   1. Existing hot water heating system being tied into:
      a. Prior to any proposed work, the plumbing/hydronics contractor shall provide a complete analysis of the existing hot water heating system to determine exact glycol and composition, etc. Submit analysis/recommendations to Sichmeller engineering & Owner. Owner to provide any recommended adjustments to existing.
      b. The plumbing contractor shall be responsible for draining and storing the existing glycol solution.
      c. The plumbing contractor shall be responsible for cleaning and flushing the new hot water heating system piping. The existing hot water heating system shall be drained as necessary for proposed tie ins and filled with new glycol solution, no cleaning and flushing on existing piping.
      d. Upon completion of the proposed work & system flushing, the existing glycol solution shall be pumped back in along with the owner provided adjustments and proposed system solution.
      e. After proposed work is complete, the plumbing/hydronics contractor is to provide a complete analysis of the hot water heating system to confirm proper glycol % and treatment. Submit analysis/recommendations to Sichmeller engineering & owner. If solution analysis indicates solution is not satisfactory, this contractor to make adjustments as recommended by glycol suppler & retest until analysis is satisfactory.
   2. Install automatic air vents in mechanical equipment rooms only at high points of system piping, at heat-transfer coils, and elsewhere as required for system air venting.

**3.8 TERMINAL EQUIPMENT CONNECTIONS**

A. Size for supply and return piping connections shall be same as for equipment connections.
B. Install control valves in accessible locations close to connected equipment.
C. Install flow control valves and strainer valves as shown on piping details.

**3.9 FIELD QUALITY CONTROL**

A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.
B. Prepare hydronic piping and perform testing according to ASME B31.9. Prepare written report of testing.

**3.10 ADJUSTING AND CLEANING**

A. Consult with and comply with boiler manufacturer’s recommendations.

B. After completing systems installation, including outlet fittings and devices, inspect finish. Remove burrs, dirt, and construction debris, and repair damaged finishes including chips, scratches, and abrasions.
C. Flush hydronic piping systems with clean water. Remove and clean or replace strainer screens. After cleaning and flushing hydronic piping systems, but before balancing, remove disposable fine-mesh strainers in pump suction diffusers.
D. Preparation for testing: Prepare hydronic piping in accordance with ASME B 31.9.
E. Testing: Test hydronic piping as specified in ASME B 31.9 “Building Services Piping.”
F. System Cleaning:
    1. Fill the entire system with clean, fresh water and properly vent. Repair piping leaks as early in this procedure as they are discovered. Inspect existing piping system and notify engineer immediately for any leaks requiring repairs. With valves positioned by bypass the boiler and terminal equipment, start the pump to circulate water through the system. Check strainers at pumps and at terminal equipment (new and existing) frequently and clean as often as needed. If the water is extremely dirty or murky, flush continuously, using the system pump, until the water being flushed out of the pipe loop has become clear. To flush in this manner requires care to be certain that make-up water is being added fast enough to replace what is being flushed out. Accomplish this by opening the make-up water bypass valve around the automatic pressure reducer valve and adjust the manual valve so that the pump suction pressure gauge continues to indicate the same positive pressure that existed before the manual drain and make-up valves were opened. Continue for at least two hours. Once the water is clear and debris flushed out, stop the pump.
    2. To complete the cleaning, fill the system with fresh water, adding an aluminum-safe cleaning agent such as trisodium phosphate (TSP). Disconnect all power to the terminal units so that they will not operate while the system is being cleaned. Then circulate cleaning solution throughout the system, with boiler controls temporarily adjusted to raise the solution temperature to about 105 deg F to 110 deg F. Do not allow the temperature to rise above 110 deg F. Alternate operation of the primary and standby pumps and circulate the warm solution for several hours. Then turn off the boiler and pump, completely drain the system, and refill with fresh water. Repeat the cleaning process only if there is indication of foreign matter still in the system or if a test of the water indicated that it is slightly acid.
    3. Water should be slightly alkaline, with a pH no higher than 8.0 and no lower than 7.0.
    4. Add glycol to hydronic piping system to provide a total of 30% by volume.
G. Install laminated engraved placard near boilers with 1” engraved letters indicating glycol type & concentration.
H. Mark calibrated nameplates of pump discharge valves after hydronic system balancing has been completed, to permanently indicate final balanced position.
I. Chemical Treatment: Provide a water analysis prepared by chemical treatment supplier to determine type and level of chemicals required to prevent scale and corrosion. Perform treatment after completing system testing and retest as necessary. If solution analysis is not satisfactory, make adjustments as recommended by glycol supplier and retest as necessary until analysis is satisfactory.

**3.11 COMMISSIONING**

A. Fill system and perform initial chemical treatment.
B. Check expansion tanks to determine that they are not air bound and that system is completely full of water.
C. Perform these adjustments before operating the system:
    1. Open valves to fully open position. Close coil bypass valves.
    2. Check pump for proper direction of rotation.
    3. Set automatic fill valves for required system pressure.
    4. Check air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
    5. Set temperature controls so all coils are calling for full flow.
    6. Check operation of automatic bypass valves.

7. Check and set operating temperatures of boilers, chillers, and cooling towers to design requirements.
8. Lubricate motors and bearings.

**3.12 MISCELLANEOUS CONNECTIONS**

A. Make all hydronic connections. This includes boiler connections, connections of heating coils to equipment supplied and/or mounted under HVAC Section. This includes piping, valves, strainers, air vents, thermometers, immersion bulbs, flow switches, drains, unions, etc.
B. Install all control valves supplied by Automatic Temperature Control Contractor.

**3.13 AUTOMATIC TEMPERATURE CONTROL**

A. Install the automatic temperature control dampers, air flow monitoring devices, openings for air flow switches, alarms and control devices as provided by the Automatic Temperature Control Contractor. These dampers and devices shall be installed under the direct supervision of the Section 23 0900, CONTROLS & CONTROL SEQUENCES Temperature Control Contractor and in strict accordance with the manufacturer's recommendations.

**END OF SECTION 23 2113**

**SECTION 23 7000**
**VENTILATION AND AIR CONDITIONING**

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. The work in this section of the specification and the accompanying drawings consists of performing all labor and furnishing of all material and equipment necessary to install air handling systems as indicated on drawings and specified herein, including minor items obviously necessary for complete and operating systems.

B. Also included is the work involved to remove existing associated equipment, remodeling of existing systems, including connections between new and existing systems.

### 1.3 SUBMITTALS

A. Shop Drawings: Shop drawings as specified in Section 23 0500 shall include the following:
   1. Terminal VAV Units
   2. Registers, Grilles, Diffusers
   3. Smoke Dampers
   4. Filter List & Filters – At the end of the project the HVAC contractor to provide an additional set of disposable filters.
   5. Spare Parts

## PART 2 - PRODUCTS

### 2.1 INTERNAL DUCT INSULATION

A. See HVAC Systems Insulation.

B. All internal duct insulation shall be 1/2” as specified duct liner with black fire resistant skin surface. Liner shall have an overall density of 2.0 lbs./cu. ft. Installation shall meet NFPA 90A and 90B fire resistant requirements.

C. Apply the insulation in fabricated pieces sized to the interior duct surfaces with the black coated or denser surface exposed to the air stream. Insulation shall be firmly held in place with B.F. 85-10 or 85-60, C.M.C. 17-477, 1-C 225 fire resistant adhesive covering no less than 100% of the duct surface. Further secure insulation on the top and sides of horizontal ducts and all sides of vertical ducts with Omark or KSM capacitor discharge studs and caps on 15” centers. Secure transverse edges with capacitor discharge studs and caps on 6“ centers.

D. Duct sizes indicated on the drawings are the internal dimensions. Where insulation is applied to the inside of ducts, the metal size of the duct shall be increased to result in internal dimensions equal to that shown on the drawings.

### 2.2 SHEET METAL WORK – LOW & MEDIUM PRESSURE SYSTEMS

A. See plans and insulation specifications for exposed ducts to be paint grip.

B. Unless otherwise specified, construct ducts from galvanized iron fabricated and erected in a workmanlike manner. Fabricate plenums and special fittings, as shown on the Drawings, or as required. Access doors to plenums shall be double wall construction with heavy hardware. All ductwork shall be of the gauges hereinafter specified and constructed to the best grade Inland, U.S. Steel, United Sheet Metal or equal brands, heavily galvanized.

C. Metal gauges for low and medium pressure duct systems shall be of metal gauges and reinforcing as recommended by SMACNA or as follows:

| Max. Dimension of Rect. Ducts or Dia. of Round Low Pressure Ducts | Galvanized Sheet Steel Gauge Number |
|---|---|
| Up thru 12” | 26 |

| | |
|---|---|
| Over 12” thru 30” | 24 |
| Over 30” thru 54” | 22 |
| Over 54” thru 84” | 20 |
| Over 84” | 18 |

| Maximum Dimension of Rectangular Ducts or Diameter of Round Medium Pressure Ducts | Galvanized Sheet Steel Gauge Number |
|---|---|
| Up thru 18” | 24 |
| Over 19” thru 48” | 22 |
| Over 49” thru 72” | 20 |
| Over 73” thru 96” | 18 |

D. Ductwork shall be constructed, braced, reinforced and sealed as recommended by ASHRAE and SMACNA. Low pressure ductwork shall be suitable for pressures up to 2 inch w.g. Medium pressure ductwork shall be suitable for pressures up to 3 inch w.g. All ductwork 18 inches and greater in width shall be cross-broken. See SMACNA requirements for proper sealing of ductwork. All supply air ductwork between VAV air handling units and VAV terminals shall be medium pressure construction.

E. Low pressure ductwork with the longest side 36" wide and over, or medium pressure ductwork shall be constructed using Ductmate 35/25 or equal slide on systems, per Ductmate Industries Installation Procedures and Duct Construction Standards, latest edition. The non-proprietary SMACNA T-22 Flanged Connection may be used as defined on Page 1-25 and 1-37, of the 1985 SMACNA Manual, First Edition. Ductmate 35/25 may be used for transverse joint construction, 35" wide and smaller. Ductmate 440 Butyl Gasket, or equal, shall be used between all rectangular transverse flanged duct connections, Ductmate's 440 Butyl Gasket, shall be used with the Ductmate Systems. For rectangular ductwork located outdoors, exposed to weather, construct ductwork per, 'Transverse Joints Rectangular' with using a continuous metal cleat on top joints of ducts for added weather protection. Slide on systems shall be Ductmate, Ward Industries, Inc., or equal.

F. No obstruction shall be permitted in the ductwork to retard the flow of air. If it is necessary to run a pipe or conduit through a duct, the duct size shall be increased to compensate for the obstruction.

G. Where space permits, duct turns shall be constructed with an inside radius equal to or greater than the duct width or duct turn vanes may be used. Where space does not permit duct turns as described above, duct turn vanes shall be used.

H. Where interior duct insulation is required, increase the duct size to maintain the free area shown on the Drawings.

I. Provide exterior insulated drip pans, 3 inches deep, under or adjacent to all roof and wall openings including but not limited to under all intake or relief hoods and louvers. Drip pans to be soldered watertight.

J. Power operated dampers not furnished as a component of the ventilating machines will be furnished under the Temperature Control Specifications. They shall be installed in the ductwork under this specification. Caulk around all sides of high efficiency damper frames.

K. Flexible connections shall be installed between suction and discharge openings in fan units and the ducts with which they are connected as shown on the Drawings, to prevent transmission of vibration noises. Material shall be watertight and fire retardant canvas weighing not less than 20 ounces per square yard, or shall be glass fabric on high temperature systems where fire hazard exists. Both materials shall be approved by Underwriter's Laboratories. The flexible material shall be furnished with all necessary angles, bolts, clips or other fasteners.

L. Furnish and install access panels in the ductwork adjacent to all motorized dampers, fire dampers, louvers, reheat coils, and equipment which may require servicing or cleaning. Panels

shall be tight fitting and shall be located so as to make them easily accessible. All panels installed in insulated ductwork shall be double wall, insulated type. Panels shall be Ruskin, Air Balance, Ventlok, ADCO, or equal.

M. Dynamic rated fire dampers shall have an 18 inch square access panel or an 18 inch long removable duct section shall be installed adjacent to dynamic rated fire dampers in addition to a smaller inspection access panel. The removable section shall be assembled using Ductmate or equal duct joints. The joint at the damper shall be assembled with plastic fastener clips. Ductwork 24 inches and wider shall have an 18 inch by 18 inch access door in lieu of removable section.

N. Ductwork installed above UL fire rated ceiling assemblies shall be installed in strict accordance with the provisions required by the UL Design Number designated in the Underwriters Laboratories Fire Resistance Directory.

O. All ductwork visible through the face of a register or grille shall be painted with a flat black paint.

P. All rigid and flexible ductwork materials installed shall have composite fire and smoke hazard ratings as tested by procedures ASTM 84, NFPA 255 and UL 723 not to exceed 25 Flame Spread and 50 Smoke Developed.

Q. Concealed low pressure round ductwork may be rigid spiral ductwork or snaplock type with adjustable elbows.

R. All exposed round ductwork and round ductwork to the inlet of VAV terminals shall be United, Semco, Norlock, Foremost or equal, rigid spiral duct and fittings.

S. All exposed ductwork to be PAINTGRIP and shall be United, Semco, Norlock, Foremost or equal, rigid spiral duct and fittings. Refer to architectural reflected ceiling plans.

T. Round ductwork shall be supported at 6 feet o.c. where building framing does not provide such support. Support shall be minimum 3/4 inch metal strap suspended from the roof or framing. Flexible duct shall not exceed 8 feet in length or pass through walls. Flexible round ductwork may only be used for final connections to supply registers and diffusers and shall not be used on return or exhaust ductwork.

