

PROJECT MANUAL

Shoals Library Addition and Renovation

Project No: 23-700-121-1

404 High Street
Shoals, IN 47581

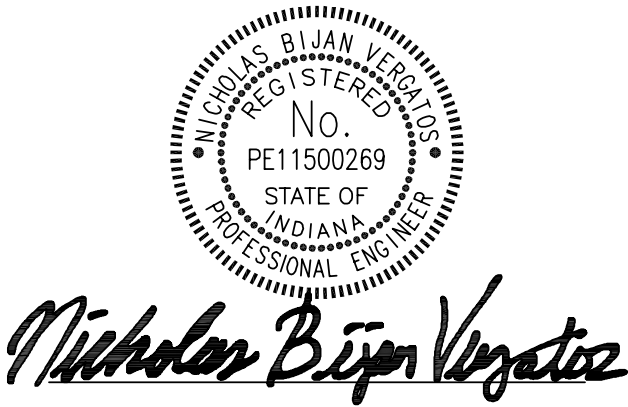
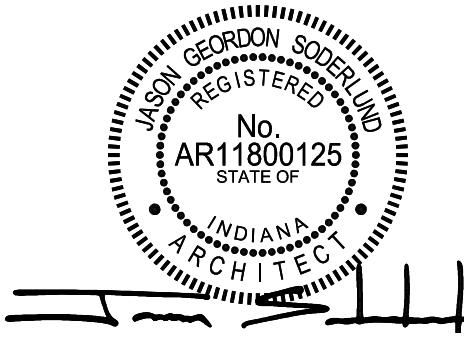
Technical Specifications

PREPARED FOR:

Shoals Library Foundation



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ADVERTISEMENT FOR BIDS

FROM:

1.1 THE Owner (HEREINAFTER REFERRED TO AS Owner):

- A. Shoals Library Foundation
- B. Address:
 - Shoals Public Library
 - 404 High Street
 - Shoals, Indiana 47581

1.2 AND THE Architect (HEREINAFTER REFERRED TO AS Architect):

- A. RQAW | DCCM
- B. Address:
 - 8770 North Street
 - Fishers, IN 46038

1.3 DATE: July 3, 2024

1.4 TO: POTENTIAL BIDDERS

- A. See the attached form RD Instruction 1942-A (Guide 19) (Attachment 1) "Advertisement for Bids."

ADVERTISEMENT FOR BIDS

Shoals Library Foundation

Owner

404 High St, Shoals, IN 47581

Address

July 3, 2024

Separate sealed BIDS for the construction of (briefly describe nature, scope, and major elements of the work) a 1,600 square-foot addition to and renovation of the Shoals Public Library in Shoals, IN.

will be received by Shoals Library Foundation

at the office of 404 High St, Shoals, IN 47581

until 4:45pm, (Local Time - Daylight Savings Time) August 5, 2024,

and then at said office publicly opened and read aloud.

The CONTRACT DOCUMENTS may be examined at the following locations:
Physical copies will be retained at the Shoals Public Library and at the Fishers

and Vincennes offices of RQAW for viewing. Digital copies may be obtained

through Eastern Engineering's Digital Plan Room at

distribution.easternengineering.com. See following pages for more details.

July 3, 2024

Date

Jenell Hoffman
Shoals Library Board President

ADVERTISEMENT FOR BIDS

The Shoals Public Library Board of Directors (Owner) is requesting Bids for the construction of the following Project:

Addition and renovation to Shoals Public Library Facility

Bids for the construction of the Project will be **received by the Shoals Public Library Board of Directors until Monday, August 5, 2024 at 4:45 P.M. local time. All sealed bids must be mailed or sent via Commercial Carrier to the Shoals Public Library, 404 High Street, Shoals, IN 47581. Sealed bids may be hand delivered to the Shoals Public Library, C/O Sylvia Albaugh, 404 High Street, Shoals, Indiana 47581.** Bids received after such hour will be returned unopened. Bids received prior to this time will be publicly read at the public meeting scheduled to take place on Monday, August 5, 2024 at 5:00 P.M. at the Shoals Public Library, 404 High Street, Shoals, Indiana 47581. All interested citizens are invited to attend and should any citizens require special provisions, such as handicapped modifications or non-English translation personnel, the Board will provide such provisions as long as the request is made by July 30, 2024.

The Project includes the following Work:

Base Bid:

Scope of work includes a 1,600 sq ft addition to and renovation of the Shoals Public Library and all other ancillary work required to complete the project as generally designed.

Mandatory Alternate #1 Bid:

Scope of work includes new finishes for the existing upper floor, new lighting for the existing upper floor of the library, and all other ancillary work required to complete the project as generally designed.

Mandatory Alternate #2 Bid:

Scope of work includes refinishing of existing exterior wood trim, including soffits, fasciae, and window exterior trim, and all other ancillary work required to complete the project as generally designed.

Obtaining the Bidding Documents

Information and Bidding Documents for the Project can be found at the following designated website:

distribution.easternengineering.com/

Bidding Documents may be downloaded from the designated website **for a non-refundable fee.** Prospective Bidders are urged to register with the designated website as a plan holder. The designated website will be updated periodically with addenda, lists of registered plan holders, reports, and other information relevant to submitting a Bid for the Project. All official notifications, addenda, and other Bidding Documents will be offered only through the designated website. Neither Owner nor Engineer will be responsible for Bidding Documents, including addenda, if any, obtained from sources other than the designated website.

A complete printed set of bidding documents may be ordered at distribution.easternengineering.com/ at printing cost to the bidder plus shipping fees.

The Issuing Office for the Bidding Documents is: **Eastern Engineering, 9901 Allisonville Road, Fishers, IN 46038, 866-884-4115.**

Plans and Specifications for the Projects are on file and may be examined at the following locations beginning: July 3, 2024

SHOALS PUBLIC LIBRARY
404 High Street
Shoals, IN 47581
(812) 247-3838

RQAW
328 N. 2nd Street
Vincennes, IN 47591
(812) 234-2551

RQAW
8770 North Street, Suite 110
Fishers, IN 46038
317-588-1753

Pre-bid Conference

A pre-bid conference will be held 10:00 AM (Local Time) on Tuesday, July 16, 2024 at the Shoals Public Library, 404 High Street, Shoals, IN 47581. Attendance at the pre-bid conference is encouraged but not required. All prime contractors, subcontractors, small, minority or women owned enterprises and other interested parties are invited to attend.

Instructions to Bidders

The work to be performed and the bid to be submitted shall include sufficient and proper sums for all general construction, mechanical installation, labor, materials, permits, licenses, insurance, and so forth incidental to and required for the construction of the facilities.

Each bid must be enclosed in a sealed envelope bearing the title of the Project, the name and address of Bidder. All bids must be submitted on the bid forms as identified in the Contract Documents and Specifications.

Each bid shall be accompanied by a certified check or acceptable bidder's bond made payable to the Owner, in a sum of not less than five percent (5%) of the total amount of the highest aggregate bid, which check or bond will be held by the Owner as evidence that the bidder will, if awarded the contract, enter into the same with the Owner upon notification from him to do so within ten (10) days of said notification.

Approved performance and payment bonds guaranteeing faithful and proper performance of the work and materials, to be executed by an acceptable surety company, will be required of the Contractor at the time he executes his contract. The bond will be in the amount of 100% of the Contract Price and must be in full force and effect throughout the term of the Construction Contract plus a period of twelve (12) months from the date of substantial completion.

The Owner reserves the right to reject any bid, or all bids, or to accept any bid or bids, or to make such combination of bids as may seem desirable, and to waive any and all informalities in bidding. Any bid may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof. Any bid received after the time and date specified shall not be considered. No bid may be withdrawn after the scheduled closing time for receipt of bids for at least ninety (90) days.

A conditional or qualified Bid will not be accepted. Award will be made to the low, responsive, responsible bidder. The low, responsive, responsible bidder must not be debarred, suspended, or otherwise be excluded from or ineligible for participation in federally assisted programs under Executive Order 12549.

All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the projects shall apply to the Projects throughout.

Bids shall be properly and completely executed on bid forms included in the Specifications. Bids shall include all information requested by Indiana Form 96 (Revised 2013) included with the Specifications. Under Section III of Form 96, the Bidder shall submit a financial statement. A copy of the proposed Financial Statement to be submitted with the bid is included in the bid documents section to these specifications. The Owner may make such investigations as deemed necessary to determine the ability of the Bidder to perform the work and the Bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. The Owner reserves the right to reject any bid if the evidence submitted by, or investigation of, such Bidder fails to satisfy the Owner that such Bidder is properly qualified to carry out the obligations of the Agreement and to complete the work contemplated therein.

Each Bidder is responsible for inspecting the Project site(s) and for reading and being thoroughly familiar with the Contract Documents and Specifications. The failure or omission of any Bidder to do any of the foregoing shall in no way relieve any Bidder from any obligation with respect to its Bid.

Bidder is required to submit with bid a written plan for an employee drug testing program that complies with IC 4-13-18-5 and IC 4-13-18-6.

Wage rates on the project shall not be less than the Federal wage scale published by the U.S. Department of Labor.

Bidders on this work shall be required to comply with the provisions of the President's Executive Order No. 11246, as amended. The Bidders shall comply with the requirements of 41 CFR Part 60-4 entitled Construction Contractors – Affirmative Action Requirements. A copy of 41 CFR Part 60-4 may be found in the Supplemental General Conditions of the Contract Documents and Specifications.

Bidders shall be aware of the requirements set by the Bipartisan Infrastructure Law of 2021, which mandate that all iron and steel, manufactured products, and construction materials used in a federal project must be produced in the United States. Pursuant to HUD's Notice, "Public Interest Phased Implementation Waiver for FY 2022 and 2023 of Build America, Buy America Provisions as Applied to Recipients of HUD Federal Financial Assistance" (88 FR 17001) any funds obligated by HUD on or after the applicable listed effective dates, are subject to BABA requirements, unless excepted by a waiver.

The Bidders attention is also called to the "Minority/Women Business Participation" and "Indiana Veteran Owned Small Business Program" requirements contained in the Project Specifications. The State of Indiana, Department of Commerce, has set a State goal of 10% participation for minority and female owned businesses and 3% participation of veteran owned businesses for construction or purchase related contracts for the work.

The Contractor must meet guidelines and practices established by the Indiana Office of Community & Rural Affairs and appropriate Federal regulations including: 1) Executive Order 11246, 2) Section 3 of the Housing and Community Development Act of 1968, as amended, 3) Certification of Non-Segregated Facilities, 4) OMB Circular A-102, 5) Title VI of the Civil Rights Act of 1964, 6) Section 504, Rehabilitation Act of 1973, 7) Age Discrimination Act of 1975, 8) Executive Order 12138, 9) Conflict of Interest Clause, 10) Retention and Custodial Requirements for Records Clause, 11) Contractors and Subcontractors Certifications, 12) Build America, Buy America Act (BABA) requirements under Title IX of the Infrastructure Investment and Jobs Act ("IIJA"), Pub. L. 117-58, 13) OMB's Memorandum M-24-02; Implementation Guidance on Application of Buy America Preference in Federal Financial Assistance Programs for Infrastructure, 14) U.S. Housing and Urban Development CPD Notice 23-12; CPD Implementation Guidance for the Build America, Buy America Act's domestic content procurement preference as part of the Infrastructure Investment and Jobs Act and others that may be appropriate or necessary.

In addition, the Contract Division procurement is subject to the Federal Regulations contained in the OMB Circular A-102, Sections B and O and the State of Indiana requirements contained in IC-36-1-9 and IC-36-1-12.

Any contract(s) awarded under this Advertisement for Bids are expected to be funded in part by a grant from the Department of Housing and Urban Development, as administered by the Indiana Office of Community & Rural Affairs. Neither the United States nor any of its departments, agencies or employees is or will be a party to this Advertisement or Bids or any resulting contract.

Pursuant to Chapter 5, 5-5 of the Labor Standards Administration and Basic Enforcement Handbook 1344.1 Rev 3; "No contract may be awarded to any contractor that is debarred, suspended or otherwise ineligible to participate in Federal or Federally assisted contracts or programs. Any contract awarded to a prime contractor or subcontractor that is found to be ineligible for award must be terminated immediately." Prior to contract award prime contractors are to be actively registered or seeking registration with SAM.gov to determine eligibility/debarment status.

For all further requirements regarding bid submittal, qualifications, procedures, and contract award, refer to the Instructions to Bidders that are included in the Bidding Documents.

This Advertisement is issued by:

Owner: **Shoals Public Library Board of Directors**

By: **Jenell Hoffman**

Title: **President**

Date: **7/3/24, 7/10/24**

END OF SECTION

SECTION 00 21 13
INSTRUCTIONS TO BIDDERS

SUMMARY

- 1.1 SEE AIA A701, INSTRUCTIONS TO BIDDERS following this document. See also modifications to A701 as noted in the document "RD Instruction 1942-A (Guide 27 - Attachment 2)," which is included after the AIA A701 document in this section.

DRAFT AIA® Document A701™ – 2018

Instructions to Bidders

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

« Shoals Library Addition and Renovation »
« 404 High Street, Shoals, IN 47581 »
« This project is for an approximately 1,600 sf addition to the Shoals Public Library. The project also includes some renovation work in the existing Library. »

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

« Shoals Library Foundation »« »
« 404 High Street, Shoals, IN 47581 »
« »
« »

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

« RQAW | DCCM »« »
« 8770 North St, Suite 110, Fishers, IN 46038 »
« »
« »

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

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

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.

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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.)

« [Eastern Engineering's Plan Room, https://distribution.easternengineering.com/](https://distribution.easternengineering.com/) »

§ 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.)

« [Email Hank Cowden at hcowden@rqaw.com](mailto:hcowden@rqaw.com) »

§ 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 uploaded to Eastern Engineering's Plan Room and distributed by email to known bidders. »

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

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

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

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 Preparation of Bids

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

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

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

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

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

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

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

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

§ 4.2 Bid Security

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

(Insert the form and amount of bid security.)

« »

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

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

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

§ 4.3 Submission of Bids

§ 4.3.1 A Bidder shall submit its Bid as indicated below:

(Indicate how, such as by website, host site/platform, paper copy, or other method Bidders shall submit their Bid.)

« **Submit a sealed bid to the owner's address prior to the date and time indicated in the Advertisement for Bids.** »

§ 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.)

« »

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.

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

« »

§ 7.2 Time of Delivery and Form of Bonds

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

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

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

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

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

§ 8.1 Copies of the proposed Contract Documents have been made available to the Bidder and consist of the following documents:

- .1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor, unless otherwise stated below.

(Insert the complete AIA Document number, including year, and Document title.)

« With modifications according to RD Instruction 1942-A (Guide 27 – Attachment 3) »

- .2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds, unless otherwise stated below.

(Insert the complete AIA Document number, including year, and Document title.)

« »

- .3 AIA Document A201™–2017, General Conditions of the Contract for Construction, unless otherwise stated below.

(Insert the complete AIA Document number, including year, and Document title.)

« »

- .4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:

(Insert the date of the E203-2013.)

« »

- .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.)

« »

ATTACHMENT TO AIA DOCUMENT A701-2018, *Instructions to Bidders*

The provisions of this Attachment shall delete, modify and supplement the provisions contained in the "*Instructions to Bidders*", AIA Document A701-2018 Edition. The provisions contained in this Attachment will supersede any conflicting provisions of the AIA Document. The term "Agency", as used in this Attachment, shall mean the United States of America, acting through the United States Department of Agriculture.

When the project is not subject to the Build America, Buy America Act the provisions in bold do not apply.

ARTICLE 1, DEFINITIONS

Add the following paragraphs and subparagraphs:

1.10 Build America, Buy America Act (BABAA) - Requirements instituted by the Bipartisan Infrastructure Law of 2021 mandating domestic preference that all iron and steel, manufactured products, and construction materials are produced in the United States.

1.10.1 Construction Materials - Those articles, materials, or supply - other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives - that are or consist primarily of: non-ferrous metals, plastic and polymer-based products, glass, lumber or drywall.

1.10.2 Manufactured Product - Items assembled out of components, or otherwise made or processed from raw materials into finished products. Manufactured products must be manufactured (assembled) in the United States, and the cost of components that were mined, produced, or manufactured in the United States must be greater than 55 percent of the total cost of all components of the project.

1.10.3 Manufacturer's Certification - Documentation provided by a Manufacturer, certifying that the items provided by Manufacturer meet the domestic preference requirements of BABAA.

ARTICLE 2, BIDDER'S REPRESENTATIONS

Add the following clauses to paragraph 2.1:

.7 This Bid has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this Bid, with any other Bidder or with any competitor.

.8 Bidder is familiar with all laws and regulations that may affect cost, progress, and performance of the work; **including BABAA requirements.**

ARTICLE 3, BIDDING DOCUMENTS

Add the following sentence to the end of subparagraph 3.3.1: "Any request for substitute or "or equal" shall include the Manufacturer's Certification of compliance with the Build America, Buy America Act (BABAA) requirements mandated by Title IX of the Infrastructure Investment and Jobs Act ("IIJA"), Pub. L.177-58".

ARTICLE 4, BIDDING PROCEDURES

Add the following sentence to the end of subparagraph 4.1.1:

"Only one copy of the Bid is to be submitted".