**2.3 DUCT HANGERS AND SUPPORTS**

A. Securely attach all ductwork to the building construction in a manner to be free of vibration and swaying under all conditions of operation. Hanger attachments shall be appropriate for the building structure and shall be subject to the A/E's approval. Hang ducts from beams and joist whenever possible.

B. Ducts shall be substantially supported with hangers located according to SMACNA standards.

**2.4 DUCT INSTALLATION**

A. Duct sizes shown on the drawings are nominal inside dimensions. Where internal insulation is provided, duct sizes must be increased appropriately to maintain indicated inside dimensions.

B. All ductwork will be run substantially as shown on the plans with bends and curves. Changes in size or cross section shall be made with long tapers. The A/E reserves the right to slightly change the run of certain ducts without extra cost to the Owner, if necessary to avoid unforeseen structural or other interferences.

C. Where ducts run through bar joists or other ceiling spaces and structural, mechanical, or electrical interference is encountered, maintain same cross sectional area as indicated on plans with a maximum of 4-1/2 to 1 aspect ratio.

D. All openings in duct for grilles, registers, etc. shall be capped dust-tight with G.I. Metal caps during the construction period.

E. Round branch duct connections to rectangular mains shall be made with round manual balancing dampers meeting the following specifications: Dampers shall consist of a 20 ga. Galvanized steel; 3/8" square plated steel axles turning in acetal bearings. Damper shall include optional 1-1/2" standoff bracket (with extended pin) to accommodate for the thickness of external duct insulation. Dampers have quadrant operator and shall be suitable for pressures

to 1.0” w.g., velocities to 2000 f.p.m. and temperatures to 180 degrees F. Testing and ratings to be in accordance with AMCA Standard 500. Basis of design is Greenheck model MBDR-50.

F. Exhaust/relief air, and air intake ducts shall be equipped with 3” deep watertight pans to collect moisture and condensate. Seal all joints with sealant.

G. All changes in direction shall be made with curved elbows having a centerline radius equal to 1-1/2 times the duct width. Where space conditions prevent the use of curved elbows and/or where square turns are indicated, provide square turn elbows with turning vanes. Vanes may be either commercial type ducturns or equal, or shop fabricated to conform to SMACNA standards. Vanes shall be double thickness type pre-assembled on runners before installing in each elbow. Brace adequately and avoid rough edges to prevent objectionable noise.

## 2.5 ACCESS PANELS

A. Provide access panels to permit inspection and maintenance of all hot water coils, motorized volume dampers, smoke dampers, control equipment, and other equipment requiring maintenance. Panels shall be located in position dictated by the equipment such that maintenance may be performed. Panels shall not be located in top side of ducts.

B. Panels shall be attached to duct with zinc plated cam latches. 18” x 18” and smaller panels shall have a minimum of two (2) latches. Larger panels shall have a minimum of four (4) latches. Panel shall set in rigid frame with sponge rubber gasketing to prevent air leakage. Where ductwork is insulated, panels shall be of double wall construction with 1” rigid insulation fill.

C. Where duct size permits, access panels shall be a minimum 18” x 16” or 2” smaller than duct size, whichever is smaller.

## 2.6 SHUTOFF VAV/REHEAT TERMINALS

A. GENERAL

1. Furnish and install single duct, variable volume air distribution assemblies with hydronic reheat of the type, size, and performance shall be as tabulated in the schedule and on the drawings.
2. The assemblies shall be pressure independent and shall reset to any air flow between zero and the maximum cataloged air volume. At an inlet velocity of 2,000 fpm, the differential static pressure for any unit with attenuator section, sizes 4 through 16, shall not exceed 0.11" w.g.
3. Sound ratings of air distribution assemblies, shall not exceed 25 NC.
4. Performance shall be ARI Certified.
5. The air flow sensor shall be of a cross configuration located at the inlet of the assembly. The sensor shall have twelve total pressure sensing ports and a center averaging chamber designed to accurately average the flow across the inlet of the assembly. Sensor shall provide accuracy within 5% with a 90° sheet metal elbow directly at the inlet of the assembly. The air flow sensor shall amplify the sensed air flow signal.
6. The assembly casing shall be constructed of 22 gauge zinc coated steel, internally lined with 1/2 inch thick, dual density fiberglass insulation which complies with UL-181 and NFPA-90A. Any cut edges of fiberglass exposed to the airstream shall be coated with NFPA-90A approved sealant.
7. The primary air valve damper shall be heavy gauge metal, with peripheral gasket, pivoted in self-lubricating bearings. In the full closed position, air leakage past the closed damper shall not exceed 2% of the nominal catalog rating at 3" inlet static pressure, as rated by ARI Standard 880.

B. CONTROLS

1. The terminal unit controller shall be a dedicated, microprocessor-based, pressure independent VAV controller complete with electronic flow transducer. The controller shall be capable of stand-alone operation and have the ability to network with a building automation system, personal computer or portable operator interface device.

2. The electric actuator shall be 24 VAC bi-directional, direct coupled to the damper shaft. The actuator must be capable of operating in the stalled position without overheating or mechanical damage.
3. The terminal unit manufacturer shall provide a flow cross or two (2) pipe sensor suitable for interfacing with a differential pressure sensor.
4. The temperature control contractor shall furnish the terminal equipment controller, flow transducer, and electric actuator for installation on each terminal unit by the terminal unit manufacturer. The cost of factory mounting, wiring, enclosure to meet local code and any factory testing and programming of the terminal equipment controller shall be included by the terminal manufacturer.
5. All components shall be calibrated and pretested to ensure a fully functional unit.
6. The zone sensor shall be furnished by the Temperature Control Contractor and shall include temperature setpoint adjustment and access for connection of a hand-held operator terminal or portable computer.
7. The DDC control package shall be calibrated and factory set for the maximum and minimum flow rates as scheduled on the drawings.
8. The air terminal unit shall be designed, installed and field adjusted, if necessary, to maintain controlled pressure independent air flow.
9. All control components shall be mounted inside a protective metal enclosure.

C. WATER REHEAT COILS
1. Provide factory mounted hot water reheat coils as scheduled.
2. The coils shall be aluminum plate fin with copper tubes and sweat connections. Coil connections can be right hand or left hand and shall be coordinated with heating contractor. Control valves, automatic air vents and drain vents, shall be supplied and field installed by others.

D. Provide & install accessories as scheduled on the plans.

**2.7 SMOKE DAMPERS**

A. General Requirements: Label according to UL 555S by an NRTL.

B. Smoke Detector: Integral, factory wired for single-point connection.

C. Frame: Hat-shaped, 0.094-inch-thick, galvanized sheet steel, with welded interlocking, gusseted or mechanically attached corners and mounting flange.

D. Vertical blades are available for special applications.

E. Blades: Roll-formed, horizontal, interlocking, 0.034-inch-thick, galvanized sheet steel.

F. Leakage: Class I.

G. Rated pressure and velocity to exceed design airflow conditions.

H. Mounting Sleeve: Factory-installed, 0.039-inch-thick, galvanized sheet steel; length to suit wall or floor application.

I. Damper Motors: two-position action.

J. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors as required for the application.
1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Section 15900 "HVAC Instrumentation and Controls."
3. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains.
4. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of 150 in. x lbf and breakaway torque rating of 150 in. x lbf.

5. Outdoor Motors and Motors in Outdoor-Air Intakes: Equip with O-ring gaskets designed to make motors weatherproof. Equip motors with internal heaters to permit normal operation at minus 40 deg F.
6. Nonspring-Return Motors: For dampers larger than 25 sq. ft., size motor for running torque rating of 150 in. x lbf and breakaway torque rating of 300 in. x lbf.
7. Electrical Connection: 115 V, single phase, 60 Hz.

K. Smoke dampers shall be by the same manufacturer and shall be smoke tight, and shall be complete with 120V electric actuator. Actuator shall be wired by Division 26.

## 2.8 REGISTERS, GRILLES, AND DIFFUSERS

A. Furnish and install registers, grilles, and diffusers where shown on the Drawings. Type, size, and performance shall be as tabulated in the schedule and on the drawings. Provide & install accessories as scheduled on the plans.

B. Provide and install options and accessories as described in schedule.

## 2.9 THROWAWAY FILTERS

A. Provide one additional set of throwaway filters for the entire system. Furnish and install throwaway type filters for air handling systems and return grilles, 1 or 2-inch thick disposable type, ASHRAE 52.1, U.L. Class 2, 30% Efficient Merv8, filters as manufactured by Flanders Airpure, American Air Filter, Farr, Cambridge, or equal where shown on the Drawings.

B. Provide entire system with one additional set of disposable filters for the owner's use.

## 2.10 AUTOMATIC TEMPERATURE CONTROL

A. Install the automatic temperature control dampers, air flow monitoring devices, openings for air flow switches, alarms and control devices as provided by the Automatic Temperature Control Contractor. These dampers and devices shall be installed under the direct supervision of the Section 23 0900, CONTROLS & CONTROL SEQUENCES Temperature Control Contractor and in strict accordance with the manufacturer's recommendations.

## 2.11 SPARE PARTS

**A. <u>Provide one additional set of disposable filters for the existing RTU-1 listed in the schedules.</u>**

**END OF SECTION 23 7000**

Schroeder Engineering

# SECTION 26 0100 - BASIC MATERIAL AND METHODS

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 MATERIAL AND WORKMANSHIP

A. All material shall be new, of the quality specified, and shall conform to NFPA, NEMA, UL and ANSI standards in every case where such a standard had been established for the particular type of material.

B. Equipment shall be furnished with an U.L. label. Materials shall be standard products of manufacturer's regularly shall be standard products of manufacturer's regularly engaged in the production of such equipment and shall be the manufacturer's latest standard design.

C. Installation of materials shall be coordinated with other trades and installed at such time and manner as to not delay or interfere with the work of other trades.

D. All workmanship shall be neat, first class and complete in both effectiveness and appearance and shall be executed by person licensed and skilled in the trade.

E. This contractor shall be held solely responsible for proper size and location of hangers, slots, chases, openings, etc., required for proper installation of his work and shall arrange with the proper contactors for the building in of inserts and leaving chases or openings.

### 1.3 STANDARDIZATION OF PRODUCT MANUFACTURER

A. Except as noted, all magnetic starters, manual starters and motor control centers shall be manufactured by the same company, all finishes shall be the same color, and all equipment shall fit the space designated. Equipment as manufactured by G.E., Square D, Westinghouse or Allen Bradley will be acceptable providing they comply with the specific condition of the specifications and accompanying drawings.

B. Wirings devices, lighting fixtures, and other items covered under single specifications shall be of the same manufacturer and style whenever practical or where failure to do so is visibly noticeable.

### 1.4 MATERIAL HANDLING , STORAGE AND PROTECTION

A. This contractor shall make provisions for delivery and safe storage of materials and arrangement for introduction into building of equipment too large to pass through finished or existing openings.

B. During construction, it shall be responsibility of this contractor to protect the surface of equipment and material furnished.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 CLEANING AND PAINTING

A. Clear away all debris, surplus material, etc., resulting from work operations, leaving the job and the equipment furnished under this contract in a clean condition.

B. Equipment furnished with finished paint coat shall be examined upon job completion for scratches and surface damage. Damaged surfaces shall be touched up to match factory finish.

C. Light fixtures shall be dusted and cleaned prior to final acceptance.

D. CONCRETE EQUIPMENT

E. Switchboards and transformers shall be mounted on 4” concrete pads furnished as noted on drawings. Size pads such that pad extend 2” beyond the perimeter of the equipment installed.

F. Exterior light fixtures shall be on or in concrete bases provided by the electrical contractor and as detailed on drawings.

G. Concrete shall conform to Division 03 of this specification.

3.2 CUTTING AND REPAIRING

A. Cutting, fitting, and repairing which may be required for this work shall be done by craftsmen skilled in their respective trades. When cutting is required it shall be done in such a manner as to not weaken walls, partition, or floors. Concrete and masonry shall be cut with a diamond core drill or concrete saw. When patching is required, it shall be done and finished to match existing. All existing walls shall be cut and patched to install new boxes and conduit for the new construction work.

3.3 PENETRATIONS

A. Sleeves shall be used to accommodate conduits, cables or pipes passing thru concrete floors, walls and partitions. Sleeves shall be black iron pipe or galvanized sheet metal

set in place and secured in position. Sleeves located above grade shall be caulked with an approved caulking compound to make water tight, fireproof, etc., as required by the particular application. Sleeves located below grade or through on- grade slabs shall be black iron pipe and shall be made watertight with oakum and / or lead wool and sealed with asphalt. For fireproofing, use item equal to 3M product 2000. One hour walls require HWB1003, ULCBJ 1000 and 5000.

B. Conduit passing through poured concrete walls or floors may be imbedded directly into the concrete, however when subject to sheer forces, i.e. below grade applications, the conduit must be rigid steel.

C. Cables and conductors, not in raceway, shall be placed in sleeves when passing through fire and smoke partitions.

D. Sleeves penetrating floors shall extend a minimum of 4” above finished floor.

E. Where acceptable to the Architect/ Engineer and other trades involved, conduit may be placed prior to concrete pour thereby eliminating the use of sleeves. The contractor shall, however, remain responsible to insure and make such installation watertight.

F. Conduit or sleeves going thru the roof shall be installed in pitch pockets complete with flashing as may be required by the type of building construction. Where feeding equipment located on roof, the electrical conduit may be run in the same pitch pocket as used to install piping, etc. to the equipment. It shall be responsibility of the electrical contractor to coordinate sizes of curbs and pitch pockets so as to allow installation of conduit. If conduit cannot be installed in common opening with piping, etc. the electrical contractor shall provide a separate pitch pocket for his wiring.