Delete subparagraph 4.2.1 in its entirety and substitute the following:

4.2.1 Each Bid must be accompanied by a Bid Bond payable to the Owner for 5% of the total amount of the Bid.

Delete the last sentence of subparagraph 4.2.4 and substitute the following:

"However, if no Contract has been awarded or a Bidder has not been notified of the acceptance of its Bid, a Bidder may withdraw its Bid and request the return of its bid security beginning 60 days after the opening of Bids, unless a different period of time is mandated by State Law." Should there be reasons why the Contract cannot be awarded within the specified period, the time may be extended, by mutual agreement between the Owner and the Bidder, and the concurrence of the Agency.

Add the following subparagraphs and clauses to paragraph 4.3:

4.3.6 All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the Project, shall apply to the Contract throughout.

4.3.7 The Bidder agrees to abide by the requirements of Executive Order 11246, specifically including the provisions of the Equal Opportunity Clause and the Standard Federal Equal Employment Construction Contract Specifications set forth in the Supplementary Conditions.

4.3.8 The Bidder agrees to abide by the requirements of section 319 of Public Law 101-121, which pertains to lobbying activities and applies to recipients of contracts or subcontracts that exceed \$100,000 at any tier under a Federal loan that exceeds \$150,000 or a Federal grant that exceeds \$100,000. Each Bid

shall be accompanied by a completed lobbying certification form identical to that included in the Bidding Documents.

4.3.9 The Bidder agrees to abide by the requirements under 2 CFR Part 417, which pertains to the debarment or suspension of a person from participating in a Federal program or activity.

4.3.10 This Bid is for services related to a project that is subject to the Build America, Buy America Act (BABAA) requirements under Title IX of the Infrastructure Investment and Jobs Act ("IIJA"), Pub. L. 117-58. Absent an approved waiver, all iron, steel, manufactured products, and construction materials used in this project must be produced in the United States, as further outlined by the Office of Management and Budget's regulation (reference 2 CFR 200, 2 CFR 184) on the application of Buy America Preference in Federal Financial Assistance Programs for Infrastructure.

4.3.11 Under these Bidding Instructions, all Bidders (Contractors / Subcontractors) shall be responsible for:

- .1 Providing bids that reflect compliance with BABAA requirements.
- .2 Providing only iron, steel, construction materials and manufactured products that meet BABAA requirements. Installation of materials or products that are not compliant with BABAA requirements shall be considered defective work.
- .3 Including manufacturer's certification for BABAA requirements with all applicable submittals. If a specific manufacturer is used in the bidding, a statement that the manufacturer will comply with BABAA requirements must be included with the bid submission. Contractor shall comply with BABAA requirements, including coordination with manufacturers, distributors, and suppliers to correct deficiencies in any BABAA documentation.
- .4 Providing manufacturer's certification for BABAA requirements with any change order for any new construction materials or manufactured products required by the change.
- .5 Certifying by submitting an application for payment, based in whole or in part on furnishing construction materials or manufactured products; that such materials and products, to the Contractor's knowledge, are compliant with BABAA requirements.
- .6 Ensuring that the Architect / Engineer has been provided an approved manufacturer's certification or

waiver prior to items being delivered to the project site.

.7 Certifying upon completion that all work and materials are in compliance with BABAA requirements.

Add the following terms and conditions to subparagraph 4.4.3:

The Owner keep the bid security provided by the Bidder.

ARTICLE 5, CONSIDERATION OF BIDS

Delete subparagraph 5.3.2 in its entirety and substitute the following:

5.3.2 The Owner shall have the right to accept Alternates in the sequence or combinations listed and to determine the low Bidder on the basis of the sum of the Base Bid and the Alternates accepted.

ARTICLE 7, PERFORMANCE BOND AND PAYMENT BOND

Delete subparagraph 7.1.1 in its entirety and substitute the following:

7.1.1 Prior to execution of the Contract, the Bidder shall furnish Bonds covering the faithful performance of the Contract and the payment of all obligations arising thereunder. Both Bonds shall be separately written, each in the amount of the Contract Sum with Power of Attorney attached naming "The United States of America, acting through the United States Department of Agriculture, Rural Development" as co-obligee. The cost shall be included in the Bid.

Delete subparagraph 7.1.3 in its entirety and substitute the following:

7.1.3 Surety companies executing Bonds must hold a certificate of authority as a acceptable surety on Federal Bonds as listed in Treasury Circular 570, as amended, and be authorized to transact business in the State where the Project is located.

Delete subparagraph 7.2.1 in its entirety and substitute the following:

7.2.1 The Bidder to whom the Contract is awarded will be required to execute the Agreement and obtain Performance and Payment Bonds, if required, within ten (10) calendar days from the date when the Notice of Award is delivered to the Bidder. The Notice shall be accompanied by the necessary Agreement.

Delete subparagraph 7.2.2 in its entirety and substitute the following:

7.2.2 The Bonds shall be written on forms identical to those included in the Bidding Documents.

ARTICLE 8, ENUMERATION OF CONTRACT DOCUMENTS

The following documents should be referenced, if applicable; in paragraph 8.1, clause .9:

Attachment to the *Standard Form of Agreement Between Owner and Contractor* (RD Instruction 1942-A, Guide 27, Attachment 3)
Attachment to the General Conditions of the Contract for Construction (RD Instruction 1942-A, Guide 27, Attachment 4)
Special Conditions
Invitation for Bids (Form RD 1924-5)
Instructions to Bidders, AIA A701-2018
Attachment to the Instructions to Bidders (this attachment)
Bid Form
Bid Bond
EEO Compliance Statement (Form RD 400-6)
Payment Bond
Performance Bond
Certification for Contracts, Grants and Loans (RD Instruction 1940-Q, Exhibit A-1)

(Note: Any additional provisions that are necessary to remain effective after execution of the Contract for Construction will be inserted here and continue in the same format.)

o0o

END OF SECTION

SECTION 00 31 00
AVAILABLE PROJECT INFORMATION

PART 1 GENERAL

1.1 EXISTING CONDITIONS

- A. Certain information relating to existing surface and subsurface conditions and structures is available to bidders but will not be part of Contract Documents, as follows:
- B. Geotechnical Report: Entitled SME Geotechnical Evaluation Report, dated February 14, 2024.
 - 1. This report identifies properties of below grade conditions and offers recommendations for the design of foundations, prepared primarily for the use of Architect.
 - 2. The recommendations described shall not be construed as a requirement of this Contract, unless specifically referenced in Contract Documents.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)



GEOTECHNICAL EVALUATION REPORT

SHOALS LIBRARY ADDITION
SHOALS, INDIANA

SME Project Number: 095099.00
February 14, 2024





11800 Exit 5 Parkway
Suite 106
Fishers, IN 46037

T (317) 876-0200

www.sme-usa.com

February 14, 2024

Ms. Sylvia Albaugh
Library Director
Shoals Public Library
P.O. Box 909, 404 High Street
Shoals, Indiana 47581

Via E-mail: salbaugh@shoals.lib.in.us

RE: Geotechnical Evaluation
Shoals Library Addition
404 High Street
Shoals, Indiana
SME Project No. 095099.00

Dear Ms. Albaugh:

We have completed our geotechnical evaluation for the subject project. This report presents the results of our observations and analyses, our geotechnical engineering recommendations, and general construction considerations based on the information disclosed by the borings.

We appreciate the opportunity to be of service. If you have questions or require additional information, please contact me.

Sincerely,

SME

A handwritten signature in blue ink, reading "Michael J. Hammond".

Michael J. Hammond, PE
Project Manager

Distribution: Mr. Clayton Springer, PE (JPS Consulting Engineers, LLC)

Enclosure: Geotechnical Evaluation Report Dated February 14, 2024

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APPENDIX A

BORING LOCATION DIAGRAM (FIGURE NO. 1)

BORING LOG TERMINOLOGY

BORING LOGS (B1 THROUGH B2)

APPENDIX B

IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL ENGINEERING REPORT

GENERAL COMMENTS

LABORATORY TESTING PROCEDURES

1. INTRODUCTION

This report presents the results of our geotechnical evaluation for the proposed library addition project in Shoals, Indiana. We conducted this evaluation in general accordance with the scope of services outlined in SME Proposal P04533.23 dated November 30, 2023. Please refer to the referenced proposal for information regarding our specific scope of services. The Shoals Public Library Director, Ms. Sylvia Albaugh, authorized our services.

To assist with our evaluation of the proposed project and to help with the preparation of this report, SME was provided with the following documents:

- Request for Proposal (RFP) for Geotechnical Services for the project titled "Shoals Library Addition" prepared by JPS Consulting Engineers, LLC and provided to SME on November 27, 2023. The document attachments included a site plan titled "City of Shoals - Shoals Public Library Expansion" prepared by RQAW and dated November 9, 2023.
- An MP4 file named "LiveDVFile_728778845.378977.MP4" showing the downhole pole-camera video performed by others. The file indicates the video was taken on February 4, 2024.

1.1 SITE CONDITIONS

The project site is located at the existing Shoals Library building located at 404 High Street in Shoals, Indiana. The general location of the site is depicted on the Location Map inset on the Boring Location Diagram (Figure No. 1) included in Appendix A of this report. The proposed addition is planned for the east side of the existing building. The project area is typically grass covered; however, the immediate area adjacent to the existing library building includes a concrete sidewalk and patio, a stairwell extending to the below-grade level of the library, and a patio constructed from paver extending east from the building.

The existing ground surface elevations at the proposed addition location generally slope down toward the south and east. The ground surface elevations within the proposed addition area range from about elevations 502 feet at the south end to about 506 feet at the north end. The project area is elevated from the adjacent road (US-50) and sidewalk, which are at about elevation 500 to 501 feet near the proposed addition area.

1.2 PROJECT DESCRIPTION

The project will include construction of a new addition to the existing Shoals Library building. The building addition will be a single-story, slab-on-grade building, approximately 20 feet by 40 feet in plan dimension. We anticipate structural loads will be maximum column loads of 100 kips and maximum wall loads of 4 kips per lineal foot based on the RFP. The site plan indicates the proposed addition will have a finished floor elevation (FFE) of 501.13 feet. Therefore, we expect cuts of about 1 to 5 feet will be required to achieve final subgrade levels in the proposed building addition.

The recommendations of this report are based on the information provided above and the results of the field evaluation. Contact SME if the final design information is different than discussed herein.

2. EVALUATION PROCEDURES

2.1 FIELD EXPLORATION

SME performed two borings (B1 through B2) at the project site on December 22, 2023. The approximate as-drilled boring locations are depicted on Figure No. 1. Borings were located slightly southeast of the proposed building footprint to avoid conflicts with existing utilities and site features (i.e., patios and picnic tables). Boring B1 was advanced to proposed depth of 20 feet. Boring B2 was terminated shallower than

proposed due to encountering a void at the boring location which created an unsafe condition for continuation of drilling operations. B2 was not offset or reperformed due to uncertainties regarding depth and lateral extent of the observed void. SME determined the number, depths, and locations of the borings based on the project information provided to us. SME staked the borings in the field using a hand-held GPS unit with sub-foot accuracy. SME also estimated the existing ground surface elevations at the boring locations using the GPS unit.

Borings were advanced with a rotary drill rig using continuous-flight augers to the termination depths of the borings to facilitate the collection of soil samples. The borings included soil sampling based upon the Split-Barrel Sampling procedure. Soil samples recovered from the field exploration were delivered to our laboratory for further observation and laboratory testing.

Groundwater level observations were recorded during and after completion of drilling and sampling. After recording groundwater level observations, the borehole at boring B1 was backfilled with auger cuttings. Therefore, long-term groundwater levels are not available from the boring. The borehole at boring B2 was left open to further evaluate the condition of the subsurface void. Shoals Library coordinated with others to perform downhole pole-camera services to evaluate the possible cause and extent of the void.

2.2 LABORATORY TESTING

The laboratory testing program consisted of visual soil classification (in general accordance with ASTM D-2488) of the recovered samples and moisture content and hand penetrometer testing of portions of the cohesive samples obtained. The Laboratory Testing Procedures in Appendix B provide descriptions of the laboratory tests performed. Based on the laboratory testing, we prepared a soil description and assigned a group symbol to the various soil strata encountered based on the Unified Soil Classification System (USCS).

Upon completion of the laboratory testing, boring logs were prepared which include information on materials encountered, the soil descriptions, penetration resistances, pertinent field observations made during the operations, and the results of the laboratory testing. The boring logs also include existing ground surface elevations at each boring location as estimated by SME. The boring logs are included in Appendix A. Explanations of symbols and terms used on the boring logs are provided on the attached Boring Log Terminology sheet.

Soil samples are normally retained in our laboratory for 60 days and then disposed, unless instructed otherwise.

3. SUBSURFACE CONDITIONS

3.1 SOIL CONDITIONS

The borings were performed in areas covered with surficial topsoil. The surficial topsoil thickness measurements reported on the boring logs should be considered approximate since mixing of these materials can occur in small diameter boreholes. Therefore, if more accurate surficial topsoil thickness measurements are required, we recommend performing additional evaluations such as shallow test pits or hand augers.

Below the surficial layer, the subsurface conditions encountered at the borings generally consisted of existing fill. The existing fill extended to a depth of about 11 feet below the ground surface at boring B1. The existing fill material typically consisted of very loose to loose sands. Asphalt fragments were observed in portions of some of the collected fill samples. The existing fill at boring B2 extend to a depth of about 3 feet below the existing ground surface, prior to encounter a void, which extended to about 9 feet below the existing ground surface. Based on the video from the downhole pole-camera services performed by others and provided to us by Shoals Library, it appears that the void was associated with a brick cistern. Images from the video are shown below.



IMAGE 1: Photograph near the top of the cistern (taken from the provided video).



IMAGE 2: Photograph near the bottom of the cistern (taken from the provided video).

It is sometimes difficult to distinguish between fill and natural soils based on samples and cutting from small-diameter boreholes, especially when the fill does not contain man-made materials, debris, topsoil or organic layers, and when the fill appears similar in composition to the local natural soils. Therefore, consider the delineation of fill described above and/or on the boring logs as approximate only. If needed, a more comprehensive evaluation of the extent and composition of the suspect fill could be made by reviewing former site topographic plans, aerial photographs, and other historical site records, along with observing test pit observations.

Below the fill strata at boring B1, the subsurface conditions typically encountered varying strata of silt, sandy lean clay, and fat clay to termination of the boring. The silt was encountered in a loose condition. The clays were encountered in a stiff to very stiff condition.

The soil profile described in this report and included on the boring logs is a generalized description of the encountered conditions. The stratification depths described in this report and shown on the logs indicate a zone of transition from one soil type to another. They are not intended to delineate exact depths of change between soil types. Soil conditions may vary between or away from the exploration locations. Please refer to the boring logs for the soil descriptions, and results of the field and laboratory tests at the specific exploration locations.

3.2 GROUNDWATER CONDITIONS

Groundwater was not encountered in the borings during and/or upon completion of drilling operations. In cohesive soils (i.e., clays and silts), a long time may be required for the groundwater level in the borehole to reach an equilibrium position. Therefore, the use of groundwater observation wells (piezometers) would be necessary to further evaluate the hydrostatic groundwater level within cohesive soils such as encountered at this site.

Expect hydrostatic groundwater levels, perched groundwater, and the potential rate of infiltration into excavations to fluctuate throughout the year, based on variations in precipitation, evaporation, run-off, and other factors. The groundwater levels indicated by the borings represent conditions at the time the readings were observed. The actual groundwater levels at the time of construction may vary.

4. ANALYSIS AND RECOMMENDATIONS

4.1 SITE PREPARATION AND EARTHWORK

4.1.1 EXISTING FILL CONSIDERATIONS

Clayey sand fill extended from below the topsoil to a depth of about 11 feet below the existing ground surface at boring B1. Asphalt fragments were observed in a portion of one of the collected samples of the clayey sand fill. The encountered existing fill had very loose to loose relative densities and contained varying unsuitable materials such as organics and asphalt fragments, which indicates the existing fill was placed in an uncontrolled manner. Therefore, we do not recommend supporting the building foundations or floor slabs on the existing fill in its current condition.

Existing fill must be removed and replaced with approved compacted engineered fill or subjected to ground improvement prior to construction of foundations and/or floor slabs. Alternatively, the structure could be supported on shallow foundation (after undercutting the existing fill and backfilling with approved engineered fill) and implementing a structural floor slab that is rigidly connected to the foundations. Utilizing a structural slab will reduce the risk of cracking from differential settlement and poor slab performance and allow existing fill to remain in place below the slab (but not the foundations). However, this option is generally more expensive than grade supported slabs. Furthermore, utilization of a structural slab would transfer slab loading to the foundation system, thereby increasing the size of foundations required.

As an alternative, a conventional slab supported on existing fill could be considered after subgrade improvement (i.e., partial undercut and in-place compaction) is performed provided the subgrade is properly prepared by the contractor, evaluated by SME during construction, and if the owner is prepared to accept the associated risks of poor structure performance. Existing fill materials inherently vary and the contractor should be prepared to remove areas of unsuitable fill materials if encountered within the building footprint. Existing fill to remain in-place should be of sufficient strength and free of deleterious materials, such as excessive debris and organics. Undercuts to remove unsuitable fills must be backfilled with engineered fill.

There are inherent risks of greater than typical settlement and poor structural performance (i.e., cracking and differential surface movements) associated with constructing floor slabs over undocumented fills. Proper subgrade preparation and evaluation during construction can reduce, but not eliminate these risks. Proper subgrade preparation typically includes proofrolling the surface of the fill in the presence of SME, additional evaluation of suspect or yielding materials, undercutting suspect materials or overly soft/loose subgrade, replacing undercuts with suitable engineered fill, and uniformly compacting the resulting subgrade surface prior to placing engineered fill.

The recommendations provided in the following report sections are based on the assumption that existing fill will be removed below proposed foundations or that ground improvement is performed using aggregate piers (see Sections 4.1.3.2 and 4.2.2.1 below). Floor slab support options are present in section 4.1.3 of this report depending on the risk tolerance for poor slab performance.

4.1.2 SITE SUBGRADE PREPARATION

Remove existing foundations, utilities, and other below-grade structures from previous construction to expose suitable natural soils and replaced with properly prepared engineered fill within the building footprint. Unsuitable existing backfill should be undercut and replaced with granular engineered fill. Exercise care when excavating near existing utilities to protect them from damage. Fill soils will not require removal and replacement if a ground improvement systems is utilized as discussed below in Sections 4.1.3.2, 4.1.3.3, and 4.2.2.

The proposed building addition area, along with other areas to receive engineered fill, must be cleared of existing topsoil, root mats, and other deleterious materials to expose the underlying inorganic subgrade soils. We recommend the clearing and stripping extend a minimum of 5 feet beyond the building areas.

After stripping surficial materials and removing deleterious materials, after cuts are made to design subgrade levels, but prior to filling, we recommend the subgrade be subjected to a comprehensive proof-rolling program in the presence of SME. The purpose of proof-rolling is to locate areas of soft/loose or disturbed subgrade materials that are considered unsuitable. We recommend proof-rolling be performed with a fully-loaded, tandem-axle dump truck or other heavily-loaded pneumatic-tire construction equipment. Areas of unsuitable subgrade during proof-rolling must be mechanically improved (compacted) in-place or removed and replaced with engineered fill. In areas not accessible to proof-rolling equipment, we recommend the exposed subgrade be evaluated by SME with hand-operated equipment such as dynamic cone penetrometers and hand augers.

The exposed subgrade soils are susceptible to disturbance due to weather, activity on-site, or when overly dry. Therefore, avoid disturbance of the subgrade and ensure these soils are suitably prepared prior to the placement of engineered fill. Areas of prepared subgrade may be protected from disturbance during construction by placing a layer of crushed aggregate over the subgrade. The contractor needs to remove or drain ponded surface water and grade the site to prevent surface water from draining toward or ponding over the building footprint and other areas of prepared subgrade.

If the subgrade becomes disturbed during the earthwork operations, it will be necessary to mechanically improve the disturbed subgrade by compacting the soil; removing and replacing the disturbed soils with engineered fill, crushed aggregate, or crushed concrete.

After the exposed subgrade is evaluated (as described above) and improved as necessary, engineered fill may be placed on the exposed subgrade to establish final design subgrade levels. See Section 4.1.4 of this report for materials and compaction requirements for engineered fill.

4.1.3 SUBGRADE PREPARATION FOR SLABS

As discussed in Section 4.1.1 of this report, unsuitable existing fill is anticipated at the proposed floor slab subgrade level. The unsuitable existing fill encountered in boring B1 was encountered in a very loose to loose condition and is not suitable for floor slab support in its in-situ condition.

Two options have been provided regarding support for floor slabs, each with their own associated level of risk. The Owner should consider the advantages of each option as well as risk tolerance. Note that recommendations provided in Section 4.1.3.4 "General Slab Support Considerations" apply regardless of the selected slab support methodology.

4.1.3.1 OPTION 1 - STRUCTURAL SLAB

A conservative approach for floor slab support would consist of utilizing a thickened and heavily reinforced structural slab rigidly connected to the adjacent foundations. The structural slab would carry the load directly and transfer to the foundation elements, thereby requiring less support from the underlying subgrade. This may include either a BRAB (Building Research and Advisory Board) Type III Post-Tensioned Slab (with or without thickened ribs) or a Type IV Mat Foundation designed for minimal flexure for areas with heavier localized loads. Similarly, a conventional slab supported on grade beams spanning between and rigidly connected to foundations could be considered, provided the slab can span between grade beams with minimum subgrade support. Note that the on-site existing fill soils could remain in-place below the slab if a structural slab is utilized, provided they pass a proof roll observation witnessed by SME personnel.

This type of floor slab system is considered more robust compared to the options discussed below, albeit at a higher price.

4.1.3.2 OPTION 2 – AGGREGATE PIERS

As an alternative to utilizing a structural slab, utilization of an aggregate pier system could be considered to improve subgrade support beneath a conventional floor slab system. A broader discussion regarding aggregate piers is provided below in Section 4.2 “Foundations” of this report. For support of the floor slabs, the aggregate piers would be placed beneath the floor slabs on a grid pattern and spaced per the aggregate pier contractor's design. The installation of this type of aggregate pier system may carry a higher initial cost, but aggregate pier elements are less dependent on prevailing site and weather conditions and will likely result in less disruption to the site. However, the feasibility for using an aggregate pier ground improvement system below the floor slab may not be practical given the size and scope of this project when considering the cost of mobilizing specialty equipment required. Furthermore, an installation methodology that considers the proximity to adjacent structures and the impacts of ground vibrations on these structures would be necessary.

In supporting the floor slab on an aggregate pier ground improvement system, it is sometimes necessary to construct a load transfer pad between the top of the pier elements and below the concrete slab-on-grade. At minimum, the aggregate pier contractor will need a stable working platform on which to traverse their equipment. The load transfer pad helps distribute loading across the slab to the pier elements and provides extra subgrade support between the stone column elements. Typically, the load transfer pad is comprised of a minimum of 12 inches crushed stone and sometimes incorporates mechanical stabilization (i.e. geogrid). The necessary thickness should be determined at the time of construction based upon the stability of the exposed subgrade as determined by proofrolling.

4.1.3.3 OPTION 3 - CONVENTIONAL SLAB ON IMPROVED SUBGRADE

A less conservative approach (which carries higher relative risk for poor performance) for floor slab construction would consist of supporting the slabs on an improved subgrade. Ground improvement consisting of mass excavating the site to partially remove the existing fill, screening to remove unsuitable material (where encountered), then re-placing in controlled compacted lifts is likely not feasible due to the depth of the fill and close proximity of the existing building and adjacent infrastructure. Therefore, partial undercut and replacement of the existing fill below the slab bearing elevation would reduce concerns regarding the existing fill compaction for immediate floor slab support, but would not eliminate risk associated with the variability of the underlying existing fill and long-term subgrade support. Preliminarily, we estimate a minimum undercut of 2 feet below the proposed subgrade level and replacement with approved compacted structural fill consisting of INDOT No. 53 crushed aggregate is necessary. The exposed subgrade must then be thoroughly proofrolled and uniformly compacted prior to backfilling with engineered fill to determine if additional undercut is required. Take care during compaction not to damage the nearby existing structure. A geogrid should be considered at the base of the undercut excavation to aid in reducing potential differential movements and may be necessary in order to achieve required compaction of the engineered backfill materials.

This option is the more cost-effective of the options discussed, but also carries higher risk as well (refer to Section 4.1.1).

4.1.3.4 GENERAL SLAB SUPPORT CONSIDERATIONS

We recommend the slab-on-grade subgrade soils be protected from frost action during winter construction. Frozen soils must be thawed and compacted, or removed and replaced prior to slab-on-grade construction. Prior to concrete placement for slabs, the subgrade needs to again be observed and tested to identify areas of subgrade that were disturbed during construction activities and to verify subgrade conditions are suitable for slab support. We recommend proof-rolling the final subgrade. If proof-rolling is not feasible because of access constraints, SME must observe and test the exposed subgrade using density in-place meters and/or other hand-operated equipment such as hand augers and cone penetrometers. Unsuitable subgrade indicated by SME needs to be removed and replaced with engineered fill or chemical modification could also be considered.

We recommend providing a minimum 6-inch thick slab subbase consisting of an approved INDOT No. 53 dense graded aggregate to provide a leveling surface for construction of slabs, and a moisture capillary break between the slabs and the underlying soils. The thickness of dense-graded aggregate may need to be increased based on the floor loads for the slabs and to protect the subgrade from disturbance during construction. When determining the aggregate thickness, consider the time of year, the condition of subgrade soils during construction, and the type and volume of construction equipment to traffic the prepared subgrade. The aggregate must also be compacted per Section 4.1.4 of this report.

We recommend a subgrade modulus (k_{30}) of 100 pounds per square inch (psi) per inch be used to design slabs supported on properly prepared subgrade and subbase course as described above. The recommended subgrade modulus k_{30} is based on correlations with soil type developed from plate load tests conducted using a 30-inch diameter plate with 0.05-inches of deflection.

Floor slabs need to be separated by isolation joints from structural walls and columns bearing on their own foundations to permit relative movement. A minimum of 6-inches of engineered fill is recommended between the bottom of the slab and the top of the shallow spread foundation below. The proposed floor slab must not be connected rigidly to the existing floor slab due to potential for differential movement (assuming ground improvement is utilized). This requirement does not apply to utilization of a structural floor slab as previously described.

We recommend a vapor retarder be provided below the floor slab if the slab is to receive an impermeable floor finish/seal or a floor covering which would act as a vapor barrier. The location of the vapor retarder (relative to the subbase) should be determined by the Architect/Engineer based on the intended floor usage, planned finishes, and in accordance with ACI recommendations.

Differential settlement could be manifested where grade slab of the building addition abuts existing structures. **Hard-finish flooring surfaces should not span across the interface between the existing building and the new addition without control joints**, as minor cracking and/or minor differential settlement may occur at the interface between the two structures.

4.1.4 ENGINEERED FILL REQUIREMENTS

Fill placed within the construction area must be free of frozen soil, organics, construction debris, particle sizes that will hinder compaction, or other deleterious materials. The fill must be spread in level layers not exceeding 9 inches in loose thickness and be compacted to a minimum of 100 percent of the maximum dry density as determined in accordance with the standard Proctor test for fill supporting foundations. A minimum of 95 percent of the maximum dry density as determined in accordance with the standard Proctor test applies for fill supporting floor slabs, adjacent to foundations, and over foundations. Sand fill should be compacted with a smooth drum vibratory roller or vibratory plate compactors including either walk-behind types, or plate compactors mounted on a backhoe or excavator (hoe-pac). Clay fill must be compacted using a sheepsfoot roller, or a pneumatic type compactor, at a moisture content ranging from the about 2 percent below to 2 percent above the optimum moisture content. Predominantly sandy soils must be compacted on the dry side of optimum (i.e., about 4 percent below optimum up to the optimum moisture content).

Based on information from the borings, we anticipate some of the existing fill should generally be suitable for reuse as engineered fill, provided they meet the general requirements listed in the previous paragraph. We recommend imported fill consist of INDOT No. 53 crushed aggregate or lean clay (if prevailing weather conditions allow). Lean clay soils used as engineered fill must have a liquid limit of less than 40, a plasticity index of less than 20, an organic content of less than 4 percent (by weight), a minimum dry unit weight of 100 pcf, and be absent of fibrous organic material, asphalt fragments or otherwise unsuitable debris.

Clays and sands with a significant amount of clays and/or silts (e.g., identified with a USCS Group Symbol of "CL", "ML", "SC", and "SM"), will be difficult to compact using smaller hand-operated compaction equipment and are not expected to be suitable for reuse as backfill for foundation excavations or utility trenches. These clayey and silty soils should also not be used as fill in areas where drainage is required. In cases where the contractor must compact clayey and/or silty subgrade soils, it

may be necessary to moisture condition the soil. Moisture conditioning is more easily performed during the warmer, drier summer months and may not be feasible during cold or wet times of the year.

The need for or extent of moisture conditioning of the soil to allow proper compaction can be affected by seasonal weather conditions at the time earthwork operations are performed, and the condition of the site soils. The project specifications should include provisions for moisture conditioning of soils to be placed and compacted on-site as engineered fill. Contractors should anticipate the need for moisture conditioning to allow for proper compaction and structure their construction bids accordingly.

Backfill in structural areas, utility trenches, and other confined areas where compaction is accomplished primarily by smaller, walk-behind plate compaction equipment should consist of an approved granular material. We recommend using open-graded granular fill material, such as INDOT No. 8 crushed aggregate, in and around areas where drainage is required. A geotextile separation fabric should be used at the interface of open-grade aggregates and surrounding material to prevent migration of finer sands and aggregates and native soils into the open-graded aggregates when used. INDOT No. 53 crushed aggregate may be used where drainage is not required. Thinner lifts may be required in confined spaces to achieve compaction of the backfill.

If necessary, we recommend coarse crushed aggregate used to backfill undercuts or to stabilize subgrades consist of a well-graded crushed natural aggregate generally ranging from 1 to 3 inches in size with no more than 7 percent by weight passing the No. 200 sieve (such as INDOT No. 2 crushed aggregate). In cases where granular engineered fill will be placed over the coarse crushed aggregate, the surface of the coarse crushed material must be covered with a suitable non-woven geotextile (e.g., Mirafi® 140N or 160N) or choked with INDOT No. 53 dense graded aggregate to help prevent migration of the granular materials into the coarser crushed aggregate.

4.2 FOUNDATIONS

4.2.1 SUBGRADE VERIFICATION

To verify suitable subgrade is exposed at the bearing surface of footing excavations, and the maximum net allowable soil bearing pressure is achievable, foundation subgrades must be evaluated and tested during construction. By preparing the geotechnical evaluation report, SME is currently the geotechnical engineer of record for this project and is best suited to observe and test the foundation subgrades during construction and to verify the recommendations of this report are properly implemented during construction.

4.2.2 SHALLOW FOUNDATIONS

4.2.2.1 SPREAD FOOTINGS ON AGGREGATE PIERS

A ground improvement technique using aggregate piers can be utilized to improve subgrade conditions for support of the building foundations due to the presence of existing fill soils. By increasing the soil modulus using aggregate piers, conventional spread foundations can be constructed at typical bearing levels and the design bearing pressure can be increased above what the existing soil conditions can support. The improvement in soil modulus will facilitate the use of a higher bearing pressure while limiting settlement to acceptable levels. Improved allowable soil bearing pressure typically range between 3,000 and 6,000 pounds per square foot (psf) depending upon existing site conditions and the required performance criteria.

Although a specialty contractor using specialized equipment will be required to install aggregate piers, this option offers several advantages that could offset the higher cost of retaining a specialty contractor. The installation of aggregate piers will be less dependent on weather conditions and therefore the project schedule may be less affected compared to the partial over excavation and replacement option. Another advantage of using aggregate piers is that some installation processes do not generate any spoil. Because of a greater level of subgrade improvement, a higher design foundation bearing pressure can be

used for foundations bearing on soils improved by aggregate piers thereby reducing foundation sizes and cost. Finally, the level of subgrade improvement and uniformity resulting from the installation of aggregate piers will result in lower total and differential settlement, which is necessary since the proposed structure will adjoin an existing building.

Aggregate piers are installed by experienced specialty contractors to meet the foundation design bearing pressure while limiting settlement to a predetermined value, which is typically one inch. The number of aggregate piers beneath isolated spread foundations and the spacing of aggregate piers beneath continuous wall foundations would be determined by the specialty contractor to meet the specified performance criteria developed by the project design engineer.

To provide uniform foundation subgrade conditions and a higher bearing pressure, we recommend aggregate piers be installed at each foundation location. Aggregate Piers can consist of Rammed Aggregate Piers (RAPs) designed and installed by Geopier® Foundation Company. More specifically, we recommend the GP3® System using lightly tamped concrete aggregate (CTA). This system consists of aggregate pier elements installed by placing and lightly tamping cement treated aggregate into the open hole in-lieu of typical crushed stone aggregate. The pier hardens after the cement is activated via drawing moisture from the subgrade, resulting in a stiffer aggregate pier compared to the typical GP3® System aggregate piers. The GP3® System using lightly tamped concrete aggregate is better suited for aggregate pier installation adjacent to existing structures where ground vibrations or disturbance resulting from the installation process are a concern. Additionally, GP3® System pier elements using CTA can be used to minimize stress overlap where new foundations are constructed adjacent to existing foundations.

Aggregate piers can also be installed to improve subgrade conditions for support of floor slabs in areas where the risk of premature loss of serviceability is not acceptable.

Preliminarily, we anticipate that an allowable bearing pressure of 3,000 to 4,000 psf (or higher) is achievable. Geopier Foundation Company can present more specific bearing pressures based on actual design loading, their desired pier spacing, and other factors.

If the aggregate pier ground improvement option is selected, we recommend SME assist the design team in preparing a performance specification outlining the proposed treatment area, design bearing pressure the foundation subgrades must achieve, and maximum settlement criteria. The specialty contractor should be asked for a submittal including their experience with similar projects, their proposed work plan, modifications to the stated design criteria (such as proposing a higher design bearing pressure), load test program, effect vibrations from the construction activities would have on nearby buildings or utilities, schedule, fee and any unit rates that apply to installation of additional piers, obstructions, delays or other events beyond their control. SME has significant experience with ground improvement by aggregate piers and is available to assist with preparing a performance specification, reviewing contractor submittals, and conducting post bid interviews.