G. Where conduits, sleeves, wireways, and other electrical raceways pass through fire partitions, walls, or floors, install a fire-stop that provides and effective barrier against the spread of fire, smoke and gases. Fire-stop material shall be packed tight, completely fill clearances between raceway and openings as required maintaining the rating of the assembly penetrated.

H. Where conduits, sleeves, wireways, and other electrical raceways pass thru partitions, walls, floors or insulation separating spaces subject to temperature differences, effective means shall be taken to prevent air leaks, and condensation problems.

I. Flexible or liquid tight flexible conduit may not be used through walls, floors, roof, etc. that are moisture, temperature, fire or smoke barriers. Conduits through these types of items must be either rigid steel or EMT.

## 3.4 MATERIAL INSTALLATION

A. In general, all wiring and electrical items shall be concealed, with visual portions set true and plumb with building lines. Items shall be aligned in an orderly fashion consistent with the patterns and design of the background material.

B. Where items are to be surface mounted, such items shall be grouped together. Provide a ¾" Fire Rated plywood backing, painted two coats grey paint. Leave Fire Rated Identification unpainted.

## 3.5 TRENCHES, EXCAVATING , AND BACKFILLING

A. The contractor shall do trenching and excavating required installing equipment, underground cable and conduit to the depth shown or required for proper operation. Excavation below the required level shall be backfilled with earth and thoroughly tamped. Contractor shall do all shoring and bracing necessary to perform his work and as required for safety. Contractor shall remove by pumping or other means any water which accumulates in the excavation. Temporary bridges shall be built by the contractor where required to maintain traffic.

B. In any excavation is across hard surfaced streets, drives, or walks, contractor shall cut and replace the surface material. Replacement material shall be identical to material removed unless shown otherwise.

C. If any excavation is across gravel bed or any stabilized yard, contractor shall repair damaged surface. Replacement material shall be identical to existing unless otherwise approved by the Engineer.

D. Contractor shall backfill all excavations made for his work. Utilities services shall be observed by the Engineer or proper inspection authority before backfilling. Backfilling shall be done by placing earth evenly and carefully around conduit in 6" maximum layers. Backfill material shall be free from rock and debris.

E. Each layer shall be carefully, mechanically compacted until at least one foot of cover exists over the pipe or equipment. The remainder of the back fill shall be placed and compacted in one-foot maximum layers. Compaction shall be 90% of the maximum standard Proctor density in area that are to be sodded or seeded Proctor density in areas that are to be sodded or seeded and shall be 95% of maximum modified Proctor density under walks, drives or any structure.

F. The contractor shall be responsible for and shall repair without charge all damage due to settlement of the earth, including but not limited to laws, drives, streets or parking lots, over the damaged area.

G. The contractor shall be responsible for cleaning up areas adjacent to the excavation where the earth has been temporarily stored, sweeping or washing pavement, repairing the gravel surface, or reseeding the lawns as required to bring the entire excavated area as close to the original conditions as possible.

H. All excavated materials not required for fill or backfill shall be disposed or removed from the site by this contractor.

END OF SECTION 26 0100

# SECTION 26 0500 - COMMON WORK RESULTS FOR ELECTRICAL

## PART 1 - GENERAL

### 1.1 SECTION REQUIREMENTS

A. Delegated Design: Design supports for multiple raceways, using performance requirements and design criteria indicated.

1. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NFPA 70.

## PART 2 - PRODUCTS

### 2.1 RACEWAYS

A. Raceways:

1. EMT: ANSI C80.3, zinc-coated steel, with setscrew or compression fittings.
2. ENT: NEMA TC 13, complying with UL 1653.
3. FMC: Zinc-coated steel.
4. IMC: ANSI C80.6, zinc-coated steel, with threaded fittings.
5. LFMC: Zinc-coated, flexible steel with sunlight-resistant and mineral-oil-resistant plastic jacket.
6. RNC: NEMA TC 2, Type EPC-40-PVC, with NEMA TC3 fittings.
7. Raceway Fittings: Specifically designed for raceway type used in Project. EMT fittings shall be steel setscrew type.

B. Wireways: Sheet metal sized and shaped, with screw covers.

C. Surface Raceways:

1. Metal: Galvanized steel with snap-on covers. Prime coating, ready for field painting.
2. Plastic: PVC, extruded and fabricated to size and shape indicated in color selected, with snap-on cover and mechanically coupled connections with plastic fasteners.

## 2.2 CONDUCTORS AND CABLES

A. Conductors Type THHN-2-THWN-2 comply with NEMA WC70/ICEA s 95-658.

1. Conductors, No. 12 AWG and Smaller: Solid copper.
2. Conductors, Larger Than No. 10 AWG: Stranded copper.
3. Insulation: Thermoplastic, rated at 75 deg C minimum.
4. Wire Connectors and Splices: Units of size, ampacity rating, material, type, and class suitable for service indicated.

B. Variable-Frequency Controller Output Circuits: Type XHHW-2 in metal conduit.

## 2.3 GROUNDING MATERIALS

A. Conductors: Solid for No. 8 AWG and smaller, and stranded for No. 6 AWG and larger unless otherwise indicated.

1. Insulated Conductors: Copper or tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
2. Bare, Solid-Copper Conductors: Comply with ASTM B 3.
3. Bare, Stranded-Copper Conductors: Comply with ASTM B 8.

B. Ground Rods: Copper-clad steel, sectional type; 5/8 by 96 inches (16 by 2400 mm) in diameter.

C. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts with clamp-type pipe connectors sized for pipe.

D. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

E. Provide a code sized, green grounding conductor in each conduit.

## 2.4 ELECTRICAL IDENTIFICATION MATERIALS

A. Conductor Identification Materials: Color-Coding Conductor Tape: Self-adhesive vinyl tape 1 to 2 inches (25 to 50 mm) wide.

B. Underground-Line Warning Tape: Permanent, bright-colored, continuous-printed, polyethylene tape with continuous metallic strip or core.

C. Tape Markers for Wire: Vinyl or vinyl-cloth, self-adhesive, wraparound type with circuit identification legend machine printed by thermal transfer or equivalent process.

D. Self-Adhesive Warning Labels: Factory printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

E. Metal-Backed, Butyrate Warning Signs: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1.0-mm) galvanized-steel backing; and with colors, legend, and size required for application.

F. Equipment Identification Labels: Engraved, laminated acrylic or melamine label; punched or drilled for screw mounting. White letters on a dark-gray background; red letters for emergency systems.

G. Fasteners: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

## 2.5 SUPPORT AND ANCHORAGE COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly, and provide finish suitable for the environment in which installed.

1. Channel Dimensions: Selected for structural loading.

B. Raceway and Cable Supports: As described in NECA 1.

C. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and fittings.

D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded malleable-iron body and insulating wedging.

E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

F. Mounting, Anchoring, and Attachment Components:

1. Powder-Actuated Fasteners: Threaded-steel stud.
2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete.
3. Concrete Inserts: Steel or malleable-iron, slotted-support-system units similar to MSS Type 18; complying with MFMA-3 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, high strength; complying with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

## 2.6 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

C. Sleeves for Rectangular Openings: Galvanized-steel sheet.

D. Sleeve Seals: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.

2. Pressure Plates: Plastic. Include two for each sealing element.
3. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

## 2.7 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

# PART 3 - EXECUTION

## 3.1 GENERAL ELECTRICAL EQUIPMENT INSTALLATION REQUIREMENTS

A. Install all electrical equipment, devices, conduit, cabling and conductors per local and national electrical codes. Identify equipment per the national electrical code (Current NEC).

B. Install electrical equipment to allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.

C. Install electrical equipment to provide for ease of disconnecting the equipment with minimum interference to other installations.

D. Install electrical equipment to allow right of way for piping and conduit installed at required slope.

E. Install electrical equipment to ensure that connecting raceways, cables, wireways, cable trays, and busways are clear of obstructions and of the working and access space of other equipment.

F. Install required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

G. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Comply with requirements in Division 08 Section "Access Doors and Frames."

H. Install sleeve and sleeve seals of type and number required for sealing electrical service penetrations of exterior walls.

I. Comply with NECA 1.

## 3.2 RACEWAY AND CABLE INSTALLATION

A. Outdoor Raceways Applications:

1. Exposed or Concealed: IMC.
2. Underground, Single Run: RNC.
3. Connection to Vibrating Equipment: LFMC.
4. Boxes and Enclosures: Metallic, NEMA 250, Type 3R or Type 4.

B. Indoor Raceways Applications:

1. Exposed or Concealed: EMT,
   a. MC Cable may be utilized as a branch circuit tail only. Meaning it can only feed one device, no daisy-chained MC Cable for branch circuiting unless prior approved.
2. Connection to Vibrating Equipment: FMC; in wet or damp locations, use LFMC.
3. Damp or Wet Locations: IMC.
4. Boxes and Enclosures: Metallic, NEMA 250, Type 1, unless otherwise indicated.

C. Conceal raceways and cables, unless otherwise indicated, within finished walls, ceilings, and floors.

D. Install raceways and cables at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Locate horizontal raceway runs above water and steam piping.

E. Install raceways embedded in slabs in middle third of slab thickness where practical, and leave at least 1-inch- (25-mm-) thick concrete cover.

1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
2. Space raceways laterally to prevent voids in concrete.
3. Install conduit larger than 1-inch (27-mm) trade size, parallel to or at right angles to main reinforcement. Where conduit is at right angles to reinforcement, place conduit close to slab support.
4. Transition from nonmetallic tubing to Schedule 80 nonmetallic conduit, rigid steel conduit, or IMC before rising above floor.

F. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch (27-mm) trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.

G. Install pull wires in empty raceways.

H. Connect motors and equipment subject to vibration, noise transmission, or movement with a 72-inch (1830-mm) maximum length of flexible conduit.

I. Install raceways and cables conceal within finished walls, ceilings, and floors unless otherwise indicated.

J. Install raceways and cables at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Locate horizontal raceway runs above water and steam piping.

## 3.3 WIRING METHODS

A. Service Entrance and Panel Feeders:

1. Feeders to building shall be type THHN-2/THWN-2 single conductors in raceway.

B. Exposed Feeders, Branch Circuits, and Class 1 Control Circuits, Including in Attic: Type THHN-THWN, single conductors in raceway.

C. Feeders in Crawlspaces: Type THHN-THWN, single conductors in raceway.

D. Feeders and Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and underground: Type THHN-THWN, single conductors in raceway.

E. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, and strain relief device at terminations to suit application.

F. Class 2 Control Circuits: Power-limited cable, concealed in building finishes.

G. Fire Alarm Circuits: Conductors in raceway or cable rated for fire alarm use.

## 3.4 GROUNDING

A. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum. Bury at least 24 inches (600 mm) below grade.

B. Pipe and Equipment Grounding Conductor Terminations: Bolted.

C. Underground Connections: Welded.

D. Install grounding conductors routed along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

E. Install ground rods driven into ground until tops are 2 inches (50 mm) below finished floor or final grade unless otherwise indicated.

F. Install bonding straps and jumpers in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.

G. Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.

H. Bond to equipment mounted on vibration isolation hangers and supports so vibration is not transmitted to rigidly mounted equipment.

I. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes, using a bolted clamp connector or by bolting a lug-type connector to a pipe flange, using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

J. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells.

1. Measure ground resistance not less than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
2. Perform tests by fall-of-potential method according to IEEE 81.
3. Report measured ground resistances that exceed the following values:

    a. Power and Lighting Equipment or System with Capacity 500 kVA and Less: 10 ohms.
    b. Power and Lighting Equipment or System with Capacity 500 to 1000 kVA: 5 ohms.

4. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

## 3.5 IDENTIFICATION

A. Power-Circuit Conductor Identification: For No. 3 AWG conductors and larger, at each location where observable, identify phase using color-coding conductor tape.

B. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring.

C. Warning Labels for Enclosures for Power and Lighting: Comply with 29 CFR 1910.145; identify system voltage with black letters on an orange background. Apply to exterior of door, cover, or other access.

D. Equipment Identification Labels:

1. Labeling Instructions:

    a. Indoor Equipment: Adhesive film label with clear protective overlay. Provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.
    b. Outdoor Equipment: Engraved, laminated acrylic or melamine label, drilled for screw attachment.

2. Equipment to Be Labeled:

    a. Panelboards, electrical cabinets, and enclosures.
    b. Electrical switchgear and switchboards.
    c. Motor-control centers.
    d. Disconnect switches.
    e. Enclosed circuit breakers.
    f. Motor starters.
    g. Push-button stations.
    h. Contactors.
    i. Terminals, racks, and patch panels for voice and data communication and for signal and control functions.

E. Verify identity of each item before installing identification products.

F. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

G. Attach nonadhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.

H. Install system identification color banding for raceways and cables at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.

I. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.

a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
b. Colors for 208/120-V Circuits:

1) Phase A: Black.
2) Phase B: Red.
3) Phase C: Blue.

c. Colors for 480/277-V Circuits:

1) Phase A: Brown.
2) Phase B: Orange.
3) Phase C: Yellow.

d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

J. Underground-Line Warning Tape: Continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade.

## 3.6 INSTALLATION OF HANGERS AND SUPPORTS

A. Fasten hangers and supports securely in place, with provisions for thermal and structural movement. Install with concealed fasteners unless otherwise indicated.

B. Separate dissimilar metals and metal products from contact with wood or cementitious materials, by painting each metal surface in area of contact with a bituminous coating or by other permanent separation.