Natural obstructions (e.g., cobbles) or man-made obstructions can affect penetration of the probe or tube resulting in the potential need for additional aggregate piers or possibly redesign of foundations. Planning for aggregate piers should include a method of measurement and payment for aggregate piers that encounter obstructions and for direct excavation of obstructions, where feasible, and backfilling these excavations to permit ground improvement. In some cases, installation of additional piers could be necessary to improve soils around obstructed piers, where excavation of the obstruction is not feasible. Such conditions should be evaluated and resolved on a case-by-case basis, during construction.

The aggregate pier contractor typically requests a stable working platform be provided for support of their equipment during aggregate pier installation. The subgrade should be proofrolled with a fully-loaded, tandem-axle truck or other similar pneumatic-tire construction equipment under the observation of SME as discussed in Section 4.1.2, improved as needed, and stabilized using crushed aggregate to provide a suitable working surface. The aggregate material used for a working platform should consist of a minimum 12-inch thick, or thicker if necessary (as determined by proofrolling), layer of crushed limestone aggregate meeting the gradational requirements of INDOT No. 53 gradation and compacted to a minimum density of 95 percent of the maximum dry density as determined by the Standard Proctor test.

We recommend the project plans and bid documents include this aggregate working surface and compaction requirement.

The pier installation and foundation subgrades should be observed and tested by SME. The testing criteria should be performed as outlined in the aggregate pier contractor's work plan. SME can assist in the development of the work plan and/or recommend an appropriate testing and verification program. SME can also prepare a performance specification and assist with selection of a qualified specialty contractor, if desired. For more information regarding Geopiers especially related to using lightly tamped concrete aggregate developed by Geopier Foundation Company, please contact Zach Ethington at (859) 583-3681.

4.2.2.2 SPREAD FOOTINGS ON IMPROVED SUBGRADE

Boring B1 encountered existing fill extending to a depth of about 11 feet below the existing ground surface, corresponding to an elevation of about 494 feet. The proposed foundations for the building addition with a FFE of 501.13 feet are anticipated to be near elevation 499 feet (assuming they are constructed approximately 2 feet below the FFE). We understand the existing building has a basement level with a FFE of 501.13 feet, and we anticipate the existing building foundations are also bearing at an elevation at or near 499 feet. Therefore, the existing fill is expected to extend approximately 5 feet below the proposed and existing foundation levels. The very loose to loose existing fill materials must be undercut from below foundations and replaced with approved engineered fill as described below. Preliminarily, we anticipate the contractor will need to undercut to an approximate depth of 5 feet to remove loose or otherwise unsuitable fill soils. Natural soils encountered below the fill will require careful inspection and testing via use of dynamic cone penetrometers, vane shear, and/or hand augers (along with strength testing) to determine appropriate depths of undercut. Care should be taken not to undermine existing building foundations during excavation of unsuitable materials. Appropriate underpinning and/or shoring should be performed, as needed.

Due to the depth of excavation (and proximity to adjacent structures), we anticipate that placement and compaction of approved aggregate backfill will be difficult. Therefore, we recommend that foundation excavations be backfilled with flowable fill as described below. Natural loose silt was encountered below the existing fill at boring B1. Silts can be easily disturbed during excavation; therefore, care should be taken when excavating to not disturb the silt stratum. The contractor should be prepared to stabilize disturbed material, as needed, before backfilling the excavated areas with flowable fill. Suitable engineered fill below footings should be limited to flowable fill having a compressive strength of 50 to 100 pounds per square inch (psi). Concrete backfill is not suitable for use as structural backfill.

The proposed building addition can be supported on conventional shallow spread footings bearing on the flowable fill overlying suitable natural silt and/or clay. Use a maximum net allowable soil bearing pressure of 2,000 pounds per square foot (psf) for foundations bearing on the soils described above. The design bearing pressure provided above is based on a minimum factor-of-safety of 3 (for general shear failure). **As an alternative to undercutting unsuitable soils and utilizing conventional spread footings, helical piles could be considered for foundation support. Note that utilization of helical piles may be necessary if a structural slab is utilized, which is expected to increase spread footing and wall loads. SME can provide additional recommendation for helical piles upon request. Contact SME if structural loads will be greater than estimated in Section 1.2 of this report.**

Where undercutting is necessary, foundations can be constructed at the bottom of the undercut, or the design foundation bearing elevation can be re-established by placing compacted engineered fill or crushed aggregate. The foundation undercuts should be oversized laterally and backfilled with granular engineered fill or crushed aggregate as shown on Image 3 (*Typical Foundation Undercutting Diagram*) below.

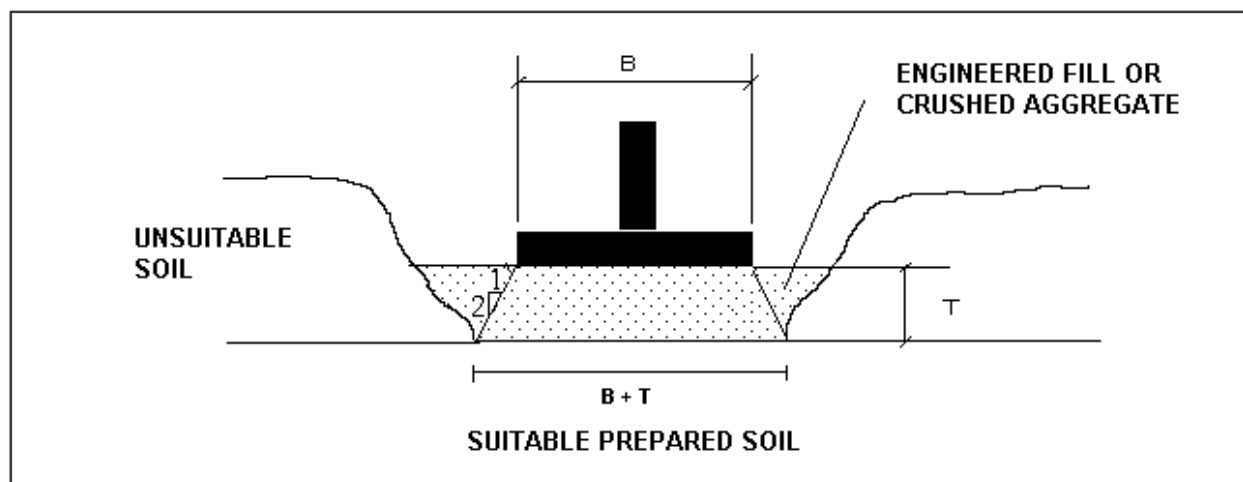


IMAGE 3: Typical foundation undercutting diagram

As indicated in the 2014 Indiana Building Code (Table 1608.2) for sites located in Martin County, shallow foundations must be situated a minimum of 24 inches below final site grade in any unheated areas for protection against frost action during normal winters. Foundations in interior (heated) areas of the building can be designed at shallower bearing levels on suitable soils just below the grade slab. However, the contractor must protect the foundations and proposed bearing soils from freezing during construction if work occurs in the winter months.

For frost heave considerations, vertical excavation sidewalls must be maintained during foundation concrete placement and the side walls must not be allowed to “mushroom out” near the top. If vertical earthen sidewalls cannot be maintained, it will be necessary to slope back the foundation excavations and form foundation sidewalls to maintain vertical faces for foundations and reduce the potentially adverse effects resulting from frost heave. Caved soils must be suitably removed from the foundation bearing surfaces before placing concrete.

For bearing capacity and settlement considerations, we recommend continuous (wall) foundations have a minimum width of 18 inches and column foundations have a minimum lateral dimension of 30 inches. In cases where structural loads are light, the minimum foundation size criteria may govern the size of the foundations and not the recommended allowable soil bearing pressure.

Total settlements for spread foundations are estimated to be 1 inch or less and differential settlements for foundations supporting similar loads are estimated to be about one-half of the total settlement, or less. This settlement estimate is based on the boring information, recommended maximum net allowable soil bearing pressures, estimated structural loads, our experience with similar structures and soil conditions, along with field verification of suitable bearing soils by SME.

4.3 SEISMIC SITE CLASSIFICATION

Based on the subsurface information obtained from the borings drilled to a maximum depth of 20 feet, along with the specifications provided by the 2014 Indiana Building Code (modified 2012 International Building Code), a Site Classification of “D” applies to this site for structural seismic design.

4.4 BELOW-GRADE WALLS

4.4.1 WALL FOUNDATIONS

The building addition is proposed to be constructed with below-grade walls. These walls will bear on shallow continuous (wall) foundations over soils suitable for the recommended design soil bearing pressure, as provided in Section 4.2 of this report.

4.4.2 WALL BACKFILL

We recommend the below-grade wall backfill immediately behind or against the wall (recommended to extend a minimum of 12 inches behind the wall) consist of an open-graded well-draining granular material (e.g., INDOT graded structural backfill with a maximum nominal diameter of 1-inch and containing no more than 8 percent passing the No. 200 sieve) compacted as engineered fill. To limit water infiltration into the granular backfill behind the wall, the upper 1 to 2 feet of the backfill should consist of compacted clay placed as engineered fill.

Exercise care during compaction of the wall backfill to avoid overstressing the walls. If required, walls must be designed to accommodate the additional stresses associated with operating compaction equipment adjacent to the wall.

4.4.3 LATERAL EARTH PRESSURES AND SLIDING RESISTANCE

Provided an open-graded granular material is used as backfill, a unit weight of 120 pounds per cubic foot (pcf) and a friction angle of 33 degrees can be considered for design purposes. The below-grade walls are expected to be rigid walls or restrained so they do not rotate sufficiently to permit the lower active earth pressure (K_a) condition to be reached. Therefore, an at-rest lateral earth pressure coefficient (K_0) of 0.45 and an equivalent fluid at-rest pressure of 57 psf per foot of wall height is recommend for calculating the lateral earth pressures. This equivalent fluid pressure would increase linearly from zero psf at the ground surface, to a maximum at the base of the wall.

Additional lateral pressures due to surcharge loading must be added to the above lateral earth pressures for design. Surcharge loads need to be modeled as a uniform pressure distribution applied to the entire wall height. We recommend using a horizontal coefficient for at-rest conditions, anticipating the below-grade walls will be held rigid, to calculate loads on walls due to surcharges.

Sliding or shear resistance along the base of wall foundations may also be used to resist horizontal loads. We recommend an ultimate coefficient of sliding friction of 0.3 for foundation design for foundations bearing on engineered fill overlying the suitable natural silt and lean clay. Additionally, we recommend a minimum factor of safety of 1.5 for sliding stability or shear resistance.

4.4.4 DRAINAGE

The earth pressures presented above are for a drained wall backfill. To reduce the potential for the build-up of hydrostatic pressure behind the below-grade walls, we recommend foundation drains be installed along the sides of the below-grade walls retaining soil. The installation of a long-term drainage system is critical for the facility, as groundwater levels observed in the area could infiltrate the lower level depending on seasonal conditions, and the final design bearing level of the walls.

We recommend the foundation drains consist of a minimum 6-inch diameter perforated plastic drain pipe, wrapped with a filter fabric (e.g. Mirafi® 140N or 160N) and surrounded by 6 inches of a filter material, such as INDOT No. 8 crushed limestone wrapped with a filter fabric. The drains need to be discharged into a gravity drainage outlet (or connected to a sump pump system if gravity drainage is impractical). We recommend the design include provisions for access to the drains for cleaning and maintenance (i.e., clean-outs). Roof downspouts must not be discharged onto the ground surface above the below-grade walls.

4.5 CONSTRUCTION CONSIDERATIONS

Excavations are not anticipated to extend below the depth of groundwater; however, water seepage into shallow foundation and utility excavations should be anticipated during construction. We anticipate standard sump pit and pump methods should generally be adequate to control groundwater on a localized and temporary basis for excavations, as needed.

The near-surface soils present at the site are moisture sensitive and susceptible to disturbance if they become wet and are trafficked by construction equipment. It will likely be more difficult and costly to attempt construction at this site during periods of seasonally cooler and/or wet weather. The warmer summer months will be the optimal time period to perform earthwork activities at this site in order to reduce disturbance of the existing soils, and the need for undercutting of disturbed materials and subgrade remediation. Subgrade stabilization using coarse crushed aggregates and geo-fabrics, and construction of dedicated construction roads, may be necessary to facilitate construction at this site. If subgrade preparation occurs during periods of adverse weather, chemical subgrade modification or stabilization could help reduce subgrade disturbance.

The contractor must protect adjacent existing buildings, utilities, and roadways during construction of the proposed building and site improvements. During the excavating and compacting operations, excessive vibrations should not cause settlement of the existing buildings, utilities, and roadways, and the contractor should avoid undermining existing buildings, utilities, and roadways. Excavations should not extend below existing foundations without first properly underpinning or shoring the existing foundations. In areas where there is insufficient space to temporarily slope back excavations in accordance with applicable regulations, temporary earth retention systems will be required during construction. Underpinning, shoring and earth retention systems should be designed by a qualified professional engineer, and installed by a contractor experienced with construction of these systems.

The contractor must provide safely sloped excavations or an adequately constructed and braced shoring system in accordance with federal, state, and local safety regulations for individuals working in an excavation that may expose them to the danger of moving ground. If material is stored or heavy equipment is operated near an excavation, use appropriate shoring to resist the extra pressure due to the superimposed loads.

Handling, transportation, and disposal of excavated materials and groundwater should be performed in accordance with applicable environmental regulations.

5. SIGNATURES

PREPARED BY:



Michael J. Hammond, PE
Project Engineer

REVIEWED BY:



Wesley J. Hemp, PE, PG (KY, LA), LEED AP
Senior Consultant

APPENDIX A

BORING LOCATION DIAGRAM (FIGURE NO. 1)

BORING LOG TERMINOLOGY

BORING LOGS (B1 THROUGH B2)



NOT TO SCALE



NOTE:

-
- A horizontal line segment is shown with vertical tick marks at 0', 20', and 40'. The segment from 0' to 20' is shaded gray, representing the 20% of the total length.

No.	Revision Date	Date	1-8-2024
		Drawn By	JLN
		Designed By	MH
		Scale	AS NOTED
		Project	095099.00

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Figure No. 1



BORING LOG TERMINOLOGY

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART		
COARSE-GRAINED SOIL (more than 50% of material is larger than No. 200 sieve size.)		
Clean Gravel (Less than 5% fines)		
GRAVEL More than 50% of coarse fraction larger than No. 4 sieve size		GW Well-graded gravel; gravel-sand mixtures, little or no fines
		GP Poorly-graded gravel; gravel-sand mixtures, little or no fines
Gravel with fines (More than 12% fines)		
		GM Silty gravel; gravel-sand-silt mixtures
		GC Clayey gravel; gravel-sand-clay mixtures
Clean Sand (Less than 5% fines)		
SAND 50% or more of coarse fraction smaller than No. 4 sieve size		SW Well-graded sand; sand-gravel mixtures, little or no fines
		SP Poorly-graded sand; sand-gravel mixtures, little or no fines
Sand with fines (More than 12% fines)		
		SM Silty sand; sand-silt-gravel mixtures
		SC Clayey sand; sand-clay-gravel mixtures
FINE-GRAINED SOIL (50% or more of material is smaller than No. 200 sieve size)		
SILT AND CLAY Liquid limit less than 50%		ML Inorganic silt; sandy silt or gravelly silt with slight plasticity
		CL Inorganic clay of low plasticity; lean clay, sandy clay, gravelly clay
		OL Organic silt and organic clay of low plasticity
SILT AND CLAY Liquid limit 50% or greater		MH Inorganic silt of high plasticity, elastic silt
		CH Inorganic clay of high plasticity, fat clay
		OH Organic silt and organic clay of high plasticity
HIGHLY ORGANIC SOIL		PT Peat and other highly organic soil

OTHER MATERIAL SYMBOLS		

LABORATORY CLASSIFICATION CRITERIA	
GW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}^2}{D_{10} \times D_{60}}$ between 1 and 3
GP	Not meeting all gradation requirements for GW
GM	Atterberg limits below "A" line or PI less than 4
GC	Atterberg limits above "A" line with PI greater than 7
SW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{D_{30}^2}{D_{10} \times D_{60}}$ between 1 and 3
SP	Not meeting all gradation requirements for SW
SM	Atterberg limits below "A" line or PI less than 4
SC	Atterberg limits above "A" line with PI greater than 7
Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows: Less than 5 percent.....GW, GP, SW, SP More than 12 percent.....GM, GC, SM, SC 5 to 12 percent.....Cases requiring dual symbols • SP-SM or SW-SM (SAND with Silt or SAND with Silt and Gravel) • SP-SC or SW-SC (SAND with Clay or SAND with Clay and Gravel) • GP-GM or GW-GM (GRAVEL with Silt or GRAVEL with Silt and Sand) • GP-GC or GW-GC (GRAVEL with Clay or GRAVEL with Clay and Sand) If the fines are CL-ML: • SC-SM (SILTY CLAYEY SAND or SILTY CLAYEY SAND with Gravel) • SM-SC (CLAYEY SILTY SAND or CLAYEY SILTY SAND with Gravel) • GC-GM (SILTY CLAYEY GRAVEL or SILTY CLAYEY GRAVEL with Sand)	
PARTICLE SIZES	
Boulders	- Greater than 12 inches
Cobbles	- 3 inches to 12 inches
Gravel- Coarse	- 3/4 inches to 3 inches
Gravel- Fine	- No. 4 to 3/4 inches
Sand- Coarse	- No. 10 to No. 4
Sand- Medium	- No. 40 to No. 10
Sand- Fine	- No. 200 to No. 40
Silt and Clay	- Less than (0.0074 mm)
PLASTICITY CHART	