C. Raceway Support Methods: In addition to methods described in NECA 1, EMT may be supported by openings through structure members, as permitted in NFPA 70.

D. Multiple Raceways or Cables: Install on trapeze-type supports fabricated with steel slotted channel.

E. Strength of Support and Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits.

Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

F. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods, unless otherwise indicated or required by Code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. To Light Steel: Sheet metal screws.
6. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount on slotted-channel racks attached to substrate.

G. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

## 3.7 ELECTRICAL EQUIPMENT MOUNTING HEIGHTS

A. Typical mounting heights:

| | | |
|---|---|---|
| 1. | Duplex receptacle standard use | 18” AFF to center |
| 2. | Switches | 48” AFF to top |
| 3. | Receptacles in shop areas | 48” AFF to bottom |
| 4. | Switches in shop areas | 48” AFF to bottom |
| 5. | Fire Alarm Pull Stations | 48” AFF to top |
| 6. | Fire Alarm Horn/Strobe | 84” AFF to bottom |
| 7. | Outdoor Fire Alarm Horn | 96” Above grade |
| 8. | Emergency Light Fixtures | 84” AFF to bottom |
| 9. | Bathroom Wall Fixtures | 6” Above the mirror |
| 10. | Outdoor Emergency Lights | 84” Above grade |
| 11. | Data /Phone | 18” AFF to center |
| 12. | Wall Mounted Phone | 54” AFF to center |
| 13. | Devices above counter: | |
| | a) 2” between bottom of box and back splash | |
| | b) 6” above the counter without back splash | |

## 3.8 SLEEVE AND SLEEVE-SEALS INSTALLATION

A. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

B. Cut sleeves to length for mounting flush with both wall surfaces.

C. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level.

D. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and cable unless sleeve seal is to be installed.

E. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.

F. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and cable, using joint sealant appropriate for size, depth, and location of joint according to Division 07 Section "Joint Sealants."

G. Roof-Penetration Sleeves: Seal penetration of individual cables with flexible boot-type flashing units applied in coordination with roofing work.

H. Aboveground Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeves to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

I. Underground Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between cable and sleeve for installing mechanical sleeve seals.

## 3.9 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly. Comply with requirements in Division 07 Section "Penetration Firestopping."

END OF SECTION 26 0500

# SECTION 26 0519 - CONDUCTORS AND CABLES

## 1.1 SUMMARY

A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

## 1.2 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

## 1.3 CONDUCTORS AND CABLES

A. Conductors, cables, and insulation shall conform to NEMA, UL and NEC standards and rules. All conductors and cables shall be new and delivered to the job site in coils or reels, clearly marked with manufacture's name, insulation type, AWG size, and UL listings.

B. Conductor Material: Copper; solid conductor for No. 10 AWG and smaller, stranded for No. 8 AWG and larger.

C. Conductor Insulation Types: Type THHN, THHN-THWN and XHHW.

D. Multiconductor Cable: Armored cable, Type AC or Metal-clad cable, Type MC may only be used:

1. Where concealed for branch circuits and used for flex drops to recessed light fixtures and not exceeding 6 feet in length.
2. For end of branch circuit wiring. It shall not be used as a main or homerun of a branch circuit.
3. Where approved in writing by Electrical Engineer.

## 1.4 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated. Use twist on spring compression type such as Ideal Twister series or 3M Scotch-Loc. Push on connectors such as Wago Wall Nuts may only be used inside of light fixtures for ballast connections.

## 1.5 CONDUCTOR AND INSULATION APPLICATIONS

A. Exposed Feeders: Type THHN-THWN, single conductors in raceway.

**B. VFD Output Circuits (VFC): Type XHHW-2 in metal conduit.**

C. Feeders Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and in Crawlspaces: Type THHN-THWN, single conductors in raceway.

E. Exposed Branch Circuits, including in Crawlspaces: Type THHN-THWN, single conductors in raceway.

F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.

G. Branch Circuits Concealed in Concrete and below Slabs-on-Grade: Type THHN-THWN, single conductors in raceway.

H. Underground Feeders and Branch Circuits: Type THHN-THWN, single conductors in raceway

I. Cord Drops and Portable Appliance Connections: Type SO, hard service cord.

J. Fire Alarm Circuits: Type THHN-THWN or Plenum Rated Fire Alarm Cable, in raceway.

K. Class 1 Control Circuits: Type THHN-THWN, in raceway.
L. Class 2 Control Circuits: Type THHN-THWN, in raceway or for thermostats Power-limited cable, concealed in building finishes may be used.

1.6 INSTALLATION
A. Conceal wiring in finished walls, ceilings, and floors, unless otherwise indicated.
B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
E. Support cables according to Division 26 Section "Basic Electrical Materials and Methods."
F. Seal around cables penetrating fire-rated elements according to Division 7 Section "Through-Penetration Firestop Systems."
G. Identify and color-code conductors and cables according to Division 26 Section "Basic Electrical Materials and Methods."
H. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
I. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

END OF SECTION 26 0519

# SECTION 26 0526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section includes grounding and bonding systems and equipment.

B. Section includes grounding and bonding systems and equipment, plus the following special applications:

1. Underground distribution grounding.
2. Foundation steel electrodes.

### 1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

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

1. Burndy; Part of Hubbell Electrical Systems.
2. Dossert; AFL Telecommunications LLC.
3. ERICO International Corporation.
4. Fushi Copperweld Inc.
5. Galvan Industries, Inc.; Electrical Products Division, LLC.
6. Harger Lightning & Grounding.
7. ILSCO.
8. O-Z/Gedney; an EGS Electrical Group brand; an Emerson Industrial Automation business.
9. Robbins Lightning, Inc.
10. Siemens Power Transmission & Distribution, Inc.

## 2.2 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

## 2.3 CONDUCTORS

A. Insulated Conductors: Copper or tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches (6.3 by 100 mm) in cross section, with 9/32-inch (7.14-mm) holes spaced 1-1/8 inches (28 mm) apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.

## 2.4 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

D. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

## 2.5 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; 5/8 by 96 inches (16 by 2400 mm).

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. CFR 77.701-3, ground wires for circuits having power conductors smaller than No. 6 AWG shall be sized identically to the power conductor. Ground wires for circuits with power conductors No. 6 AWG or larger must be sized to a minimum of half the cross sectional area of the circuit power conductor.

C. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2/0 AWG minimum.

1. Bury at least 24 inches (600 mm) below grade.
2. Duct-Bank Grounding Conductor: Bury 12 inches (300 mm) above duct bank when indicated as part of duct-bank installation.

D. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated.

1. Install bus horizontally, on insulated spacers 2 inches (50 mm) minimum from wall, 6 inches (150 mm) above finished floor unless otherwise indicated.
2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.

E. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 GROUNDING SEPARATELY DERIVED SYSTEMS

A. Generator: Install grounding electrode(s) at the generator location. The electrode shall be connected to the equipment grounding conductor and to the frame of the generator.

## 3.4 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

A. Comply with IEEE C2 grounding requirements.

B. Pad-Mounted Transformers and Switches: Install two ground rods and ground ring around the pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Install tinned-copper conductor not less than No. 2 AWG for ground ring and for taps to equipment grounding terminals. Bury ground ring not less than 6 inches (150 mm) from the foundation.

## 3.5 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
4. Single-phase motor and appliance branch circuits.
5. Three-phase motor and appliance branch circuits.
6. Flexible raceway runs.
7. Armored and metal-clad cable runs.
8. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.

C. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

D. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

E. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

## 3.6 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

D. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

E. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install tinned bonding jumper to bond across flexible duct connections to achieve continuity.

F. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet (18 m) apart.

G. Concrete-Encased Grounding Electrode (Ufer Ground): Fabricate according to NFPA 70; using electrically conductive coated steel reinforcing bars or rods, at least 20 feet (6.0 m) long. If reinforcing is in multiple pieces, connect together by the usual steel tie wires or exothermic welding to create the required length.

## 3.7 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.

3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal. Make tests at ground rods before any conductors are connected.

    a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
    b. Perform tests by fall-of-potential method according to IEEE 81.

4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

B. Grounding system will be considered defective if it does not pass tests and inspections.

C. Report measured ground resistances that exceed the following values:

1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.

D. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 26 0526

# SECTION 26 0529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

### 1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. IMC: Intermediate metal conduit.

C. RMC: Rigid metal conduit.

### 1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

### 1.5 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Comply with NFPA 70.

1.6 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified together with concrete Specifications.

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Section 07 7200 "Roof Accessories."

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

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

a. Allied Tube & Conduit.
b. Cooper B-Line, Inc.; a division of Cooper Industries.
c. ERICO International Corporation.
d. Flex-Strut Inc.
e. GS Metals Corp.
f. G-Strut.
g. Haydon Corporation.
h. Metal Ties Innovation.
i. Thomas & Betts Corporation, A Member of the ABB Group.
j. Unistrut; an Atkore International company.
k. Wesanco, Inc.

2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
5. Channel Dimensions: Selected for applicable load criteria.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

1. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

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

        1) Cooper B-Line, Inc.; a division of Cooper Industries.
        2) Empire Tool and Manufacturing Co., Inc.
        3) Hilti, Inc.
        4) ITW Ramset/Red Head; Illinois Tool Works, Inc.
        5) MKT Fastening, LLC.

2. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
3. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
5. Toggle Bolts: All-steel springhead type.
6. Hanger Rods: Threaded steel.

## 2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Section 05 5000 "Metal Fabrications" for steel shapes and plates.

# PART 3 - EXECUTION

## 3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

    1. Secure raceways and cables to these supports with single-bolt conduit clamps using spring friction action for retention in support channel.

D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

## 3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT RMC may be supported by openings through structure members, as permitted in NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
6. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

## 3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Section 05 5000 "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 03 3000 "Cast-in-Place Concrete."

C. Anchor equipment to concrete base.

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint with a brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).

B. Touchup: Comply with requirements in Section 09 9113 "Exterior Painting" Section 09 9123, "Interior Painting" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 26 0529

# SECTION 26 0533 - RACEWAYS AND BOXES

## 1.1 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

B. See Division 26 Section "Basic Electrical Materials and Methods" for supports, anchors, and identification products.

C. See Division 26 Section "Wiring Devices" for devices installed in boxes and for floor-box service fittings.

## 1.2 SUBMITTALS

A. Product Data: For surface raceways, such as Wiremold or Panduit products.

## 1.3 METAL CONDUIT AND TUBING

A. RMC: Rigid metal conduit shall be galvanized steel with steel fittings (ANSI C80.1).

B. EMT and Fittings: Electrical metallic tubing shall be galvanized steel (ANSI C80.3.)
   1. Fittings Dry Location: Steel set-screw type such as Raco series 2000.
   2. Fittings Wet Location: Steel compression type such as Raco series 2902.

C. FMC: Flexible metal conduit shall be zinc-coated steel, ½" minimum size.
   1. Fittings Dry Location: Steel squeeze type such as Raco series 2100.

D. LFMC: Liquid tight flexible metal conduit with PVC jacket.
   1. Fittings: Steel compression type such as Raco series 3500.

## 1.4 NONMETALLIC CONDUIT AND TUBING

A. RNC: Rigid Non-Metallic conduit Schedule 40 unless otherwise specified on the plans.
   1. Fittings and conduit bodies: Compatible and of equal wall strength as the conduit.

## 1.5 METAL UNDERFLOOR BOXES

A. Available Manufacturers:
   1. Steel City – 664-SC
   2. Approved Equal

## 1.6 SURFACE RACEWAYS

A. Surface Nonmetallic Raceways: Two-piece construction, manufactured of rigid PVC compound with matte texture and manufacturer's standard color.
   1. Available Manufacturers:
      a. Hubbell, Inc.; Wiring Device Division.
      b. Lamson & Sessions; Carlon Electrical Products.
      c. Panduit Corp.
      d. Walker Systems, Inc.; Wiremold Company (The).
      e. Wiremold Company (The); Electrical Sales Division.

B. Use Panduit (or equal) type TE-70, with divider wall Te70DW, snap on electrical faceplate T70PG, hanging box TE70DW, device mounting bracket T70DB-X, and sloped snap on data faceplates. Provide all other misc items necessary for a complete system.

## 1.7 BOXES, ENCLOSURES, AND CABINETS

A. Sheet Metal Outlet and Device Boxes: Use welded steel metal boxes – min. size 4"x4"x1 ½ ", size as required to meet NEC. Provide appropriate device rings and covers.

B. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

C. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage and include accessory feet where required for freestanding equipment.

1.8 RACEWAY APPLICATION

A. Outdoors:
1. Exposed: Rigid steel or IMC.
2. Concealed: Rigid steel or IMC.
3. Underground, Single Run: RNC.
4. Underground, Grouped: RNC.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
6. Boxes and Enclosures: NEMA 250, Type 3R.

B. Indoors:
1. Exposed: EMT.
2. Concealed: EMT.
3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC; except use LFMC in damp or wet locations.
4. Damp or Wet Locations: Rigid steel conduit.
5. Boxes and Enclosures: NEMA 250, Type 1, except as follows:
a. Damp or Wet Locations: NEMA 250, Type 3R.

C. Minimum Raceway Size: ½" trade size above ground, ¾" below ground or under floor or in poured concrete and minimum size homerun shall not be less than ¾". Minimum Raceway Size for DATA/Communications systems shall be ¾".

1.9 INSTALLATION

A. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

B. Complete raceway installation before starting conductor installation.

C. Support raceways as specified in Division 26 Section "Basic Electrical Materials and Methods."

D. Install temporary closures to prevent foreign matter from entering raceways.

E. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portions of bends are not visible above finished slab.

F. Make bends and offsets so ID is not reduced. Keep legs of bends in same plane and keep straight legs of offsets parallel, unless otherwise indicated.

G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
1. Install concealed raceways with a minimum of bends in shortest practical distance, considering type of building construction and obstructions, unless otherwise indicated.

H. Raceways Embedded in Slabs: Install in middle 1/3 of slab thickness where practical and leave at least 2 inches of concrete cover.
1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
2. Space raceways laterally to prevent voids in concrete.

3. Run conduit larger than 1-inch trade size parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
4. Change from nonmetallic conduit to rigid steel conduit before rising above floor.

I. Install exposed raceways parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.
1. Run parallel or banked raceways together on common supports.
2. Make parallel bends in parallel or banked runs. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.

J. Join raceways with fittings designed and approved for that purpose and make joints tight.
1. Use insulating bushings to protect conductors, in any raceway 1 ½" or larger.

K. Terminations:
1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.
2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.

L. Flexible Connections: Use maximum of 72 inches of flexible conduit for recessed and semi recessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use LFMC in damp or wet locations. Install separate ground conductor across flexible connections.

M. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying raceways to receptacle or fixture ground terminals.

N. Set floor boxes level and flush with finished floor surface.

O. Set floor boxes level. Trim after installation to fit flush with finished floor surface.

P. Install hinged-cover enclosures and cabinets plumb. Support at each corner.

1.10 PROTECTION

A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 26 0533

# SECTION 26 0553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Underground-line warning tape.
5. Warning labels and signs.
6. Instruction signs.
7. Equipment and device identification labels.
8. Miscellaneous identification products.

### 1.3 QUALITY ASSURANCE

A. Comply with ANSI A13.1 and IEEE C2.

B. Comply with NFPA 70.

C. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

### 1.4 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with location of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 FLOOR MARKING TAPE

A. 2-inch- (50-mm-) wide, 5-mil (0.125-mm) pressure-sensitive vinyl tape, with yellow and black stripes and clear vinyl overlay.

B. 16” MINIMUM ROUND WARNING LABEL IDENTIFYING ELECTRICAL SPACE TO REMAIN CLEAR.

2.2 UNDERGROUND-LINE WARNING TAPE

A. Tape:

1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical utility lines.
2. Printing on tape shall be permanent and shall not be damaged by burial operations.
3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

B. Color and Printing:

1. Comply with ANSI Z535.1 through ANSI Z535.5.
2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE,.
3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE,.

2.3 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."

2.4 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. inches (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).

2.5 EQUIPMENT IDENTIFICATION LABELS

A. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).

B. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).

2.6 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

F. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches (400 mm) overall.

G. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

A. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:

1. Emergency Power.

B. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.

a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
b. Colors for 208/120-V Circuits:

1) Phase A: Black.
2) Phase B: Red.
3) Phase C: Blue.

c. Colors for 480/277-V Circuits:

1) Phase A: Brown.
2) Phase B: Orange.
3) Phase C: Yellow.

d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

C. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.

D. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

E. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.

1. Comply with 29 CFR 1910.145.
2. Identify system voltage with black letters on an orange background.

3. Apply to exterior of door, cover, or other access.
4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:

    a. Power transfer switches.
    b. Controls with external control power connections.

F. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- (10-mm-) high letters for emergency instructions at equipment used for power transfer.

G. Receptacles: Provide clear self-adhered label with branch circuit information on the faceplate of each device. Labels shall be installed level and centered with consistency of location between each device.

H. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:

    a. Indoor Equipment: Adhesive film label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.
    b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
    c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
    d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

2. Equipment to Be Labeled:

    a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be self-adhesive, engraved, laminated acrylic or melamine label.

    b. CORD AND PLUG RECEPTACLES
    c. Enclosures and electrical cabinets.
    d. Access doors and panels for concealed electrical items.
    e. Switchgear.
    f. Switchboards.
    g. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
    h. Emergency system boxes and enclosures.
    i. Enclosed switches.
    j. Enclosed circuit breakers.
    k. Enclosed controllers.
    l. Variable-speed controllers.
    m. Push-button stations.

n. Power transfer equipment.Contactors.
o. Remote-controlled switches, dimmer modules, and control devices.
p. Power-generating units.

END OF SECTION 26 0553

# SECTION 26 0923 - LIGHTING CONTROL DEVICES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Time switches.
2. Photoelectric switches.
3. Indoor occupancy and outdoor motion sensors.
4. Low Voltage Lighting Relay Panels
5. Wireless Sensors and communication devices.

B. Related Requirements:

1. Section 26 2726 "Wiring Devices" for wall-box dimmers, wall-switch occupancy sensors, and manual light switches.

### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

### 1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

### 1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data

## PART 2 - PRODUCTS

### 2.1 MANUFACTURE

A. Products: Subject to compliance with requirements, provide one of the following:

1. Basis of Design: nLight – Acuity Brand
    a) Digital system as shown on plans.
2. Wattstopper.
3. Intermatic, Inc.
4. Tyco Electronics.

5. Sensor Switch
6. Or approved equal

B. Description: Solid state, with SPST dry contacts rated for 1800 VA, to operate connected load, complying with UL 773.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Light-Level Monitoring Range: 1.5 to 10 fc (16.14 to 108 lux), with an adjustment for turn-on and turn-off levels within that range.
3. Time Delay: Thirty-second minimum, to prevent false operation.
4. Lightning Arrester: Air-gap type.
5. Mounting: Twist lock complying with NEMA C136.10, with base.

## 2.2 INDOOR OCCUPANCY SENSORS

A. Provide as noted on drawings.

B. System shall be a complete operating system including all components required. Provide and coordinate all required components and power requirements for the system shown on the plans. System is shown on plans for control intent, not all components are identified on plans.

C. Or approved equal

## 2.3 LIGHTING RELAY PANELS

A. Provide as noted on drawings.

B. System shall be a complete operating system including all components required. Provide and coordinate all required components and power requirements for the system shown on the plans. System is shown on plans for control intent, not all components are identified on plans.

C. Panels shall include 25% space for expansion.

D. Or approved equal

## 2.4 WIRELESS CONTROL DEVICES

A. Provide as noted on drawings.

B. Or approved equal

2.5 TOUCH SCREEN CONTROL DEVICES

A. Provide as noted on drawings.

B. Or approved equal

2.6 DMX CONTROL DEVICES, CABLES AND DEVICES

A. Provide as noted on drawings.

B. System shall be a complete operating system including all components required. Provide and coordinate all required components and power requirements for the system shown on the plans. System is shown on plans for control intent, not all components are identified on plans.

C. Or approved equal

2.7 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 26 0519 "Low-Voltage Electrical Power Conductors and Cables."

B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Section 26 0519 "Low-Voltage Electrical Power Conductors and Cables."

C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Section 26 0519 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Relay Panels and Digital Controls: Include (2) trips by manufacturers programing representative to the site for system programming. Coordinate trips between electrical contractor and owner’s IT Department. Provide 2 hours of onsite training and full system programing, scheduling, and setup of lighting control system for each visit.

B. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

C. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied

conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.

D. Mount electrically held lighting contactors with elastomeric isolator pads to eliminate structure-borne vibration, unless contactors are installed in an enclosure with factory-installed vibration isolators.

E. Wiring Method: Comply with Section 26 0519 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch (13 mm).

F. Identify components and power and control wiring according to Section 26 0553 "Identification for Electrical Systems."

## 3.2 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified agent to evaluate lighting control devices and perform tests and inspections.

B. Perform the following tests and inspections:

1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Lighting control devices will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 26 0923

# SECTION 26 2416 - PANELBOARDS

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section Includes:

1. Distribution panelboards.
2. Lighting and appliance branch-circuit panelboards.

### 1.3 DEFINITIONS

A. SVR: Suppressed voltage rating.

B. TVSS: Transient voltage surge suppressor.

### 1.4 ACTION SUBMITTALS

A. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
2. Detail enclosure types and details for types other than NEMA 250, Type 1.
3. Detail bus configuration, current, and voltage ratings.
4. Short-circuit current rating of panelboards and overcurrent protective devices.
5. Include evidence of NRTL listing for series rating of installed devices.
6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
7. Include wiring diagrams for power, signal, and control wiring.
8. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device.

### 1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Keys: Two spares for each type of panelboard cabinet lock.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

C. Comply with NFPA 70.

1.7 PROJECT CONDITIONS

A. Environmental Limitations:

1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

B. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures within limits specified.
2. Altitude not exceeding 6600 feet (2000 m).

1.8 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

A. Enclosures: Flush- and surface-mounted cabinets.

1. Rated for environmental conditions at installed location.

    a. Indoor Dry and Clean Locations: NEMA 250, Type 1.

2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
4. Finishes:

    a. Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
    b. Back Boxes: Galvanized steel.

5. Directory Card: Inside panelboard door, mounted in transparent card holder.

B. Incoming Mains Location: Top and bottom.

C. Phase, Neutral, and Ground Buses:

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.

D. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Main and Neutral Lugs: Mechanical type.
3. Ground Lugs and Bus-Configured Terminators: Mechanical type.
4. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
5. Subfeed (Double) Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.

E. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

F. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

## 2.2 PERFORMANCE REQUIREMENTS

A. Surge Suppression: Factory installed as an integral part of indicated panelboards, complying with UL 1449 SPD Type 1 where shown or noted.

## 2.3 DISTRIBUTION PANELBOARDS

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

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric GE

3. Square D; a brand of Schneider Electric.
4. Siemens

B. Panelboards: NEMA PB 1, power and feeder distribution type.

C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.

1. For doors more than 36 inches (914 mm) high, provide two latches, keyed alike.

D. Mains: Circuit breaker or Lugs only.

E. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.

F. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers.

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

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

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric GE
3. Square D; a brand of Schneider Electric.

B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

C. Mains: Circuit breaker or lugs only.

D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.5 Surge Protection Device Description: IEEE C62.41-compliant, integrally mounted, wired-in, solid-state, parallel-connected, modular (with field-replaceable modules) type, with sine-wave tracking suppression and filtering modules, UL 1449, second edition, short-circuit current rating matching or exceeding the switchboard short-circuit rating, and with the following features and accessories:

1. Fuses, rated at 200-kA interrupting capacity.
2. Fabrication using bolted compression lugs for internal wiring.
3. Integral disconnect switch.
4. Redundant suppression circuits.
5. Redundant replaceable modules.
6. Arrangement with wire connections to phase buses, neutral bus, and ground bus.
7. LED indicator lights for power and protection status.
8. Audible alarm, with silencing switch, to indicate when protection has failed.
9. Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of system operation. Contacts shall reverse position on failure of

any surge diversion module or on opening of any current-limiting device. Coordinate with building power monitoring and control system.

10. Six-digit, transient-event counter set to totalize transient surges.

B. Peak Single-Impulse Surge Current Rating: 120 kA per mode/240 kA per phase.

C. Withstand Capabilities: 12,000 IEEE C62.41, Category C3 (10 kA), 8-by-20-mic.sec. surges with less than 5 percent change in clamping voltage.

D. Protection modes and UL 1449 SVR for grounded wye circuits with 480Y/277-V, three-phase, four-wire circuits shall be as follows:

1. Line to Neutral: 800 V for 480Y/277.
2. Line to Ground: 800 V for 480Y/277.
3. Neutral to Ground: 800 V for 480Y/277.

## 2.6 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

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

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric GE
3. Square D; a brand of Schneider Electric.
4. Siemens

B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 200 A and larger to 100% rating.
2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:

    a. Instantaneous trip.
    b. Long- and short-time pickup levels.
    c. Long- and short-time time adjustments.
    d. Ground-fault pickup level, time delay, and I squared x t response.

4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
5. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
6. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip).
7. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
8. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:

    a. Standard frame sizes, trip ratings, and number of poles.

b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
c. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
d. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in off position.

## 2.7 ACCESSORY COMPONENTS AND FEATURES

A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

B. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

A. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.

B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.

C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 INSTALLATION

A. Install panelboards and accessories according to NEMA PB 1.1.

B. Comply with mounting and anchoring requirements specified in Section 26 0548.16 "Seismic Controls for Electrical Systems."

C. Mount top of trim 90 inches (2286 mm) above finished floor unless otherwise indicated.

D. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

E. Install overcurrent protective devices and controllers not already factory installed.

1. Set field-adjustable, circuit-breaker trip ranges.

F. Install filler plates in unused spaces.

G. Stub four 1-inch (27-GRC) empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch (27-GRC) empty conduits into raised floor space or below slab not on grade.

H. Comply with NECA 1.

## 3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 26 0553 "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 26 0553 "Identification for Electrical Systems."

D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Section 26 0553 "Identification for Electrical Systems."

## 3.4 FIELD QUALITY CONTROL

A. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

B. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
3. Perform the following infrared scan tests and inspections and prepare reports:

    a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.
    b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.
    c. Instruments and Equipment:

        1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

C. Panelboards will be considered defective if they do not pass tests and inspections.

## 3.5 ADJUSTING

A. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges as indicated by manufacturer coordination study and recommendation.

END OF SECTION 26 2416

# SECTION 26 2726 - WIRING DEVICES

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section Includes:

1. Receptacles, receptacles with integral GFCI, and associated device plates.
2. Twist-locking receptacles.
3. Receptacles with integral surge-suppression units.
4. Isolated-ground receptacles.
5. Hospital-grade receptacles.
6. Tamper-resistant receptacles.
7. Weather-resistant receptacles.
8. Snap switches and wall-box dimmers.
9. Wall-switch and exterior occupancy sensors.
10. Communications outlets.
11. Pendant cord-connector devices.
12. Cord and plug sets.
13. Floor service outlets, poke-through assemblies, service poles, and multioutlet assemblies.