VISUAL MANUAL PROCEDURE	
When laboratory tests are not performed to confirm the classification of soils exhibiting borderline classifications, the two possible classifications would be separated with a slash, as follows: For soils where it is difficult to distinguish if it is a coarse or fine-grained soil: • SC/CL (CLAYEY SAND to Sandy LEAN CLAY) • SM/ML (SILTY SAND to SANDY SILT) • GC/CL (CLAYEY GRAVEL to Gravelly LEAN CLAY) • GM/ML (SILTY GRAVEL to Gravelly SILT) For soils where it is difficult to distinguish if it is sand or gravel, poorly or well-graded sand or gravel; silt or clay; or plastic or non-plastic silt or clay: • SP/GP or SW/GW (SAND with Gravel to GRAVEL with Sand) • SC/GC (CLAYEY SAND with Gravel to CLAYEY GRAVEL with Sand) • SM/GM (SILTY SAND with Gravel to SILTY GRAVEL with Sand) • SW/SP (SAND or SAND with Gravel) • GP/GW (GRAVEL or GRAVEL with Sand) • SC/SM (CLAYEY to SILTY SAND) • GM/GC (SILTY to CLAYEY GRAVEL) • CL/ML (SILTY CLAY) • ML/CL (CLAYEY SILT) • CH/MH (FAT CLAY to ELASTIC SILT) • CL/CH (LEAN to FAT CLAY) • MH/ML (ELASTIC SILT to SILT)	
DRILLING AND SAMPLING ABBREVIATIONS	
2ST	- Shelby Tube - 2" O.D.
3ST	- Shelby Tube - 3" O.D.
AS	- Auger Sample
GS	- Grab Sample
LS	- Liner Sample
NR	- No Recovery
PM	- Pressure Meter
RC	- Rock Core diamond bit. NX size, except where noted
SB	- Split Barrel Sample 1-3/8" I.D., 2" O.D., except where noted
VS	- Vane Shear
WS	- Wash Sample
OTHER ABBREVIATIONS	
WOH	- Weight of Hammer
WOR	- Weight of Rods
SP	- Soil Probe
PID	- Photo Ionization Device
FID	- Flame Ionization Device
DEPOSITIONAL FEATURES	
Parting	- as much as 1/16 inch thick
Seam	- 1/16 inch to 1/2 inch thick
Layer	- 1/2 inch to 12 inches thick
Stratum	- greater than 12 inches thick
Pocket	- deposit of limited lateral extent
Lens	- lenticular deposit
Hardpan/Till	- an unstratified, consolidated or cemented mixture of clay, silt, sand and/or gravel, the size/shape of the constituents vary widely
Lacustrine	- soil deposited by lake water
Mottled	- soil irregularly marked with spots of different colors that vary in number and size
Varved	- alternating partings or seams of silt and/or clay
Occasional	- one or less per foot of thickness
Frequent	- more than one per foot of thickness
Interbedded	- strata of soil or beds of rock lying between or alternating with other strata of a different nature
DESCRIPTION OF RELATIVE QUANTITIES	
The visual-manual procedure uses the following terms to describe the relative quantities of notable foreign materials, gravel, sand or fines: Trace - particles are present but estimated to be less than 5% Few - 5 to 10% Little - 15 to 25% Some - 30 to 45% Mostly - 50 to 100%	

CLASSIFICATION TERMINOLOGY AND CORRELATIONS			
Cohesionless Soils		Cohesive Soils	
Relative Density	N ₆₀ (N-Value) (Blows per foot)	Consistency	Undrained Shear Strength (kips/ft ²)
Very Loose	0 to 4	Very Soft	<2
Loose	5 to 10	Soft	2 - 4
Medium Dense	11 to 30	Medium	5 - 8
Dense	31 to 50	Stiff	9 - 15
Very Dense	51 to 80	Very Stiff	16 - 30
Extremely Dense	Over 81	Hard	> 30
Standard Penetration 'N-Value' = Blows per foot of a 140-pound hammer falling 30 inches on a 2-inch O.D. split barrel sampler, except where noted. N60 values as reported on boring logs represent raw N-values corrected for hammer efficiency only.			

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BORING B 1

PAGE 1 OF 1

BORING DEPTH: 20 FEET

PROJECT NAME: Shoals Library Addition

PROJECT NUMBER: 095099.00

CLIENT: JPS Consulting Engineers

PROJECT LOCATION: Shoals, Indiana

DATE STARTED: 12/22/23

COMPLETED: 12/22/23

BORING METHOD: Hollow-stem Augers

DRILLER: CS/BN

RIG NO.: 670 - Mobile B-29 (Truck)

LOGGED BY: BLB

CHECKED BY: MJH

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	ELEVATION: 505.1± FT NAVD88 PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	HAMMER EFFICIENCY: 60% DATE: N ₆₀ -- O	DRY DENSITY (pcf) -- ■ 90 100 110 120	MOISTURE & ATTERBERG LIMITS (%) PL MC LL	▼ HAND PENE. ■ TORVANE SHEAR ● UNC. COMP. □ VANE SHEAR (PK) × VANE SHEAR (REM) ◆ TRIAXIAL (UU) SHEAR STRENGTH (KSF) 1 2 3 4	REMARKS
505	0		0.3 3 inches of TOPSOIL 504.8								
			FILL- Fine to Medium CLAYEY SAND- Brown- Moist (SC)	AS1							
			3.5 501.6								
	5		FILL- Fine to Medium CLAYEY SAND- Occasional Roots- Brown and Dark Brown- Very Loose (SC)	SB2	4	1 0 0					
			6.0 499.1								
			FILL- Fine CLAYEY SAND- Brown- Moist- Very Loose (SC)	SB3	7	1 1 2					
			8.5 496.6								
			FILL- Fine to Medium CLAYEY SAND- Occasional Asphalt Fragments- Brown and Gray- Moist- Loose (SC)	SB4	16	4 4 5					
495	10		11.0 494.1								
			SILT- Brown- Moist- Loose (ML)	SB5	18	4 4 5					
			13.5 491.6								
			Sandy LEAN CLAY with Gravel- Occasional Sandstone Fragments- Brown and Gray- Stiff to Very Stiff (CL)	SB6	13	4 4 5		15		▼	
490	15		16.0 489.1								
			FAT CLAY- Occasional Sandstone Fragments- Red, Brown, and Gray- Stiff to Very Stiff (CL)	SB7	16	5 6 9		15 26		▼	
			18.5 486.6								
			Sandy LEAN CLAY- Occasional Fat Clay Seams- Brown, Gray, and Red- Stiff to Very Stiff (CL)	SB8	17	5 8 12		20 37		▼	
			20.0 485.1								

END OF BORING AT 20.0 FEET.

GROUNDWATER & BACKFILL INFORMATION		
GROUNDWATER WAS NOT ENCOUNTERED		
CAVE-IN OF BOREHOLE AT:	DEPTH (FT) 4.5	ELEV (FT) 500.6
BACKFILL METHOD:	Auger Cuttings	

- NOTES: 1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. No hammer efficiency data was available, and the graphic output illustrates the field measured blow counts.

Split-barrel sample was not obtained at sample AS1 to avoid downhole loss of equipment if potential void was present, similar to at boring B2. Driller collected sample from auger cuttings.

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BORING B 2

PAGE 1 OF 1

BORING DEPTH: 9 FEET

PROJECT NAME: Shoals Library Addition

PROJECT NUMBER: 095099.00

CLIENT: JPS Consulting Engineers

PROJECT LOCATION: Shoals, Indiana

DATE STARTED: 12/22/23

COMPLETED: 12/22/23

BORING METHOD: Hollow-stem Augers

DRILLER: CS/BN

RIG NO.: 670 - Mobile B-29 (Truck) LOGGED BY: BLB

CHECKED BY: MJH

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	ELEVATION: 502.7± FT NAVD88 PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	HAMMER EFFICIENCY: 60% DATE: N ₆₀ -- O	DRY DENSITY (pcf) -- ■ 90 100 110 120	MOISTURE & ATTERBERG LIMITS (%) PL MC LL	HAND PENE. TORVANE SHEAR UNC. COMP. VANE SHEAR (PK) VANE SHEAR (REM) TRIAXIAL (UU) SHEAR STRENGTH (KSF)	REMARKS
	0		0.3 3 inches of TOPSOIL 502.4								
500			FILL- Fine to Medium CLAYEY SAND- Occasional Roots and Asphalt Fragments- Brown- Dense (SC)	SB1	8	3 12 24	36 ○				
	5		Driller encountering a void. Downhole pole-camera services performed by others on February 4, 2024 indicate the void was associated with a brick cistern.								
495											
	9		9.0 END OF BORING AT 9.0 FEET. 493.7								
490	10										
	15										
485											
	20										

GROUNDWATER & BACKFILL INFORMATION		NOTES: 1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual. 2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered. 3. No hammer efficiency data was available, and the graphic output illustrates the field measured blow counts. 4. Borehole was left open to further evaluate the encountered void. Downhole pole-camera services were performed by others on February 4, 2024.
GROUNDWATER WAS NOT ENCOUNTERED		
BACKFILL METHOD: Note 4		

APPENDIX B

IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL ENGINEERING REPORT

GENERAL COMMENTS

LABORATORY TESTING PROCEDURES

Important Information about This Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer

will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the “Findings” Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site’s subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report’s Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals’ misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals’ plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note*

conspicuously that you’ve included the material for information purposes only. To avoid misunderstanding, you may also want to note that “informational purposes” means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled “limitations,” many of these provisions indicate where geotechnical engineers’ responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a “phase-one” or “phase-two” environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer’s services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, *proper implementation of the geotechnical engineer’s recommendations will not of itself be sufficient to prevent moisture infiltration.* Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. *Geotechnical engineers are not building-envelope or mold specialists.*



**GEOPROFESSIONAL
BUSINESS
ASSOCIATION**

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GENERAL COMMENTS

BASIS OF GEOTECHNICAL REPORT

This report has been prepared in accordance with generally accepted geotechnical engineering practices to assist in the design and/or evaluation of this project. If the project plans, design criteria, and other project information referenced in this report and utilized by SME to prepare our recommendations are changed, the conclusions and recommendations contained in this report are not considered valid unless the changes are reviewed, and the conclusions and recommendations of this report are modified or approved in writing by our office.

The discussions and recommendations submitted in this report are based on the available project information, described in this report, and the geotechnical data obtained from the field exploration at the locations indicated in the report. Variations in the soil and groundwater conditions commonly occur between or away from sampling locations. The nature and extent of the variations may not become evident until the time of construction. If significant variations are observed during construction, SME should be contacted to reevaluate the recommendations of this report. SME should be retained to continue our services through construction to observe and evaluate the actual subsurface conditions relative to the recommendations made in this report.

In the process of obtaining and testing samples and preparing this report, procedures are followed that represent reasonable and accepted practice in the field of soil and foundation engineering. Specifically, field logs are prepared during the field exploration that describe field occurrences, sampling locations, and other information. Samples obtained in the field are frequently subjected to additional testing and reclassification in the laboratory and differences may exist between the field logs and the report logs. The engineer preparing the report reviews the field logs, laboratory classifications, and test data and then prepares the report logs. Our recommendations are based on the contents of the report logs and the information contained therein.

REVIEW OF DESIGN DETAILS, PLANS, AND SPECIFICATIONS

SME should be retained to review the design details, project plans, and specifications to verify those documents are consistent with the recommendations contained in this report.

REVIEW OF REPORT INFORMATION WITH PROJECT TEAM

Implementation of our recommendations may affect the design, construction, and performance of the proposed improvements, along with the potential inherent risks involved with the proposed construction. The client and key members of the design team, including SME, should discuss the issues covered in this report so that the issues are understood and applied in a manner consistent with the owner's budget, tolerance of risk, and expectations for performance and maintenance.

FIELD VERIFICATION OF GEOTECHNICAL CONDITIONS

SME should be retained to verify the recommendations of this report are properly implemented during construction. This may avoid misinterpretation of our recommendations by other parties and will allow us to review and modify our recommendations if variations in the site subsurface conditions are encountered.

PROJECT INFORMATION FOR CONTRACTOR

This report and any future addenda or other reports regarding this site should be made available to prospective contractors prior to submitting their proposals for their information only and to supply them with facts relative to the subsurface evaluation and laboratory test results. If the selected contractor encounters subsurface conditions during construction, which differ from those presented in this report, the contractor should promptly describe the nature and extent of the differing conditions in writing and SME should be notified so that we can verify those conditions. The construction contract should include provisions for dealing with differing conditions and contingency funds should be reserved for potential problems during earthwork and foundation construction. We would be pleased to assist you in developing the contract provisions based on our experience.

The contractor should be prepared to handle environmental conditions encountered at this site, which may affect the excavation, removal, or disposal of soil; dewatering of excavations; and health and safety of workers. Any Environmental Assessment reports prepared for this site should be made available for review by bidders and the successful contractor.

THIRD PARTY RELIANCE/REUSE OF THIS REPORT

This report has been prepared solely for the use of our Client for the project specifically described in this report. This report cannot be relied upon by other parties not involved in the project, unless specifically allowed by SME in writing. SME also is not responsible for the interpretation by other parties of the geotechnical data and the recommendations provided herein.

LABORATORY TESTING PROCEDURES

VISUAL ENGINEERING CLASSIFICATION

Visual classification was performed on recovered samples. The appended General Notes and Unified Soil Classification System (USCS) sheets include a brief summary of the general method used visually classify the soil and assign an appropriate USCS group symbol. The estimated group symbol, according to the USCS, is shown in parentheses following the textural description of the various strata on the boring logs appended to this report. The soil descriptions developed from visual classifications are sometimes modified to reflect the results of laboratory testing.

MOISTURE CONTENT

Moisture content tests were performed by weighing samples from the field at their in-situ moisture condition. These samples were then dried at a constant temperature (approximately 110° C) overnight in an oven. After drying, the samples were weighed to determine the dry weight of the sample and the weight of the water that was expelled during drying. The moisture content of the specimen is expressed as a percent and is the weight of the water compared to the dry weight of the specimen.

HAND PENETROMETER TESTS

In the hand penetrometer test, the unconfined compressive strength of a cohesive soil sample is estimated by measuring the resistance of the sample to the penetration of a small calibrated, spring-loaded cylinder. The maximum capacity of the penetrometer is 4.5 tons per square-foot (tsf). Theoretically, the undrained shear strength of the cohesive sample is one-half the unconfined compressive strength. The undrained shear strength (based on the hand penetrometer test) presented on the boring logs is reported in units of kips per square-foot (ksf).

TORVANE SHEAR TESTS

In the Torvane test, the shear strength of a low strength, cohesive soil sample is estimated by measuring the resistance of the sample to a torque applied through vanes inserted into the sample. The undrained shear strength of the samples is measured from the maximum torque required to shear the sample and is reported in units of kips per square-foot (ksf).

LOSS-ON-IGNITION (ORGANIC CONTENT) TESTS

Loss-on-ignition (LOI) tests are conducted by first weighing the sample and then heating the sample to dry the moisture from the sample (in the same manner as determining the moisture content of the soil). The sample is then re-weighed to determine the dry weight and then heated for 4 hours in a muffle furnace at a high temperature (approximately 440° C). After cooling, the sample is re-weighed to calculate the amount of ash remaining, which in turn is used to determine the amount of organic matter burned from the original dry sample. The organic matter content of the specimen is expressed as a percent compared to the dry weight of the sample.

ATTERBERG LIMITS TESTS

Atterberg limits tests consist of two components. The plastic limit of a cohesive sample is determined by rolling the sample into a thread and the plastic limit is the moisture content where a 1/8-inch thread begins to crumble. The liquid limit is determined by placing a 1/2-inch thick soil pat into the liquid limits cup and using a grooving tool to divide the soil pat in half. The cup is then tapped on the base of the liquid limits device using a crank handle. The number of drops of the cup to close the gap formed by the grooving tool 1/2 inch is recorded along with the corresponding moisture content of the sample. This procedure is repeated several times at different moisture contents and a graph of moisture content and the corresponding number of blows is plotted. The liquid limit is defined as the moisture content at a nominal 25 drops of the cup. From this test, the plasticity index can be determined by subtracting the plastic limit from the liquid limit.

GRAIN SIZE DISTRIBUTION ANALYSIS

COARSE-GRAINED (GRANULAR) SAMPLES WITH LOW FINES CONTENT

Grain size distribution tests performed on granular samples involves oven-drying a representative sample of soil and washing out the fines (passing the No. 200 sieve) with tap water. The sample retained on the No. 200 sieve is then oven-dried, cooled and sieved on a series of stacked sieves beginning with the largest sieve on top and progressing to the smallest on the bottom. The portions of the sample retained on each sieve are then weighed and used to develop the grain size distribution curve in the report for each sample tested.