### 1.3 DEFINITIONS

A. EMI: Electromagnetic interference.

B. BAS: Building automation system.

C. EMI: Electromagnetic interference.

D. GFCI: Ground-fault circuit interrupter.

E. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

F. RFI: Radio-frequency interference.

G. SPD: Surge protective device.

H. UTP: Unshielded twisted pair.

### 1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Receptacles for Owner-Furnished Equipment: Match plug configurations.
2. Cord and Plug Sets: Match equipment requirements.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

1.6 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Wiring Devices:
      a. Bryant Electric, Inc./Hubbell Subsidiary.
      b. Eagle Electric Manufacturing Co., Inc.
      c. Hubbell Incorporated; Wiring Device-Kellems.
      d. Leviton Mfg. Company Inc.
      e. Pass & Seymour/Legrand; Wiring Devices Div.
   2. Floor Service Outlets:
      a. Wiremold Company (Walker).
      b. Or equal – Floor service outlets must be compatible with floor duct

B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

1.7 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:

   1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
   2. Devices shall comply with the requirements in this Section.

1.8 RECEPTACLES

A. Straight-Blade-Type Receptacles:
   1. Tamper Resistant: P&S TR20-GRY or equal.
   2. Hospital Grade Heavy-Duty Duplex, Tamper Resistant P&S TR63-HGRY or equal.

B. GFCI Self Testing Receptacles:
   1. Tamper Resistant P&S 2097TR-GRY or equal.
   2. Weather Resistant, Tamper Resistant P&S 2097TRWR-GRY or equal.
   3. Hospital Grade, Tamper-Resistant P&S 2097HGTR-GRY or equal.
   4. Hospital Grade, Tamper-Resistant, Nightlight P&S 2097HGNTLTR-GRY or equal.

1.9 PENDANT CORD-CONNECTOR DEVICES

A. Description:

1. Matching, locking-type plug and receptacle body connector.
2. NEMA WD 6 Configurations L5-20P and L5-20R, heavy-duty grade, and FS W-C-596.
3. Body: Nylon, with screw-open, cable-gripping jaws and provision for attaching external cable grip.
4. External Cable Grip: Woven wire-mesh type made of high-strength, galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

1.10 CORD AND PLUG SETS

A. Description:

1. Match voltage and current ratings and number of conductors to requirements of equipment being connected.
2. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and ampacity of at least 130 percent of the equipment rating.
3. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

1.11 SWITCHES

A. Single Pole Switches: P & S CS20AC1-GRY, 20 A, 120/277-V ac or equal.
B. Three Way Switches: P & S CS20AC3-GRY, 20 A, 120/277-V ac or equal.
C. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on/off switches and audible frequency and EMI/RFI filters.
1. Control: Continuously adjustable slider; with single-pole or three-way switching to suit connections.
2. Fluorescent Lamp and LED Dimmer Switches: Modular; compatible with fixture manufacturer. Capable of consistent dimming with low end not greater than 5 percent of full brightness.

D. Pilot-Light Switches, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Cooper; AH1221PL for 120 and 277 V.
b. Hubbell; HBL1201PL for 120 and 277 V.
c. Leviton; 1221-LH1.
d. Pass & Seymour; PS20AC1RPL for 120 V, PS20AC1RPL7 for 277 V.

2. Description: Single pole, with neon-lighted handle, illuminated when switch is "off."

1.12 WALL PLATES

A. Single and combination types to match corresponding wiring devices.
1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Finished Locations: Type 302 stainless steel, P&S S(X)-N or equal
3. All devices shall have the faceplate labeled with the panel name and circuit number. Clear adhesive label with black lettering is acceptable. Coordinate with owner prior to labeling.

4. Wet Locations: Thermoplastic with spring-loaded lift cover and listed and labeled for use in "wet locations."
5. Unfinished Surface Mounted Locations: Raised covers such as Raco 800 series.

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

1.13 EXTERIOR IN-USE COVER

1. Intermatic WP1010MXD, or equal.

1.14 FLOOR SERVICE FITTINGS

A. Metal Floor Boxes:

Basis of design: Legrand, Walker RFB-4 with in lay cover. Finish and flooring type selected by Architect.

1. Material: Cast metal.

2. Type: Fully adjustable.

3. Shape: Rectangular.

4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. At each power location provide and install one 20A 125v duplex receptacle. Configuration 5-20R, gray finish.

C. At each voice and data communication outlet provide and install one Panduit GFG4IW “GFCI” module frame with two RJ45 Cat 6 jacks.

D. Compartments: Barrier separates power from voice and data communication cabling.

E. Service Plate: Round, die-cast aluminum with satin finish.

F. Power Receptacle: NEMA WD 6 Configuration 5-20R, gray finish, unless otherwise indicated.

G. Voice and Data Communication Outlet: Two modular, keyed, color-coded, RJ-45 jacks for UTP cable complying with requirements in Section 271500 "Communications Horizontal Cabling."

1.15 FINISHES

A. Device Color:
A. Color:
1. Wiring Devices Connected to Normal Power System: To be selected by Architect, or required finish by NFPA 70.

2. Wiring Devices Connected to Emergency Power System: Red, unless otherwise indicated or required by NFPA 70.

B. Wall Plate Color: Stainless Steel Type 302 unless noted for plastic covers, match device color.

PART 2 - EXECUTION

2.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:

a. Cut back and pigtail, or replace all damaged conductors.
b. Straighten conductors that remain and remove corrosion and foreign matter.
c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.

7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the left.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
   a. Provide clear label with branch circuit information on each.

G. Dimmers:

1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan speed control are listed for that application.
3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

## 2.2 GFCI RECEPTACLES

A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

## 2.3 IDENTIFICATION

A. Comply with Section 26 0553 "Identification for Electrical Systems."

B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with white-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

## 2.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:
1. Test Instruments: Use instruments that comply with UL 1436.
2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

B. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.

2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

C. Wiring device will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 26 2726

# SECTION 26 2816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

## 1.1 SUMMARY

A. This Section includes individually mounted enclosed switches and circuit breakers, rated 600 V and less, used for disconnecting and protection functions.

## 1.2 SUBMITTALS

A. Product Data: For each type of switch and circuit breaker indicated.
B. Shop Drawings: Include wiring diagrams for shunt-tripped circuit breakers.

## 1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
B. Source Limitations: Obtain switches and circuit breakers through one source from a single manufacturer.
C. Comply with NFPA 70.

## 1.4 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. General Electric Co.; Electrical Distribution & Control Division.
   2. Siemens Energy & Automation, Inc.
   3. Square D Co.

## 1.5 ENCLOSED SWITCHES

A. Enclosed, Nonfusible Switch: NEMA KS 1, Type HD, with lockable handle, interlocked with cover.
B. Enclosed, Fusible Switch, 800 A and Smaller: NEMA KS 1, Type HD, with clips to accommodate specified fuses, and lockable handle, interlocked with cover.

## 1.6 ENCLOSED CIRCUIT BREAKERS

A. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.
   1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
   2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
   3. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
   4. GFCI Circuit Breakers: Single- and two-pole configurations with 5 -mA trip sensitivity.
B. Molded-Case Circuit-Breaker Features and Accessories: Standard frame sizes, trip ratings, and number of poles.
   1. Lugs: Suitable for number, size, trip ratings, and material of conductors.

2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.
3. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
4. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage.

1.7 ENCLOSURES

A. Listed for environmental conditions of installed locations, including:
   1. Outdoor Locations: NEMA 250, Type 3R.
   2. Food Service Areas: NEMA 250, Type 4X, stainless steel.
   3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

1.8 INSTALLATION

A. Identify components; provide warning signs as specified in Division 26 Section "Basic Electrical Materials and Methods."

1.9 FIELD QUALITY CONTROL

A. Testing: After installing disconnect switches and circuit breakers and after electrical circuits have been energized, demonstrate product capability and compliance with requirements.
B. Inspections and Tests for Switches and Circuit Breakers: Make internal and external inspections and perform tests, including the following:
   1. Inspect for freedom from physical damage, proper unit rating, mechanical condition, enclosure integrity, cover operation, unit anchorage, clearances, and tightness of electrical connections. If a loose electrical connection is observed on any unit, check each electrical connection for each switch and circuit breaker with a torque wrench for compliance with manufacturer's torquing instructions.
   2. Test cover and other interlocks and interlock release devices for proper operation.
C. Additional Inspections and Tests for Switches: Include the following:
   1. Inspect for proper rating and fuse provisions.
   2. Check adequacy and integrity of fuseholders by removing and installing fuses.
   3. Check integrity of phase barriers.
   4. Inspect blade alignment visually while operating switch to observe adequacy of blade pressure.
D. Additional Inspections and Tests for Circuit Breakers: Include the following:
   1. Inspect for proper frame, trip, and fault current interrupting rating.
   2. Test shunt trip devices, circuits, and actuating components for proper operation.
E. Correct defective and malfunctioning units on-site, where possible, and re-inspect and retest to demonstrate compliance; otherwise, remove and replace with new units and retest.

END OF SECTION 26 2816

SECTION 26 5119 - LED LIGHTING

1.1 SUMMARY

A. Section Includes:

1. Interior solid-state luminaires that use LED technology.
2. Lighting fixture supports.
3. Exterior solid-state luminaires that are designed for and exclusively use LED lamp technology.
4. Luminaire supports.
5. Luminaire-mounted photoelectric relays.

1.2 DEFINITIONS

A. Retain terms that remain after this Section has been edited for a project.
B. CCT: Correlated color temperature.
C. CRI: Color Rendering Index.
D. Fixture: See "Luminaire."
E. IP: International Protection or Ingress Protection Rating.
F. LED: Light-emitting diode.
G. Lumen: Measured output of lamp and luminaire, or both.
H. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.3 SUBMITTALS

A. Product Data: For each type of lighting fixture scheduled, arranged in order of fixture designation. Include data on features, accessories, and finishes.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
B. Warranty Period: One (1) year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 LUMINAIRE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
B. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.
C. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.
D. Recessed Fixtures: Comply with NEMA LE 4.
E. CRI of minimum 80. CCT of 4000 K.
F. Minimum rated lamp life of 50,000 hours.
G. Lamps dimmable from 100 percent to 0 percent of maximum light output.
H. Internal driver.
I. Nominal Operating Voltage: Universal 120-277v.
J. Housings: Extruded-aluminum housing and heat sink.

2.2 MATERIALS

A. Metal Parts:
   1. Free of burrs and sharp corners and edges.
   2. Sheet metal components shall be steel unless otherwise indicated.
   3. Form and support to prevent warping and sagging

B. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit ordinary maintenance without removing the fixture from the ceiling grid. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during maintenance and when secured in operating position.

2.3 METAL FINISHES

A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

2.4 LUMINAIRE SUPPORT COMPONENTS

A. Comply with requirements in Section 260510 "Basic Electrical Materials and Methods" for channel and angle iron supports and nonmetallic channel and angle supports.

B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.

C. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, 12 gage.

D. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.

E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.1 INTERIOR INSTALLATION

A. Fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.

B. Support for Fixtures in or on Grid-Type Suspended Ceilings: Use grid for support.
   1. Install a minimum of two ceiling support system wires for each fixture. Locate not more than 6 inches from diagonally opposite fixture corners.
   2. Support Clips: Fasten to fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
   3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.

C. Adjust aimable fixtures to provide required light intensities.

3.2 EXTERIOR INSTALLATION

A. Fasten luminaire to structural support.

B. Supports:
   1. Sized and rated for luminaire weight.
   2. Able to maintain luminaire position after cleaning and revamping.
   3. Support luminaires without causing deflection of finished surface.
   4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

C. Wall-Mounted Luminaire Support:

1. Attached to structural members in walls or attach using through bolts and backing plates on either side of wall.

D. Install luminaires level, plumb, and square with finished grade unless otherwise indicated. Install luminaires at height and aiming angle as indicated on Drawings.

E. Coordinate layout and installation of luminaires with other construction.

F. Mark locations of exterior luminaires for approval by Architect prior to the start of luminaire installation.

G. Adjust luminaires that require field adjustment or aiming.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
3. Verify operation of photoelectric controls.

END OF SECTION 26 5119

# SECTION 27 1500 - VOICE AND DATA COMMUNICATION CABLING

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

A. This Section includes wire, cable, connecting devices, installation, and testing for wiring systems to be used as signal pathways for voice and high-speed data transmission.

## 1.3 SCOPE OF WORK

A. The contractor shall provide and install all boxes, conduit, cable tray and cables (data, phone and TV). The contractor shall provide and install all field termination devices, faceplates, patch panels and floor mounted data racks.

## 1.4 DEFINITIONS

A. EMI: Electromagnetic interference.
B. IDC: Insulation displacement connector.
C. LAN: Local area network.
D. PVC: Polyvinyl chloride.
E. STP: Shielded twisted pair.
F. UTP: Unshielded twisted pair.

## 1.5 SUBMITTALS

A. Product Data: Include data on features, ratings, and performance for each component specified.
B. Product Certificates: For each type of cable, connector, and terminal equipment, signed by product manufacturer.
C. Qualification Data: For Installer submit BICSI registration and Manufacturer’s Certified Installer documentation.
D. O&Ms; Include all data information for the complete installed system. Include test report.

## 1.6 QUALITY ASSURANCE

A. Installer Qualifications: System installer must be certified by the manufacturer in the installation of the products used and has a ***minimum of a BICSI registration at the Installer level.***
B. Source Limitations: Obtain all products except twisted-pair cables through one source from a single manufacturer.
C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
D. Comply with NFPA 70.

## 1.7 COORDINATION

A. Coordinate layout and installation of voice and data communication cabling with Owner's Director of Technology.
    1. Meet jointly with telecommunications and LAN equipment suppliers, local exchange carrier representatives, and Owner to exchange information and agree on details of equipment arrangements and installation interfaces.
    2. Record agreements reached in meetings and distribute to other participants.

3. Adjust arrangements and locations of distribution frames and cross-connect and patch panels in equipment rooms and wiring closets to accommodate and optimize arrangement and space requirements of telephone switch and LAN equipment.

1.8 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

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

1. Cable:
   a. General Cable Genspeed 6A, CMP rated, Manufacturers part # 7141823. For all data openings and cameras.
   b. General Cable Genspeed 10 UTP Category 6A, CMP rated, Manufacturers part # 7141823. For all WAP locations.
   c. General Cable Genspeed 6000 Enhanced, CMP rated, Manufacturers part #7131940. For all control applications including lighting.
   d. Or **pre-approved** equal.
2. Fiber Optic Cable
   a. Corning Cable Systems MIC Interlocking Armored Plenum Cable – 006E88-31131-A3 (six strand single mode).
   b. Berk Tech 6 Strand 50 micron fiber with plenum rated amour shield M-5-IPJ-6-DN-LE-AQ-BER
   c. Berk Tech 12 Strand 50 micron fiber with plenum rated amour shield M-5-IPJ-12-DN-LE-AQ-BER
   d. Or identified on plan.
3. Terminal and Connector Components and Distribution Racks:
   a. Panduit
   b. Or **pre-approved** equal

1.9 SYSTEM REQUIREMENTS

A. General: Coordinate the features of materials and equipment so they form an integrated system. Match components and interconnections for optimum future performance.

B. Expansion Capability: Unless otherwise indicated, provide spare conductor pairs in cables, positions in cross-connect and patch panels, and terminal strips to accommodate 20 percent future increase in active workstations.

1.10 MOUNTING ELEMENTS

A. Raceways and Boxes: Comply with Division 26 Section "Raceways and Boxes."

B. Backboards: 3/4-inch, interior-grade, fire-retardant-treated plywood.

1.11 TWISTED-PAIR CABLES, CONNECTORS, AND TERMINAL EQUIPMENT

A. Cables: Listed as complying with Category 6A TIA/EIA-568-B.

B. Conductors: Solid copper.

C. UTP Cable: Comply with TIA/EIA-568-B. Four, thermoplastic-insulated, individually twisted pairs of conductors; No. 24 AWG, color-coded; plenum rated jacket. General Cable Corporation. Genspeed 6000 Enhanced (Blue color jacket).

D. UTP Cable Connecting Hardware: Comply with TIA/EIA-568-B. IDC type, using modules designed for punch-down caps or tools.

1. IDC Terminal Block Modules: Integral with connector bodies, including plugs and jacks where indicated.

2. IDC Connecting Hardware: Consistent throughout Project.

E. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.
   1. Number of Jacks per Field: One for each four-pair UTP cable or two-pair STP cable indicated.
   2. Mounting: Rack.
   3. See detail on electrical plans.

F. Jacks and Jack Assemblies for UTP Cable: Modular, color-coded, RJ-45 receptacle units with integral IDC-type terminals.
   1. Panduit CJ688TP – Color as shown on the plan detail.

G. Workstation Outlets: Multiple jack-connector assemblies mounted in single or multigang faceplate, match cable openings as shown on the plans.
   1. Faceplate with Labels: Panduit CFPL-x- IG, verify color at time of shop drawings.
   2. Mounting: Flush, unless otherwise indicated.

H. Data Racks:
   1. Floor mounted two post Panduit R2P with vertical cable management on both sides use front and rear access Panduit PRV8 with PRD covers. Vertical management may be shared when mounted between racks.
   2. Floor mounted four post racks Panduit R4P with vertical cable management on both sides use front and rear access Panduit PRV6 with PRD covers.
   3. Install one horizontal cable management system between each patch panel, use Panduit WMP1E.

I. Patch Panels: All patch panels in IDF and rack mounted panels in MDF shall be Panduit CPPL48BLY Patch Panels, designed to fit within standard 19” equipment racks. Panels shall contain the quantity of RJ45 modular connectors as identified in the drawings or specifications. Any blank or spare ports shall be filled with CMBBL-X inserts. Provide enough patch panel space to terminate all of the cables plus 20% spares.

J. Fiber optic closet connector housing, use Panduit fiber enclosure FRME1U in IDF locations and FRMEZU in MDF location and Panduit FAP6WAQSCZ L/C fiber bulkheads.

1.12 IDENTIFICATION PRODUCTS

A. Comply with Division 26 Section "Basic Electrical Materials and Methods " and the following:
   1. Cable Labels: Self-adhesive vinyl or vinyl-cloth wraparound tape markers, machine printed with alphanumeric cable designations.

1.13 EXAMINATION

A. Examine pathway elements intended for cables. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation. Proceed with installation only after unsatisfactory conditions have been corrected.

1.14 APPLICATION OF MEDIA

A. Horizontal Cable for Data Service: Use UTP Category 6 plenum rated cable for runs between wiring closets and workstation outlets.

B. Horizontal Cable for Voice Service: Use UTP Category 6 plenum rated cable for runs between wiring closets and workstation outlets.

C. Terminate the 50 pair phone cable to telco 110 style patch panels in rack, use Leviton 49013-48 and Leviton 49013-24 or equal.

1.15 INSTALLATION

A. Wiring Method: Install wiring in raceway and cable tray except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. J-Hooks shall be installed with adequate support brackets as required per the drawings and standards. J-hooks shall be supported using commercially available components designed for the purpose of the existing building structure, and appropriate mounting application. J-Hooks shall not be supported from fixtures originally placed to support other equipment. Cabling contractor shall utilize the appropriate quantity of J- hooks and spaced as recommended by TIA/EIA industry standards. Use UL-listed plenum cable throughout. Conceal raceway and cables except in unfinished spaces. No single J-Hook shall contain more than 40 Cat 6 cables.

B. Install cables using techniques, practices, and methods that are consistent with Category 6 rating of components and that ensure Category 6 performance of completed and linked signal paths, end to end.

1. Cable raceways shall not be filled greater than the NEC maximum fill for the particular raceway type and in no case greater than 40%. Minimum Raceway shall be ¾" trade size.
2. Cables shall be installed in continuous lengths from origin to destination (no splices) unless specifically addressed in the document. Maximum cable lengths will not be exceeded per industry standards.
3. Where cable transition points are allowed, they shall be in accessible locations and housed in an enclosure intended and suitable for the purpose.
4. The cable's minimum bend radius and maximum pulling tension shall not be exceeded.
5. If a J-hook system is used to support cable bundles all horizontal cables shall be supported at a maximum of five-foot intervals. At no point shall cable(s) rest on acoustic ceiling grids or panels.
6. Horizontal distribution cables shall be bundled in groups of not greater than 40 cables. Cable bundle quantities in excess of 40 cables may cause deformation of the bottom cables within the bundle.
7. Cable shall be installed above fire-sprinkler and systems and shall not be attached to the system or any ancillary equipment or hardware. The cabling system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.
8. Cables shall not be attached to ceiling grid or lighting support wires. Where light support for drop cable legs are required, the contractor shall install clips to support the cabling.
9. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor prior to final acceptance at no cost to the Owner.
10. Cables shall be identified by a self-adhesive label in accordance with, ANSI/TIA/EIA-606A "Administration Standard for Telecommunications Infrastructure of Commercial Buildings". The cable label shall be applied to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate.

11. Unshielded twisted pair cable shall be installed so that there are no bends less than four times the cables outside diameter (4 X cable O.D.) at any point in the run.
12. Pulling tension on 4-pair UTP cables shall not exceed 25-pounds for a single cable or cable bundle.
13. Use of Panduit TAK-TAPE TTS-20R0 in the MDF, IDF and computer room (data center) is required. No nylon cable ties shall be allowed. In all plenum applications, Panduit HLSP or HLTP Tak-Ty cable ties shall be used.
14. Maximum cable lengths shall not be exceeded.
15. All horizontal runs, moves, adds, and changes must be documented. Permanent Link test results must be provided.
16. All penetrations through fire rated building structures (walls and floors) shall have a metal stuffing pipe that extends 12” beyond each side of the building structure and sealed with an appropriate firestop system. This requirement applies to through penetrations (complete penetrations) and membrane penetrations (through one side of a hollow fire structure). Any penetrating items i.e. riser slots and sleeves, cables, conduit, cable tray and raceways, etc. shall be firestopped.

C. Install exposed cables parallel and perpendicular to surfaces or exposed structural members and follow surface contours where possible. Exposed cables are only permitted in non-public spaces such as the rooms used for the data racks
D. Wiring within Wiring Closets and Enclosures: Provide conductors of adequate length. Train conductors to terminal points with no excess. Use lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
E. Separation of Wires: Comply with TIA/EIA-569-B rules for separating unshielded copper voice and data communication cabling from potential EMI sources, including electrical power lines and equipment.
F. Make splices, taps, and terminations only at indicated outlets, terminals, and cross-connect and patch panels.
G. Use splice and tap connectors compatible with media types.

1.16 GROUNDING

A. Comply with Division 26 Section "Grounding and Bonding."
B. Ground cable shields, drain conductors, and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.
C. Bond shields and drain conductors to ground at only one point in each circuit.
D. Signal Ground Terminal: Locate in each equipment room and wiring closet; isolate from power system and equipment grounding.
E. Signal Ground Bus: Mount on wall of main equipment room with standoff insulators.
F. Signal Ground Backbone Cable: Extend from signal ground bus to signal ground terminal in each equipment room and wiring closet.

1.17 INSTALLATION IN EQUIPMENT ROOMS AND WIRING CLOSETS

A. Mount patch panels, terminal strips, and other connecting hardware on floor-mounted racks, unless otherwise indicated.
B. Group connecting hardware for cables into separate logical fields.
C. Use patch panels to terminate cables entering the space, unless otherwise indicated.

1.18 INSTALLATION STANDARDS

A. Comply with requirements in TIA/EIA-568-B and TIA/EIA-569-B.

1.19 IDENTIFICATION

A. In addition to requirements in this Article, comply with applicable requirements in Division 26 Section "Basic Electrical Materials and Methods" and TIA/EIA-606.
B. System: Use a unique, three-syllable, alphanumeric designation for each cable and label cable and jacks, connectors, and terminals to which it connects with same designation. Use logical and systematic designations for facility's architectural arrangement.
C. Workstation: Label cables within outlet boxes.
D. Distribution Racks and Frames: Label each unit and field within that unit.
E. Within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
F. Cables, General: Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
G. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project, in software and format selected by Owner.

1.20 QUALITY ASSURANCE AND WARRANTIES

A. Perform the following tests and inspections:

1. Visually inspect UTP and optical fiber cable jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568-B.1.
2. Visually confirm Category 6, marking of outlets, cover plates, outlet/connectors, and patch panels.
3. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
4. Test UTP backbone copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.

    a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

5. Optical Fiber Cable Tests:

    a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
    b. Link End-to-End Attenuation Tests:

1) Horizontal and multimode backbone link measurements: Test at 850 or 1300 nm in 1 direction according to TIA-526-14-A, Method B, One Reference Jumper.
2) Attenuation test results for backbone links shall be less than 2.0 dB. Attenuation test results shall be less than that calculated according to equation in TIA/EIA-568-B.1.

6. UTP Performance Tests:

a. Test for each outlet. Perform the following tests according to TIA/EIA-568-B.1 and TIA/EIA-568-B.2:

1) Length (physical vs. electrical, and length requirements).
2) Insertion loss.
3) Near-end crosstalk (NEXT) loss.
4) Power sum near-end crosstalk (PSNEXT) loss.
5) Equal-level far-end crosstalk (ELFEXT).
6) Power sum equal-level far-end crosstalk (PSELFEXT).
7) Return loss.
8) Propagation delay.
9) Delay skew.

7. Optical Fiber Cable Performance Tests: Perform optical fiber end-to-end link tests according to TIA/EIA-568-B.1 and TIA/EIA-568-B.3.
8. Final Verification Tests: Perform verification tests for UTP and optical fiber systems after the complete communications cabling and workstation outlet/connectors are installed.

a. Voice Tests: These tests assume that dial tone service has been installed. Connect to the network interface device at the demarcation point. Go off-hook and listen and receive a dial tone. If a test number is available, make and receive a local, long distance, and digital subscription line telephone call.
b. Data Tests: These tests assume the Information Technology Staff has a network installed and is available to assist with testing. Connect to the network interface device at the demarcation point. Log onto the network to ensure proper connection to the network.

B. Document data for each measurement. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.

C. End-to-end cabling will be considered defective if it does not pass tests and inspections.

D. **Prepare test and inspection reports. Include in O&M Manuals**

END OF SECTION 27 1500

# SECTION 28 4621 - ADDRESSABLE FIRE-ALARM SYSTEMS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Fire-alarm control unit.
2. Manual fire-alarm boxes.
3. System smoke detectors.
4. Non-system smoke detectors.
5. Heat detectors.
6. Notification appliances.
7. Magnetic door holders.
8. Remote annunciator.
9. Addressable interface device.
10. Digital alarm communicator transmitter.