FINE-GRAINED (SILT OR CLAY) SAMPLES OR COARSE-GRAINED SAMPLES WITH HIGH FINES CONTENT

Particle size distribution tests performed on fine-grained or coarse-grained samples with a high fines content involves oven-drying a representative sample and mixing the sample with a liquid deflocculant to disperse the soil particles. The slurry is placed in a graduated cylinder and shaken to suspend the soil particles in the slurry. The graduated cylinder is then placed on a tabletop; a calibrated hydrometer is floated in the slurry to determine its density. The hydrometer measurements are made at selected time intervals as the soil in the cylinder settles and slurry density decreases. When the hydrometer measurements are completed, the slurry is poured onto a No. 200 sieve and the fines are washed out with tap water. The sample retained on the No. 200 sieve is then oven-dried, cooled and sieved on a series of stacked sieves beginning with the largest sieve on top and progressing to the smallest on the bottom. The portions of the sample retained on each sieve are then weighed and used with the hydrometer data to develop the grain size distribution curve in the report for each sample tested.

WET/DRY DENSITY TESTS

Wet/dry density tests involve extracting a representative soil sample from either a Shelby tube or sample liner, trimming the ends perpendicular to the length of the sample and measuring the length and diameter. The sample is then weighed, oven-dried and weighed again after drying. The wet density is equal to the wet weight of the sample (prior to drying) divided by the volume, while the dry density is the dry weight of the sample divided by the volume.

UNCONFINED COMPRESSIVE STRENGTH TESTS

In addition to the hand penetrometer and Torvane tests, unconfined compression tests were performed to better estimate the undrained shear strength of selected cohesive samples recovered from either Shelby tubes or liners taken in conjunction with the Standard Penetration Test. In the unconfined compression test, the unconfined compressive strength of a soil sample is determined by axially loading the soil sample at a slow, constant rate of strain. The unconfined compressive strength is the maximum compressive stress in the soil sample, up to 15 percent strain. Theoretically, the undrained shear strength of the cohesive sample is one-half the unconfined compressive strength. The undrained shear strength presented on the boring logs is reported in units of kips per square-foot (ksf).

CORROSION TESTS

The soil corrosion tests may include measuring the electrical resistivity, pH and concentrations of soluble chlorides and sulfates. Soil samples tested are generally taken from a composite of two or more selected soil samples with generally similar visual characteristics. The electrical resistivity of the selected soil samples was performed on natural-state and saturated samples using a Miller multi-combination meter with a soil box configured in a four-pin arrangement. pH tests are conducted in general accordance with Brighton Analytical's method reference EPA 150.1. The soil samples for the soluble sulfates and chlorides were prepared at a water-to-soil ratio of 2:1 and tested in general accordance with Brighton Analytical's method reference SW846-9056.

MOISTURE-DRY DENSITY RELATIONSHIPS (COMPACTION) TESTS

Moisture-dry density tests involve the preparation of a bulk soil sample by compacting the sample at a given energy into a calibrated mold with a known volume of 0.0333 cubic feet at various moisture contents. A graph of the moisture content vs. dry density is developed, which results in an inverted U-shaped curve. The maximum dry density is the peak of the curve and the corresponding moisture content is the optimum moisture. Two methods can be performed, namely:

STANDARD PROCTOR METHOD

This method involves a standard energy of 12,400 ft-lbs per cubic foot of soil volume to compact the sample. The sample is compacted in three layers of equal thickness using a 5.5-pound hammer dropped 12 inches using 25 blows per layer.

MODIFIED PROCTOR METHOD

This method involves a modified energy of 56,000 ft-lbs per cubic foot of soil volume to compact the sample. The sample is compacted in five layers of equal thickness using a 10-pound hammer dropped 18 inches using 25 blows per layer.

SPECIFIC GRAVITY TESTS

This test involves the determination of the ratio of the weight of a known volume of soil particles in air to weight of the same volume of water in air. The test is performed by oven drying a soil sample and placing the sample with water into a calibrated pycnometer, boiling the soil/water mixture, filling the pycnometer with distilled water to its calibration mark, weighing the pycnometer and soil/water mixture and measuring the temperature of the mixture. The specific gravity is equal to the weight of the dry soil particles multiplied by the specific gravity of distilled water at the temperature measured for the soil/water mixture divided by the sum of the weight of the dry soil particles plus the weight of the pycnometer, soil/water mixture plus the weight of the pycnometer plus water from the calibration curve developed for the pycnometer.

DIRECT SHEAR TESTS

A bulk samples is compacted in a direct shear mold at a specified density and moisture content. Shear tests are then performed using the direct shear procedure. The direct shear test is performed at several overburden pressures or normal stresses that represent approximate potential stresses in the proposed construction. Values of both peak friction angle and residual friction angle are determined from the tests for each overburden pressure. The results of the direct shear tests are tabulated and plotted on the Direct Shear Test Plots in Appendix A.

CONSOLIDATION TESTS

Consolidation tests are used to evaluate the magnitude and rate of consolidation of soil when it is restrained laterally and drained on the top and bottom while subjected to vertical load applied in controlled increments. The range of test loads applied is generally selected to represent the anticipated vertical stress conditions resulting from existing conditions and the proposed construction. Plots of the percent strain vs. log pressure are constructed from the data to assess consolidation characteristics, while the rate of consolidation is evaluated from plots of deformation vs. time for each vertical load increment.

PERMEABILITY TESTS

The permeability of either relatively undisturbed or compacted soils can be determined by various laboratory test equipment including a triaxial cell, permeameter mold or from a liner sample. The type of permeability equipment used and test performed will be based on the soil type being evaluated.

CLAY, SILT AND OTHER LOW PERMEABLE SOIL SAMPLES

For samples with relatively low permeability characteristics, an undisturbed or compacted soil sample is placed in a triaxial cell. Prior to performing the permeability test, the sample must be fully saturated by forcing water into the sample using a backpressure (water under pressure from an air supply) which is slightly less than the cell pressure. Once the sample is saturated, water is forced through the top of the sample with pressure from an air supply (which is slightly less than the cell pressure) and water forced out of the bottom of the sample is measured in a burette. The volume of water displaced from the sample is recorded with time and from that information, the coefficient of permeability is calculated. This method is a constant head permeability test.

SAND SAMPLES

Due to the nature of relatively clean granular soils, the use of a triaxial cell is generally not practical and the permeability of these types of soils is typically determined from either a liner sample (either recovered directly from a split-spoon in the field or a sample compacted in the liner) or a bulk sample compacted in a 6-inch diameter permeameter mold. A falling head permeability test can be performed on most granular samples by filling a standpipe with water and measuring the head drop with time. For highly permeable soils, the rate of drop in a falling head test may be too rapid to obtain reliable volume and time measurements. Thus, a constant head test will be required where a constant head of water is maintained, and the volume of water discharged from the sample is measured with time.

TRIAXIAL TESTS

Triaxial tests were conducted on samples trimmed from Shelby tubes or liners. There are several types of triaxial tests which can be performed and each are described below:

UNCONSOLIDATED-UNDRAINED TRIAXIAL TEST METHOD

The strength and stress-strain relationships of a cylindrical soil sample are determined for a sample subjected to a selected confining fluid pressure in a triaxial chamber. No drainage of the sample is permitted during the test and the sample is sheared in compression at a constant rate of axial deformation. The peak stress measured for the sample is recorded, up to a maximum 15 percent strain. At least three triaxial tests are performed at various confining fluid pressures to model in-situ stress conditions for loading. A plot of the Mohr circles at failure stress for each confining pressure is included in Appendix A.

CONSOLIDATED-DRAINED TRIAXIAL TEST METHOD

The strength and stress-strain relationships of a cylindrical soil sample are determined for a sample subjected to a selected confining fluid pressure in a triaxial chamber. The sample is isotropically consolidated prior to applying axial loads and sheared in compression at a slow constant rate of axial deformation while allowing the sample to drain. The peak stress measured for the sample is recorded, up to a maximum 15 percent strain. At least three triaxial tests are performed at various confining fluid pressures to model in-situ stress conditions for loading. A plot of the Mohr circles at failure stress for each confining pressure is included in Appendix A.

CONSOLIDATED-UNDRAINED TRIAXIAL TEST METHOD

The strength and stress-strain relationships of a cylindrical soil sample are determined for a sample subjected to a selected confining fluid pressure in a triaxial chamber. The sample is isotropically consolidated prior to applying axial loads and sheared undrained in compression at a constant rate of axial deformation. Pore water pressure measurements can also be measured during the shearing of the sample. The peak stress measured for the sample is recorded, up to a maximum 15 percent strain. At least three triaxial tests are performed at various confining fluid pressures to model in-situ stress conditions for loading. A plot of the Mohr circles at failure stress for each confining pressure is included in Appendix A.

DENSITY TESTS ON ROCK CORES

Density tests involve trimming the ends of an intact rock core sample perpendicular to the length of the sample and measuring the length and diameter. The sample is then weighed and the weight is divided by the volume to calculate the density.

UNCONFINED COMPRESSIVE STRENGTH TESTS ON ROCK CORES

Unconfined compression tests were performed to estimate the compressive strength of selected rock core samples. Representative rock cores were selected and cut perpendicular to the length of the sample on both ends to a specified length with a wet saw. In the unconfined compression test, the unconfined compressive strength of a rock core sample is determined by axially loading the rock core sample at a slow, constant rate of strain. The unconfined compressive strength is the maximum compressive stress in the rock core sample or the load applied when a predetermined amount of strain is achieved.



*Passionate People Building
and Revitalizing our World*



END OF SECTION

SECTION 00 41 00
BID FORM

THE PROJECT AND THE PARTIES

1.1 TO:

- A. Shoals Library Foundation (Owner)
Shoals Public Library
Shoals, Indiana 47581

1.2 FOR:

- A. Project: Shoals Library Addition and Renovation

1.3 BID FORM

- A. See attached form "RD Instruction 1942-A (Guide 19 - Attachment 3)."

1.4 BID BOND FORM

- A. See attached form "RD Instruction 1942-A (Guide 19 - Attachment 4)."

1.5 BID FORM SUPPLEMENTS

- A. The following Supplements are attached to this Bid Form and are considered an integral part of this Bid Form:
 - 1. Document 00 43 23 - Alternates Form: Include the cost variations to the Bid Sum applicable to the Work as described in Section 01 23 00 Alternates.
 - 2. Document 00 60 00 - Affidavit of Compliance
 - 3. Document 00 60 00 - State of Indiana Form 96 - Contractor's Bid for Public Work
 - 4. Document 00 60 00 - USDA Form RD 400-6 COMPLIANCE STATEMENT.
 - 5. Document 00 60 00 - NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENTS FOR CERTIFICATIONS OF NON-SEGREGATED FACILITIES.
 - 6. Document 00 60 00 - RD Instruction 1940-Q Exhibit A-1 CERTIFICATION FOR CONTRACTS, GRANTS, AND LOANS.
 - 7. Document 00 60 00 - Disclosure of Lobbying Activities
 - 8. Document 00 60 00 - U.S. Department of Agriculture - Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions.
 - 9. Power of Attorney: to be provided by the contractor's bonding company
 - 10. Certificate of Insurance: to be provided by the contractor's insurance company
- B. We agree to submit the following Supplements to Bid Forms within 48 hours after submission of this bid for additional bid information:
 - 1. Document 00 43 36: Include the names of all Subcontractors and the portions of the Work they will perform.

BID

Proposal of _____ (hereinafter called "BIDDER"), organized and existing under the laws of the State of _____ doing business as _____ *. To the _____ (hereinafter called "OWNER").

In compliance with your Advertisement for Bids, BIDDER hereby proposes to perform all WORK for the construction of _____ in strict accordance with the CONTRACT DOCUMENTS, within the time set forth therein, and at the prices stated below.

By submission of this BID, each BIDDER certifies, and in the case of a joint BID each party thereto certifies as to its own organization, that this BID has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this BID with any other BIDDER or with any competitor.

BIDDER hereby agrees to commence WORK under this contract on or before a date to be specified in the NOTICE TO PROCEED and to fully complete the PROJECT within _____ consecutive calendar days thereafter. BIDDER further agrees to pay as liquidated damages, the sum of \$_____ for each consecutive calendar day thereafter as provided in Section 15 of the General Conditions.

BIDDER acknowledges receipt of the following ADDENDUM:

* Insert "a corporation", "a partnership", or "an individual" as applicable.

BIDDER agrees to perform all the work described in the CONTRACT DOCUMENTS for the following unit prices or lump sum:

BID SCHEDULE

NOTE: BIDS shall include sales tax and all other applicable taxes and fees.

NO.	ITEM	UNIT	UNIT PRICE	AMOUNT	TOTAL PRICE
-----	------	------	------------	--------	-------------

NO.	ITEM	UNIT	UNIT PRICE	AMOUNT	TOTAL PRICE
-----	------	------	------------	--------	-------------

TOTAL OF BID \$ _____
LUMP SUM PRICE (if applicable) \$ _____

Respectfully submitted:

_____ Signature	_____ Address
--------------------	------------------

_____ Title	_____ Date
----------------	---------------

_____ License number (if applicable)

SEAL - (if BID is by a corporation)

END OF SECTION

SECTION 00 43 23
ALTERNATES FORM

PARTICULARS

- 1.1 THE FOLLOWING IS THE LIST OF ALTERNATES REFERENCED IN THE BID
SUBMITTED BY:
1.2 (Bidder) _____
1.3 TO (Owner): Shoals Library Foundation
1.4 Dated _____ and which is an integral part of the Bid Form.

ALTERNATES LIST

- 2.1 THE FOLLOWING AMOUNTS SHALL BE ADDED TO OR DEDUCTED FROM THE BID
AMOUNT. REFER TO SECTION 01 23 00 - Alternates.
ALTERNATE # 1: ADD \$ _____
ALTERNATE # 2: ADD \$ _____

END OF SECTION

SECTION 00 43 36
PROPOSED SUBCONTRACTORS FORM

PARTICULARS

- 1.1 Herewith is the list of Subcontractors referenced in the bid submitted by:
- 1.2 (Bidder) _____
- 1.3 Dated _____ and which is an integral part of the Bid Form.
- 1.4 The following work will be performed (or provided) by Subcontractors and coordinated by us:

LIST OF SUBCONTRACTORS

WORK SUBJECT SUBCONTRACTOR NAME (TO BE APPENDED TO THIS DOCUMENT
BY THE BIDDER)

END OF SECTION

SECTION 00 50 00
CONTRACTING FORMS AND SUPPLEMENTS

PART 1 GENERAL

- 1.1 Contractor is responsible for obtaining a valid license to use all copyrighted documents specified but not included in the Project Manual.
- 1.2 AGREEMENT AND CONDITIONS OF THE CONTRACT
- A. See Section 00 52 00 - Agreement Form for the Agreement form to be executed.
 - B. See Section 00 72 00 - General Conditions for the General Conditions.
 - C. Comply with Indiana Office of Community & Rural Affairs Federal Construction Contract Provisions for Community Development Block Grant Program.
 - 1. Both this document and the applicable prevailing wages are attached at the end of this section.
- 1.3 FORMS
- A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in Contract Documents.
 - B. Bond Forms:
 - 1. Bid Bond Form: RD Instruction 1942-A (Guide 19 - Attachment 4) BID BOND.
 - 2. Performance Bond Form: RD Instruction 1942-A (Guide 19 - Attachment 5) PERFORMANCE BOND.
 - a. Alternatively, AIA Form 312 may be used. The United States, acting through Rural Development, will be named as co-obligee on all surety unless prohibited by state law.
 - 3. Payment Bond Form: RD Instruction 1942-A (Guide 19 - Attachment 6) PAYMENT BOND.
 - a. Alternatively, AIA Form 312 may be used. The United States, acting through Rural Development, will be named as co-obligee on all surety unless prohibited by state law.
 - C. Notice of Award Form:
 - 1. RD Instruction 1942-A (Guide 19 - Attachment 7) NOTICE OF AWARD
 - D. Post-Award Certificates and Other Forms:
 - 1. RD Instruction 1942-A (Guide 19 - Attachment 8) NOTICE TO PROCEED
 - 2. Schedule of Draws: Provide an approximate schedule of monthly contract draw amounts for the duration of the contract. Contractor may choose the form format, but include:
 - a. Include the following information above the schedule of draws: Company Name, Project Name, Project Address, Contact Name, Email address, Total Contract Amount

- b. Include the following columns: Draw Number, Estimated Draw Date, Percentage of Total Contract Amount, Draw Amount, Description of Work.
- 3. Application for Payment Form: USDA Rural Development and Farm Service Agency Contract Change Order Form RD 1924-18.
- E. Clarification and Modification Forms:
 - 1. Change Order Form: USDA Rural Development and Farm Service Agency Contract Change Order Form RD 1924-7.
- F. Closeout Forms:
 - 1. Affidavit of Release of Liens Form: USDA Form RD 1924-9.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

(Guide 19 - Attachment 4)

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, _____
_____ as Principal, and
_____ as Surety, are hereby held and
firmly bound unto _____ as OWNER in the penal sum of
_____ for the payment of
which, well and truly to be made, we hereby jointly and severally bind
ourselves, successors and assigns.
Signed, this _____ day of _____, 19_____.
The Condition of the above obligation is such that whereas the Principal has
submitted to _____ a certain BID,
attached hereto and hereby made a part hereof to enter into a contract in
writing, for the

NOW, THEREFORE,

- (a) If said BID shall be rejected, or
- (b) If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attachment hereto (Properly completed in accordance with said BID) and shall furnish a BOND for faithful performance of said contract, and for the payment of all persons performing labor furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID, then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

(1-15-79) SPECIAL PN

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by any extension of the time within which the OWNER may accept such BID; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

_____(L.S.)
Principal

Surety

By: _____

IMPORTANT - Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

oOo

(Guide 19 - Attachment 5)

PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS: that

(Name of Contractor)

(Address of Contractor)

a _____, hereinafter called Principal,
and
(Corporation, Partnership, or Individual)

(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto _____

(Name of Owner)

(Address of Owner)

hereinafter called OWNER, and the United States of America acting through
Rural Development hereinafter referred to as the Government in the total
aggregate penal sum of _____

_____ Dollars (\$_____)

in lawful money of the United States, for the payment of which sum well and
truly to be made, we bind ourselves, our heirs, executors, administrators,
successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered
into a certain contract with the OWNER, dated the _____ day of _____
19____, a copy of which is hereto attached and made a part hereof for the
construction of:

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, or GOVERNMENT, with or without notice to the SURETY and during the one year guaranty period and if the PRINCIPAL shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER and GOVERNMENT from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER and GOVERNMENT all outlay and expense which the OWNER and GOVERNMENT may incur in making good any default, then this obligation shall be void, otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the liability of the PRINCIPAL AND SURETY hereunder to the GOVERNMENT shall be subject to the same limitations and defenses as may be available to them against a claim hereunder by the OWNER, provided, however, that the GOVERNMENT may, at its option, perform any obligations of the OWNER required by the contract.

PROVIDED, FURTHER, that the said SURETY, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to WORK to be performed thereunder or the SPECIFICATIONS accompanying same shall in any way affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that it is expressly agreed that the BOND shall be deemed amended automatically and immediately, without formal and separate amendments hereto, upon amendment to the Contract not increasing the contract price more than 20 percent, so as to bind the PRINCIPAL and the SURETY to the full and faithful performance of the CONTRACT as so amended. The term "Amendment", wherever used in this BOND, and whether referring to this BOND, the Contract or the Loan Documents shall include any alteration, addition, extension, or modification of any character whatsoever.

PROVIDED, FURTHER, that no final settlement between the OWNER or GOVERNMENT and the PRINCIPAL shall abridge the right of the other beneficiary hereunder, whose claim may be unsatisfied. The OWNER and GOVERNMENT are the only beneficiaries hereunder.

ATTEST:

(SEAL)

(Address)

ATTEST:

(Address)

(Address)

If CONTRACTOR is partnership, all partners should execute BOND.
IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the Project is located.

(5-23-79) PN 675

KNOW ALL PERSONS BY THESE PRESENTS: that

(Address of Contractor)

(Name of Surety)

(Name of Owner)

hereinafter called OWNER and the United States of America acting through Rural Development hereinafter referred to as GOVERNMENT, and unto all persons, firms, and corporations who or which may furnish labor, or who furnish materials to perform as described under the contract and to their successors and assigns in the total aggregate penal sum of

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

NOW, THEREFORE, if the PRINCIPAL shall promptly make payment to all persons, firms, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extensions or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK, and for all labor cost incurred in such WORK including that by a SUBCONTRACTOR, and to any mechanic or materialman lienholder whether it acquires its lien by operation of State or Federal law; then this obligation shall be void, otherwise to remain in full force and effect.

PROVIDED, that beneficiaries or claimants hereunder shall be limited to the SUBCONTRACTORS, and persons, firms, and corporations having a direct contract with the PRINCIPAL or its SUBCONTRACTORS.

PROVIDED, FURTHER, that the said SURETY for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any way affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of this contract or to the WORK or to the SPECIFICATIONS.

PROVIDE, FURTHER, that no suit or action shall be commenced hereunder by any claimant: (a) Unless claimant, other than one having a direct contract with the PRINCIPAL (or with the GOVERNMENT in the event the GOVERNMENT is performing the obligations of the OWNER), shall have given written notice to any two of the following: The PRINCIPAL, the OWNER, or the SURETY above named within ninety (90) days after such claimant did or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the PRINCIPAL, OWNER, or SURETY, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the state in which the aforesaid project is located, save that such service need not be made by a public officer. (b) After the expiration of one (1) year following the date of which PRINCIPAL ceased work on said CONTRACT, is being understood, however, that if any limitation embodied in the BOND is prohibited by any law controlling the construction hereof, such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.

PROVIDED, FURTHER, that it is expressly agreed that this BOND shall be deemed amended automatically and immediately, without formal and separate amendments hereto, upon amendment to the Contract not increasing the contract price more than 20 percent, so as to bind the PRINCIPAL and the SURETY to the full and faithful performance of the Contract as so amended. The term "Amendment", wherever used in this BOND and whether referring to this BOND, the contract or the loan Documents shall include any alteration, addition, extension or modification of any character whatsoever.

PROVIDED, FURTHER, that no final settlement between the OWNER or GOVERNMENT and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

(Guide 19 - Attachment 6) (Page 3)

WITNESS WHEREOF, this instrument is executed in ____ counterparts, each of
Number
which shall be deemed an original, this the ____ day of _____.

ATTEST:

_____ (Principal) Secretary (SEAL)	_____ Principal By _____ (s) _____ (Address) _____ Witness as to Principal _____ (Address) _____ ATTEST: _____ Witness as to Surety _____ (Address) _____
	_____ Surety By _____ Attorney-in-Fact _____ (Address) _____

NOTE: Date of BOND must not be prior to date of Contract.

If CONTRACTOR Is partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the Project is located.

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RD Instruction 1942-A
(Guide 19 - Attachment 7)

NOTICE OF AWARD

TO: _____

PROJECT Description: _____

The OWNER has considered the BID submitted by you for the above described WORK in response to its Advertisement for Bids dated _____, 19____, and Information for Bidders.

You are hereby notified that your BID has been accepted for items in the amount of \$_____.

You are required by the Information for Bidders to execute the Agreement and furnish the required CONTRACTOR'S Performance BOND, Payment BOND and certificates of insurance within ten (10) calendar days from the date of this Notice to you.

If you fail to execute said Agreement and to furnish said BONDS within ten (10) days from the date of this Notice, said OWNER will be entitled to consider all your rights arising out of the OWNER's acceptance of your BID as abandoned and as a forfeiture of your BID BOND. The OWNER will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

Dated this _____ day of _____, 19____.

Owner

By _____

Title _____

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged

by _____
this the _____ day of _____, 19____.
By _____
Title _____

NOTICE TO PROCEED

TO: _____ DATE: _____

Project: _____

You are hereby notified to commence WORK in accordance with the Agreement dated _____, 19____, on or before _____, 19____, and you are to complete the WORK within _____ consecutive calendar days thereafter. The date of completion of all WORK is therefore _____, 19____.

Owner

By _____

Title _____

ACCEPTANCE OF NOTICE
Receipt of the above NOTICE TO PRO-
CEED is hereby acknowledged by _____

this the _____, 19____

By _____

Title _____

Employer Identification
Number _____

oOo

Form RD 1924-18
(Rev. 6-97)UNITED STATES DEPARTMENT OF AGRICULTURE
RURAL DEVELOPMENT
FARM SERVICE AGENCY**PARTIAL PAYMENT ESTIMATE**

CONTRACT NO. _____

PARTIAL PAYMENT ESTIMATE NO. _____

PAGE _____

OWNER: _____

CONTRACTOR: _____

PERIOD OF ESTIMATE

FROM _____ TO _____

CONTRACT CHANGE ORDER SUMMARY

ESTIMATE

No.	Agency Approval Date	Amount		
		Additions	Deductions	
				1. Original Contract
				2. Change Orders
				3. Revised Contract (1 + 2)
				4. Work Completed*
				5. Stored Materials*
				6. Subtotal (4 + 5)
				7. Retainage*
				8. Previous Payments
				9. Amount Due (6-7-8)
				* Detailed breakdown attached
TOTALS				
NET CHANGE				

CONTRACT TIME

Original (days) _____
Revised _____
Remaining _____

On Schedule

☐ Yes☐ No

Starting Date _____

Projected Completion _____

CONTRACTOR'S CERTIFICATION:

The undersigned Contractor certifies that to the best of their knowledge, information and belief the work covered by this payment estimate has been completed in accordance with the contract documents, that all amounts have been paid by the contractor for work for which previous payment estimates was issued and payments received from the owner, and that current payment shown herein is now due.

Contractor _____

By _____

Date _____

APPROVED BY OWNER:

Owner _____

By _____

Date _____

ARCHITECT OR ENGINEER'S CERTIFICATION:

The undersigned certifies that the work has been carefully inspected and to the best of their knowledge and belief, the quantities shown in this estimate are correct and the work has been performed in accordance with the contract documents.

Architect or Engineer _____

By _____

Date _____

ACCEPTED BY AGENCY:

The review and acceptance of this estimate does not attest to the correctness of the quantities shown or that the work has been performed in accordance with the contract documents.

By _____

Title _____

Date _____

TYPICAL UNIT PRICE BREAKDOWN *

[illegible]

TYPICAL LUMP SUM PRICE BREAKDOWN:

TYPICAL STORED MATERIALS AND RETAINAGE BREAKDOWN

ITEM	DESCRIPTION	SCHEDULED VALUE	WORK COMPLETED		% COM- PLETE	MATERIALS STORED AT END OF THIS PAYMENT PERIOD			
			THIS PERIOD	TO DATE		DESCRIPTION	QUANTITY	UNIT VALUE	AMOUNT
						RETAINAGE			
							THIS ESTIMATE	PERCENT	RETAINED
						WORK COMPLETED:		%	
						STORED MATERIALS:			
						OTHER (explain)			
	TOTALS					TOTAL			

* As a minimum, detailed breakdowns should contain this information.

UNITED STATES DEPARTMENT OF AGRICULTURE
RURAL DEVELOPMENT AND
FARM SERVICE AGENCY

CONTRACT CHANGE ORDER

CONTRACT FOR

OWNER

ORDER NO.

DATE _____

STATE

COUNTY

To

(Contractor)

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

Description of Changes (Supplemental Plans and Specifications Attached)	DECREASE in Contract Price	INCREASE in Contract Price
	\$ _____	\$ _____
TOTALS	\$ _____	_____
NET CHANGE IN CONTRACT PRICE	\$ _____	_____

JUSTIFICATION:

The amount of the Contract will be (Decreased) (Increased) By The Sum Of:

Dollars (\$)).

The Contract Total Including this and previous Change Orders Will Be:

Dollars (\$).

The Contract Period Provided for Completion Will Be (Increased) (Decreased) (Unchanged) : Days.

This document will become a supplement to the contract and all provisions will apply hereto.

Requested _____ (Owner)

(Date)

Recommended _____
(Owner's Architect/Engineer)

(Date)

Accepted _____ (Contractor)

(Date)

Approved by Agency _____ (Name and Title)

(Date)

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0575-01042. The time required to complete this information collection is estimated to average 15 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

- ☐ ORIGINAL-BORROWER'S CASE FOLDER
☐ COPY-CONTRACTOR
☐ COPY-BORROWER

USDA
Form RD 1924-9
(Rev. 1-98)

Form Approved
OMB No. 0575-0042

Date _____

Dear Sir:

I hereby acknowledge the receipt of _____ dollars

(S _____) in full payment of my contract dated _____
for improvement work which I did for you and which is described in my contract.

I certify that I have paid in full for all materials purchased and all labor employed in the performance of this contract, and that there are no claims against me under this contract on account of injuries sustained by workers employed by me or by subcontractors thereunder. I hereby release you from any claims arising by virtue of this contract.

I am attaching Form RD 1924-10, "Release by Claimants," signed by all persons from whom I have purchased materials and by all subcontractors and all persons employed in connection with my contract with the above-named borrower.

WARNING

The statements and representations made above are made in connection with construction financed in whole or in part by the United States Department of Agriculture (USDA). The statements and representations will be used to determine the release of USDA provided funds. The making of any false statement or misrepresentation herein may be a crime punishable under Title 18 U.S.C. § 1001 which provides in part: "Whoever, in any matter within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals or covers up by any trick, scheme, or device a material fact, or makes any false, fictitious or fraudulent statements or representations, or makes or uses any false writing or statement or entry, shall be fined under [title 18 of the United States code] or imprisoned not more than five years, or both.

Sincerely,

Contractor

Position 6

According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0575-0042. The time required to complete this information collection is estimated to average 15 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

RD 1924-9 (Rev. 1-98)

Used by contractors to certify that payment has been made in full for all material and labor used in the performance of this contract and to release the borrower from any claims which might arise by virtue of the contract. When, pursuant to State Instruction, Form RD 1924-10, "Release of Claimants," is not required in conjunction with Form RD 1924-9, the last paragraph of Form RD 1924-9 will be deleted.

PROCEDURE FOR PREPARATION : RD Instruction 1924-A.

PREPARED BY : Contractor.

NUMBER OF COPIES : Original only.

SIGNATURES REQUIRED : Original by contractor.

DISTRIBUTION OF COPIES : Original to servicing office.

Date _____

Dear Sir:

I hereby acknowledge the receipt of _____ dollars
(\$ _____) in full payment of my contract dated _____ for improvement work which I did for you and
which is described in my contract.

I certify that I have paid in full for all materials purchased and all labor employed in the performance of this contract, and that there
are no claims against me under this contract on account of injuries sustained by workers employed by me or by subcontractors
thereunder. I hereby release you from any claims arising by virtue of this contract.

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Contractor

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Form Approved
OMB No. 0575-0042

The undersigned, having received payment in full for all labor, materials, supplies, or equipment supplied to _____, Contractor, or to any subcontractor, in the construction or repair of the improvements upon the property located at:

_____, do (does) hereby release and waive any and all claims, liens, and lien rights, of any kind, nature, or description whatsoever, against said property and the Owner thereof, and against said Contractor.

[illegible]

According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0575-0042. The time required to complete this information collection is estimated to average 30 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

RD 1924-10 (Rev. 1-98)

Used also in connection with work performed by or under the direction of the borrower whenever the borrower or USDA has reason to believe that there may be danger of claims against the property. In such case, the borrower will be required to secure the signatures of appropriate claimants on Form RD 1924-10 before final payments are made for labor, materials, or equipment.

: RD Instructions 1924-A and 1942-A

: Contractor for work performed by the contract method.
Borrower for work performed by the borrower method.

: Original only.

: All persons or firms who furnished labor, material, or equipment to the contractor or borrower in connection with construction, repair, or improvements.

: Original to Area or Local Servicing Office.

RELEASE BY CLAIMANTS

The undersigned, having received payment in full for all labor, materials, supplies, or equipment supplied to _____, Contractor, or to any subcontractor, in the construction or repair of the improvements upon the property located at:

_____, and furnished in the execution and fulfillment of contract between said Contractor and _____ Owner, dated _____

_____, do (does) hereby release and waive any and all claims, liens, and lien rights, of any kind, nature, or description whatsoever, against said property and the Owner thereof, and against said Contractor.

<i>Lien or Claimant</i>	<i>Work or Materials</i>	<i>Amount</i>	<i>Date</i>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0575-0042. The time required to complete this information collection is estimated to average 30 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.



Federal Construction Contract Provisions

COMMUNITY DEVELOPMENT BLOCK GRANT PROGRAM

Grant Services Division
One North Capitol,
Suite 600
Indianapolis, Indiana
46204

Revised November 2023

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Note: This document is to be used as a guide for contractors and subcontractors working on Community Development Block Grant projects in the State of Indiana. It is not verified to be all inclusive and the contractor is fully responsible for complying with all federal regulations applicable to the CDBG program.

SECTION 5: REQUIRED POSTERS

IOSHA Safety and Health Protection on the Job

Notice to All Employees working on Federally Financed Construction Projects

Equal Employment Opportunity is The Law

Federal Fair Housing Law

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Federal Labor Standards Provisions (HUD-4010)

Contractor's Certification

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Wage/Fringe Benefits Certification

Certified Payroll Form (WH-347)

Certified Payroll Form (WH-348)

Instructions for Completing Certified Payroll Form

Required Contract Provisions
Federally Assisted Construction Contracts

SECTION 1 General Information

BONDING REQUIREMENTS: IC 36-1-12-4.5,
IC 36-1-12-13.1, IC 36-1-12-14 e

The minimum requirements for contracts exceeding \$100,000 for construction shall be as follows:

A Bid Bond or a certified check shall be filed with each bid equivalent to 5% of the bid price as assurance that the bidder will, upon acceptance of their bid, execute such contractual documents as may be required within the time specified.

A Performance Bond for 100% of the contract price to assure fulfillment of the contractor's obligations under the contract.

A Payment Bond for 100% of the contract price to assure payment of all persons supplying labor and material in the execution of the work provided for in the contract.