### 1.2 ACTION SUBMITTALS

A. General Submittal Requirements:

1. Shop Drawings shall be prepared by persons with the following qualifications:

a. Trained and certified by manufacturer in fire-alarm system design.
b. NICET-certified, fire-alarm technician; Level III or IV minimum.

B. Product Data: For each type of product, including furnished options and accessories.

C. Shop Drawings: For fire-alarm system.

1. Comply with recommendations and requirements in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
2. Include plans, elevations, sections, details, and attachments to other work.
3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.
4. Detail assembly and support requirements.
5. Include voltage drop calculations for notification-appliance circuits.
6. Include battery-size calculations.
7. Include input/output matrix.
8. Include statement from manufacturer that all equipment and components have been tested as a system and meet all requirements in this Specification and in NFPA 72.
9. Include performance parameters and installation details for each detector.

10. Verify that each duct detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
11. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale; coordinate location of duct smoke detectors and access to them.
    a. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators.
    b. Show field wiring required for HVAC unit shutdown on alarm.
    c. Locate detectors according to manufacturer's written recommendations.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 260500, include the following:

    a. Comply with the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
    b. Provide "Fire Alarm and Emergency Communications System Record of Completion Documents" according to the "Completion Documents" Article in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
    c. Complete wiring diagrams showing connections between all devices and equipment.
    d. Riser diagram.
    e. Record copy of site-specific software.
    f. Provide "Inspection and Testing Form" according to the "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:

        1) Equipment tested.
        2) Frequency of testing of installed components.
        3) Frequency of inspection of installed components.
        4) Requirements and recommendations related to results of maintenance.
        5) Manufacturer's user training manuals.

    g. Manufacturer's required maintenance related to system warranty requirements.
    h. Abbreviated operating instructions for mounting at fire-alarm control unit and each annunciator unit.

## 1.5 QUALITY ASSURANCE

A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.

## 1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: One year from date of Substantial Completion.

# PART 2 - PRODUCTS

## 2.1 SYSTEM DESCRIPTION

A. Noncoded, UL-certified addressable system, with multiplexed signal transmission and an emergency voice/alarm communications system. (Voice Evacuation)

B. Speaker/Strobe evacuation by building occupancy type and local jurisdiction

C. Automatic sensitivity control of certain smoke detectors.

D. All components provided shall be listed for use with the selected system.

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

## 2.2 SYSTEMS OPERATIONAL DESCRIPTION

A. Fire-alarm signal initiation shall be by one or more of the following devices:

1. Manual stations.
2. Heat detectors.
3. Smoke detectors.
4. Duct smoke detectors.
5. Carbon monoxide detectors.

B. Fire-alarm signal shall initiate the following actions:

1. Continuously operate alarm notification appliances.
2. Identify alarm and specific initiating device at fire-alarm control unit and remote annunciators.
3. Transmit an alarm signal to the remote alarm receiving station.
4. Unlock electric door locks in designated egress paths.
5. Release fire and smoke doors held open by magnetic door holders.

6. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
7. Close smoke dampers in air ducts of designated air-conditioning duct systems.
8. Activate emergency shutoffs for gas and fuel supplies.
9. Record events in the system memory.

C. Supervisory signal initiation shall be by one or more of the following devices and actions:

1. Loss of communication with any panel on the network.

D. System trouble signal initiation shall be by one or more of the following devices and actions:

1. Open circuits, shorts, and grounds in designated circuits.
2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
3. Loss of communication with any addressable sensor, input module, relay, control module, or remote annunciator.
4. Loss of primary power at fire-alarm control unit.
5. Ground or a single break in internal circuits of fire-alarm control unit.
6. Abnormal ac voltage at fire-alarm control unit.
7. Break in standby battery circuitry.
8. Failure of battery charging.
9. Abnormal position of any switch at fire-alarm control unit or annunciator.

E. System Supervisory Signal Actions:

1. Initiate notification appliances.
2. Identify specific device initiating the event at fire-alarm control unit and remote annunciators.
3. After a time delay of 200 seconds, transmit a trouble or supervisory signal to the remote alarm receiving station.

## 2.3 FIRE-ALARM CONTROL UNIT

A. Manufacturer:

1. Existing Manufacturer: Siemens Industry, Inc.; Fire Safety Division.
   a. Current service agent:
      1) Automatic Building Controls (ABC) – Phone # (605) 336-1200

B. General Requirements for Fire-Alarm Control Unit:

1. Bases of design: Siemens

2. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864.

3. Addressable Initiation Device Circuits: The FACP shall indicate which communication zones have been silenced and shall provide selective silencing of alarm notification appliance by building communication zone.
4. Addressable Control Circuits for Operation of Notification Appliances and Mechanical Equipment: The FACP shall be listed for releasing service.

C. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.

1. Annunciator and Display: Liquid-crystal type, 80 characters, minimum.
2. Keypad: Arranged to permit entry and execution of programming, display, and control commands.

D. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:

1. Pathway Class Designations: NFPA 72, Class B.
2. Pathway Survivability: Level 2.

E. Notification-Appliance Circuit:
1. Audible appliances shall be voice/alarm communications Type. (Voice Evacuation)
2. Where permissible by building occupancy type, audible appliances shall sound in a three-pulse temporal pattern, as defined in NFPA 72.
3. Where notification appliances provide signals to sleeping areas, the alarm signal shall be a 520-Hz square wave with an intensity 15 dB above the average ambient sound level or 5 dB above the maximum sound level, or at least 75 dBA, whichever is greater, measured at the pillow.
4. Visual alarm appliances shall flash in synchronization where multiple appliances are in the same field of view, as defined in NFPA 72.

F. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.

G. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory signals supervisory and digital alarm communicator transmitters and digital alarm radio transmitters shall be powered by 24-V dc source.

1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.

H. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.

## 2.4 MANUAL FIRE-ALARM BOXES

A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38.

1. Single-action mechanism, breaking-glass or plastic-rod, or pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
2. Station Reset: Key- or wrench-operated switch.

## 2.5 SYSTEM SMOKE DETECTORS

A. General Requirements for System Smoke Detectors:

1. Comply with UL 268; operating at 24-V dc, nominal.
2. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
3. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
4. Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status.

    a. Rate-of-rise temperature characteristic of combination smoke- and heat-detection units shall be selectable at fire-alarm control unit for 15 or 20 deg F per minute.
    b. Fixed-temperature sensing characteristic of combination smoke- and heat-detection units shall be independent of rate-of-rise sensing and shall be settable at fire-alarm control unit to operate at 135 or 155 deg F.
    c. Multiple levels of detection sensitivity for each sensor.
    d. Sensitivity levels based on time of day.

B. Photoelectric Smoke Detectors:

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:

    a. Primary status.
    b. Device type.
    c. Present average value.
    d. Present sensitivity selected.
    e. Sensor range (normal, dirty, etc.).

C. Duct Smoke Detectors: Photoelectric type complying with UL 268A.

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:

    a. Primary status.
    b. Device type.
    c. Present average value.

d. Present sensitivity selected.
e. Sensor range (normal, dirty, etc.).

3. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector for smoke detection in HVAC system ducts.
4. Each sensor shall have multiple levels of detection sensitivity.
5. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
6. Relay Fan Shutdown: Fully programmable relay rated to interrupt fan motor-control circuit.

## 2.6 CARBON MONOXIDE DETECTORS

A. General: Carbon monoxide detector listed for connection to fire-alarm system.

1. Mounting: Adapter plate for outlet box mounting.
2. Testable by introducing test carbon monoxide into the sensing cell.
3. Detector shall provide alarm contacts and trouble contacts.
4. Detector shall send trouble alarm when nearing end-of-life, power supply problems, or internal faults.
5. Comply with UL 2075.
6. Locate, mount, and wire according to manufacturer's written instructions.
7. Provide means for addressable connection to fire-alarm system.
8. Test button simulates an alarm condition.

## 2.7 HEAT DETECTORS

A. General Requirements for Heat Detectors: Comply with UL 521.

1. Temperature sensors shall test for and communicate the sensitivity range of the device.

B. Heat Detector, Combination Type: Actuated by either a fixed temperature or a rate of rise.

1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

C. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature.

1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

## 2.8 NOTIFICATION APPLIANCES

A. General Requirements for Notification Appliances: Connected to notification-appliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.

1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.

B. Speaker: For Voice Evacuation.
1. Ceiling Speakers: Siemens SL Series

C. Chimes: Vibrating type.

D. Speaker/Strobe Combinations.
1. Ceiling Mounted: Siemens SL Series
2. Wall Mounted: Siemens SL Series

E. Amplifiers:
1. System provide shall design voice notification system and provide amplifiers as required.
2. Coordinate amplifier locations with electrical contractor for supply power.
3. Coordinate amplifier locations with owner prior to installation rough-in.

F. Visible Notification Appliances: Xenon strobe lights complying with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- high letters on the lens.

1. Mounting: Wall mounted unless otherwise indicated.
2. Flashing shall be in a temporal pattern, synchronized with other units.
3. Strobe Leads: Factory connected to screw terminals.
4. Mounting Faceplate: Factory finished, red or white, verify color at time of shop drawings.

## 2.9 MAGNETIC DOOR HOLDERS

A. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching doorplate.

1. Electromagnets: Require no more than 3 W to develop 25-lbf holding force.
2. Wall-Mounted Units: Flush mounted unless otherwise indicated.
3. Rating: 24-V ac or dc.

B. Material and Finish: Match door hardware.

## 2.10 REMOTE ANNUNCIATOR

A. Description: Annunciator functions shall match those of fire-alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control unit, including acknowledging, silencing, resetting, and testing.

1. Mounting: Flush cabinet, NEMA 250, Type 1.

B. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

## 2.11 ADDRESSABLE INTERFACE DEVICE

A. General:

1. Include address-setting means on the module.
2. Store an internal identifying code for control panel use to identify the module type.
3. Listed for controlling HVAC fan motor controllers.

B. Monitor Module: Microelectronic module providing a system address for alarm-initiating devices for wired applications with normally open contacts.

C. Integral Relay: Capable of providing a direct signal to elevator controller to initiate elevator recall, to circuit-breaker shunt trip for power shutdown, or Boiler Shutdowns.

1. Allow the control panel to switch the relay contacts on command.
2. Have a minimum of two normally open and two normally closed contacts available for field wiring.

D. Control Module:

1. Operate notification devices.
2. Operate solenoids for use in sprinkler service.

## 2.12 DIGITAL ALARM COMMUNICATOR TRANSMITTER

A. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632.

B. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit and automatically capture a telephone line(s) and dial a preset number for a remote central station. When contact is made with central station(s), signals shall be transmitted. If service on either line is interrupted for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report telephone service restoration to the central station. If service is lost on both telephone lines, transmitter shall initiate the local trouble signal.

C. Local functions and display at the digital alarm communicator transmitter shall include the following:

1. Verification that both telephone lines are available.
2. Programming device.
3. LED display.
4. Manual test report function and manual transmission clear indication.
5. Communications failure with the central station or fire-alarm control unit.

D. Digital data transmission shall include the following:

1. Address of the alarm-initiating device.
2. Address of the supervisory signal.
3. Address of the trouble-initiating device.
4. Loss of ac supply.
5. Loss of power.
6. Low battery.
7. Abnormal test signal.
8. Communication bus failure.

E. Secondary Power: Integral rechargeable battery and automatic charger.

F. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

## PART 3 - EXECUTION

### 3.1 EQUIPMENT INSTALLATION

A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."

B. Equipment Mounting: Install fire-alarm control unit on finished floor.

C. Install wall-mounted equipment, with tops of cabinets not more than 78 inches above the finished floor.

D. Manual Fire-Alarm Boxes:

1. Install manual fire-alarm box in the normal path of egress within 60 inches of the exit doorway.
2. Mount manual fire-alarm box on a background of a contrasting color.
3. The operable part of manual fire-alarm box shall be between 42 inches and 48 inches above floor level. All devices shall be mounted at the same height unless otherwise indicated.

E. Smoke- or Heat-Detector Spacing: Comply with NFPA 72.

F. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct. Tubes more than 36 inches long shall be supported at both ends.

G. Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location. Do not install smoke detectors in sprinklered elevator shafts.

H. Single-Station Smoke Detectors: Where more than one smoke alarm is installed within a dwelling or suite, they shall be connected so that the operation of any smoke alarm causes the alarm in all smoke alarms to sound.

I. Remote Status and Alarm Indicators: Install in a visible location near each smoke detector, sprinkler water-flow switch, and valve-tamper switch that is not readily visible from normal viewing position.

J. Audible Alarm-Indicating Devices: Install not less than 6 inches below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Install all devices at the same height unless otherwise indicated.

K. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches below the ceiling. Install all devices at the same height unless otherwise indicated.

L. Device Location-Indicating Lights: Locate in public space near the device they monitor.

## 3.2 PATHWAYS

A. Pathways shall be installed in EMT.

B. Exposed EMT shall be painted red enamel.

## 3.3 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals.

B. Install framed instructions in a location visible from fire-alarm control unit.

## 3.4 GROUNDING

A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

B. Ground shielded cables at the control panel location only. Insulate shield at device location.

## 3.5 FIELD QUALITY CONTROL

A. Field tests shall be witnessed by authorities having jurisdiction.

B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Visual Inspection: Conduct visual inspection prior to testing.

    a. Inspection shall be based on completed record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" table in the "Documentation" section of the "Fundamentals" chapter.
    b. Comply with the "Visual Inspection Frequencies" table in the "Inspection" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.

2. System Testing: Comply with the "Test Methods" table in the "Testing" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
3. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" section of the "Fundamentals" chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

C. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

D. Fire-alarm system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

## 3.6 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

END OF SECTION 284621