NOTE: The Bid Bond must be submitted with the bid and the Performance Bond and Payment Bond must be provided to the project owner *before* construction begins on the project.

RETAINAGE: IC 36-1-12-14

Public work contracts in excess of \$100,000 require the retainage of 5% of the dollar value of all work satisfactorily completed by the contractor(s). The escrow agent shall be selected by mutual agreement between the board of the awarding agency and the contractor(s). The contractor shall be paid in full within sixty one (61) days after the date of substantial completion. If upon substantial completion of the public work there remain uncompleted minor items, an amount equal to two hundred percent (200%) of the value of each item as determined by the architect/engineer shall be withheld until the item is completed.

CHANGE ORDERS: IC 36-1-12-18

A change order may not be issued before

commencement of the actual construction except in the case of an emergency. In such a case, the board of awarding agency must make a declaration and the board's minutes must show the nature of the emergency. The total of all change orders issued that increase the scope of the project may not exceed twenty percent (20%) of the amount of the original contract. A change order issued as a result of circumstances that could not have been reasonably foreseen does not increase the scope of the project. All change orders must be prepared by the project engineer or architect and approved and signed by the board of the awarding agency and the contractor. All change orders must be directly related to the original public work project.

Contractor must ensure to procure domestic products for all federal assisted projects in compliance with the Buy American Build America Act. This shall include reviewing manufacture information determining and certifying that to the best of the contractor's knowledge and belief all iron and steel products, manufactured products and construction materials referenced in any change orders comply with the provisions set by the Buy America Build America Act unless otherwise specified by a waiver.

CONFLICT OF INTEREST:
24 CFR 570.611

In the procurement of supplies, equipment, construction and/or services by recipients and subrecipients, any conflict of interest is prohibited. No persons who exercise or have exercised any functions or responsibilities with respect to CDBG activities assisted under this part or who are in a position to participate in a decision making process or gain inside information with regard to such activities, may obtain a financial interest or benefit from a CDBG-assisted activity, or have a financial interest in any contract, subcontract, or agreement with respect to a CDBG-assisted activity, or with respect to

Required Contract Provisions
Federally Assisted Construction Contracts

the proceeds of the CDBG-assisted activity, either for themselves or those with whom they have business or immediate family ties, during their tenure or for one year thereafter.

MINORITY, WOMEN AND VETERAN
BUSINESS PARTICIPATION: IC 4-13-
16.5 IC 5-22-14-3.5

On each CDBG funded project, the grantee is required to maintain documentation supporting their best efforts to achieve the state goal of 10% MBE/WBE and 3% IVOSB participation. Only those businesses duly registered on IDOA's Minority and Women's Business Enterprises List may be counted toward the 10% goal and businesses participating in Indiana Veteran Owned Small Business Program may be counted toward the 3% goal. For IDOA's MBE/WBE List and IVOSB program the information is available at www.in.gov/idoa/2352.htm.

CODE OF CONDUCT: 24 CFR 84.42

The recipient of CDBG grant funds shall maintain written standards of conduct governing the performance of employees engaged in the award and administration of contracts stating that no employee, officer, or agent shall participate in the selection, award, or administration of a contract supported by Federal funds if a real or apparent conflict of interest would be involved.

RECORD RETENTION: 24 CFR 85.42

Financial records, supporting documents, statistical records and all other records pertinent to a grant shall be retained for a period of five years. If any litigation, claim, negotiation, audit or other action is started before the expiration of the five-year period, the records shall be retained until all litigations, claims or audit findings involving the records have been resolved. The retention period starts from the date of the submission of the final expenditure report or, from the date of the submission of the annual financial status report covering the last

expenditure of grant funds for that year.

ACCESS TO RECORDS: 24 CFR 85.42-e

The awarding agency and the Comptroller General of the United States, or any of their authorized representatives, shall have the right of access to any pertinent books, documents, papers or other records which are pertinent to the grant in order to make audits, examinations, excerpts and transcripts. The right of access in this section must not be limited to the required retention period but shall last as long as the records are retained.

CONTRACT PROVISIONS:

In addition to provisions defining a sound and completed procurement contract, any recipient of federal funds shall include the following:

Contracts other than small purchases shall contain provisions or conditions which will allow for administrative, contractual, or legal remedies in instances where contractors violate or breach contract terms and provide for such sanctions and penalties as may be appropriate.

All contracts in excess of \$25,000 shall contain suitable provisions for termination by the grantee including the manner by which it will be affected and the basis for settlement. In addition, such contract shall describe conditions under which the contract may be terminated for default as well as conditions where the contract may be terminated because of circumstances beyond the control of the contractor.

Contracts, subcontracts, and subgrants of amounts in excess of \$100,000 shall contain a provision which requires compliance with all applicable standards, orders, or requirements issued under Section 306 of the Clean Air Act (42 USC 1857 (h)), Section 508 of the Clear Water Act (33 USC 1368), Executive Order 11738, and Environmental Protection Agency regulations (40 CFR, Part 15), which prohibit

Required Contract Provisions
Federally Assisted Construction Contracts

the use under non-exempt federal contracts, grants or loans of facilities included on the EPA List of Violating Facilities. The provision shall require reporting of violations to the grantor agency and to the US EPA Administrator for Enforcement (EN-329).

Contracts, subcontracts, and subgrants shall contain a provision which requires compliance with the requirements of the Build America, Buy America (BABA) Act, 41 USC 8301 note, and all applicable rules and notices, as may be amended, if applicable to the Grantee's infrastructure project. Pursuant to HUD's Notice, "Public Interest Phased Implementation Waiver for FY 2022 and 2023 of Build America, Buy America Provisions as Applied to Recipients of HUD Federal Financial Assistance" (88 FR 1700 I), any funds obligated by HUD on or after the applicable listed effective dates, are subject to BABA requirements, unless excepted by a waiver.

These contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract.

Except as otherwise provided for in each section, the contractor shall insert in each subcontract all of the stipulations contained in these Required Contract Provisions, and further require their inclusion in any lower tier subcontract that may in turn be made. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with these Required Contract Provisions.

A breach of any of the stipulations contained in these Required Contract Provisions shall be sufficient grounds for termination of the contract.

A breach of the Required Contract Provisions may also be grounds for debarment as provided in 29 CFR 5.12.

CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING:

(Applicable to all Federal-aid construction contracts and to all related subcontracts

which exceed \$100,000- 49 CFR 20)

The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief that:

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

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

This certification is a material representation of fact upon which reliance was placed with this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

The prospective participant also agrees by submitting his or her bid or proposal that he or she shall require that the language of this certification be included in all lower tier subcontracts, which exceed \$100,000, and that all such recipients shall certify and disclose accordingly.

Required Contract Provisions
Federally Assisted Construction Contracts

Any and all contractors, subcontractors, independent contractors, suppliers, facilitators or any person participating in any program or activity receiving federal financial assistance shall:

- a. Prohibit discrimination based on race, color or national origin under Title VI of the Civil Rights Act of 1964;
- b. Prohibit discrimination on the basis of sex under Title VII of the Civil Rights Act of 1964 and amended by the Equal Employment Opportunity Act of 1972;
- c. Prohibit discrimination on the basis of age under the Age Discrimination Act of 1975;
- d. Prohibit discrimination on the basis of disability under
- e. Section 504 of the Rehabilitation Act of 1973;
- f. Take affirmative action to employ and advance qualified disabled people under Section 503 of the Rehabilitation Act of 1973;
- g. Promote and insure equal opportunity for all persons, without regard to race, color, religion, sex, or national origin under Executive Order 11246 as Amended;
- h. Display posters which summarize the Federal laws prohibiting job discrimination based on race, color, sex, national origin, religion, age, equal pay and disability;
- i. Prohibit discrimination based on disability under the Americans with Disabilities Act of 1990
- j. Assure that all buildings assigned for public use be designed, constructed and altered so as to be accessible to and usable by persons with physical disabilities under the Architectural Barriers Act of 1968; and
- k. Avoid maintaining or providing any segregated facilities.

Any and all contractors, subcontractors, independent contractors, suppliers, facilitators or any person participating in any program or activity receiving federal financial assistance shall:

Comply with the provisions for the elimination of Lead- Based paint hazards under 24 CFR Part 35;

Take all necessary precautions to guard against damages to property and injury to persons.

Comply with the provisions of the Build America Buy America Act. Contractors shall procure iron and steel, construction material, and manufactured products that are produced in the United States, unless a waiver is in effect.

SECTION 2 Equal Employment Opportunity Regulations

NONDISCRIMINATION:

(Applicable to all Federal-aid construction contracts and to all related subcontracts of \$10,000 or more)

Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630 and 41 CFR 60) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The Equal Opportunity Construction Contractor Specifications set forth under 41 CFR 60-4.3 and the provisions of the American Disabilities Act of 1990 (42 U.S.D. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO.

The contractor will work with the awarding agency and the Federal Government in carrying out EEO obligations and in their review of his/her activities under the contract.

The contractor will accept as his operating policy the following statement: "It is the policy of this Company to assure that

Required Contract Provisions
Federally Assisted Construction Contracts

applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability.

Such action shall include: employment, upgrading, demotion, or transfer, recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

EEO OFFICER:

The contractor will designate and make known to the awarding agency an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active contractor program of EEO and who must be assigned adequate authority and responsibility to do so.

DISSEMINATION OF POLICY:

All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO officer.

All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their

reporting for duty with the contractor.

All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minority employees.

Notices and posters identifying the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

RECRUITMENT OF EMPLOYEES:

When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minority groups in the area from which the project work force would normally be derived.

The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minority group applicants. To meet this requirement, the contractor will identify sources of potential minority group employees and establish with such identified sources procedures whereby minority group applicants may be referred to the contractor for employment consideration.

In the event the contractor has a valid bargaining agreement providing for exclusive hall referrals, he is expected to observe the provisions of that agreement to the extent that the system permits the contractor's compliance with EEO contract provisions. (The DOL has held that where implementations of such agreements have the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Executive Order 11246, as amended.)

Required Contract Provisions
Federally Assisted Construction Contracts

The contractor will encourage his present employees to refer minority group applicants for employment. Information and procedures with regard to referring minority group applicants will be discussed with employees.

**SELECTION OF SUBCONTRACTORS,
PROCUREMENT OF MATERIALS AND
LEASING OF EQUIPMENT:**

The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment.

The contractor shall notify all potential subcontractors and suppliers of his/her EEO obligations under this contract.

Disadvantaged business enterprises (DBE) as defined in 49 CFR 23 and Veteran Owned business (VOB) as defined in 38 CFR 74, shall have equal opportunity to compete for and perform subcontracts which the contractor enters into pursuant to this contract. The contractor will use his best efforts to solicit bids from and to utilize DBE and VOB subcontractors or subcontractors with meaningful minority group and female representation among their employees.

The contractor will use his best efforts to ensure subcontractor compliance with their EEO obligations.

EEO RECORDS AND REPORTS:

The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following completion of the contract work and shall be available at reasonable times and places for inspection by authorized representatives. The records kept by the contractor shall document the following:

The number of minority and non-minority group members and women employed in each work classification on the project;

The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women;

The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minority and female employees; and

The progress and efforts being made in securing the services of DBE subcontractors or subcontractors with meaningful minority and female representation among their employees.

NONSEGREGATED FACILITIES:

Applicable to all Federal-aid construction contracts and to all related subcontracts of \$10,000 or more.

By the execution of this contract or subcontract, or the consummation of this material supply agreement or purchase order, all parties certify that the firm does not maintain or provide for its employees any segregated facilities at any of its establishments, and that the firm does not permit its employees to perform their services at any location under its control, where segregated facilities are maintained. The contractor agrees that a breach of this certification is a violation of the EEO provisions of this contract. The contractor further certifies that no employee will be denied access to adequate facilities on the basis of sex or disability.

As used in this certification, the term "segregated facilities" refers to facilities provided for employees which are segregated by explicit directive, or on the basis of race, color, religion, national origin, age or disability, because of habit, local custom, or otherwise. The only exception will be for the disabled when the demands for accessibility override, (e.g. disabled parking).

The contractor agrees that it has obtained or will obtain identical certification from proposed subcontractors or material suppliers prior to award of subcontracts or consummation of material supply agreements of \$10,000 or more and that it

Required Contract Provisions
Federally Assisted Construction Contracts

will retain such certifications in its files.

FALSIFICATION Of DOCUMENTS:

The falsification of any of the above certifications may subject the contractor to civil or criminal prosecution under 18U.S.C. 1001 and 31 U.S.C. 231.

The contractor or subcontractor shall make the records required available for inspection, copying, or transcription by authorized representatives of the awarding agency or the DOL, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the awarding agency, HUD or DOL, or all may, after written notice to the contractor, sponsor, applicant, or owner, take such actions as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds of debarment action pursuant to 29 CRF 5.12.

SECTION 3

The purpose of Section 3 requires that recipients of HUD funds and their contractors and subcontractors provide jobs and other economic opportunities to low-income persons. The CDBG project service area for Section 3 compliance will be the nonmetropolitan county.

Contractors and subcontractors participating in federally- assisted projects are required to track and report their activity relative to the hiring and training of low- and moderate-income persons and the use of local businesses owned by low-income persons. This information must be reported by all contractors and subcontractors, whose contract is \$100,000 or greater, prior to project completion utilizing the "Section 3 Compliance form".

All Section 3 covered contracts shall include the following Section 3 clause:

"The work to be performed under this contract is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u (Section 3). The parties to this contract agree to comply with this Section and certify that they are under no contractual or other impediment that would prevent them from complying with these regulations.

The contractor agrees to notify each labor organization or representative workers with which the contractor has a collective bargaining agreement of the contractor's commitments under this Section 3 clause and include this clause in every subcontract subject to compliance with the Section 3 regulations. The contractor will certify that any vacant employment positions, including training positions, that are filled after the contractor is selected but before the contract is executed with persons other than those to whom the regulations of 24 CFR Part 135 require employment opportunities to be directed, were not filled to circumvent the contractors' obligations under this section of the Code of Federal Regulations. Noncompliance with HUD's regulations in this Part may result in sanctions, termination of this contract for default, and debarment or suspension from future HUD assisted contracts."

OFFICE Of FEDERAL CONTRACT COMPLIANCE (OFCCP)

For federally assisted construction contracts, the OFCCP administers and enforces Executive Order 11246, as amended. This Order prohibits discrimination and requires affirmative action to ensure equal employment opportunity without regard to race, color, sex, religion and/or national origin; and the implementing regulations at 41 CFR Parts 60-1 through 60-50. Generally, all contractors and subcontractors holding non- exempt federally assisted construction contracts and subcontracts exceeding \$10,000 must comply with Executive Order 11246.

A "Notice of Requirement for

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Affirmative Action to Ensure Equal Employment Opportunity" (Executive Order 11246) is to be included in the bid solicitations for all federally assisted construction contracts and subcontracts in excess of \$10,000. The Notice, which is published at 41 CFR 60-4.2, informs the contractor/bidder of the affirmative action requirements imposed under Executive Order 11246, including the specified goals for minority and female participation.

Covered federally assisted construction contracts and subcontracts must incorporate the equal opportunity clause found at 41 CFR 60-1.4(b).

The equal opportunity clause may be expressly included in each contract or subcontract or incorporated by reference. Importantly, the equal opportunity clauses are deemed to be a part of every covered construction contract and subcontract even if they are not physically incorporated in the contract documents.

In addition to the equal opportunity clauses, federally assisted construction contracts and subcontracts in excess of \$10,000 must include the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" which are found at 41 CFR 60-4.3. The specifications describe the affirmative action obligations and set forth the specific affirmative action steps the construction contractor must implement in order to make a good faith effort to achieve the goals for minority and female participation that were listed in the bid solicitation.

Additional information regarding OFCCP Compliance may be found at www.dol.gov/esa/OFCCP or, at 1-800-397-6251. The Indiana office is located at 46 East Ohio Street, Suite 419, Indianapolis, IN 46204 and phone number is 317-226-5860.

SECTION 3 Federal Labor Standards Regulations

Any and all contractors, subcontractors, independent contractors, suppliers, facilitators or any person participating in any program or activity receiving federal financial

assistance shall:

Comply with federal labor standards regulations as follows:

1. Davis-Bacon Act
2. Contract Work Hours and Safety Standards Act
3. Copeland Act (Anti-Kickback Act)
4. Fair Labor Standards Act

The U. S. Department of Labor has published rules and regulations corresponding to the above regulations at Title 29 CFR Parts 1, 3, 5, 6 and 7.

CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION PRIMARY COVERED TRANSACTIONS:

(Applicable to all Federal-aid contracts 49 CFR 29)

By signing and submitting this proposal, the prospective primary participant is providing the certification set out below.

The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective primary participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

The certification in this clause is a material representation of fact upon which reliance was placed when the department or agency determined to enter into this transaction. If it is later determined that the prospective primary participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

The prospective primary participant shall provide immediate written notice to the

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department or agency to which this proposal is submitted if any time the prospective primary participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

The terms "covered transaction", "debarred", "suspended", "ineligible", "lower tier covered transaction", "participant", "person", "primary covered transaction", "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the department or agency to which this proposal is submitted for assistance in obtaining a copy of those regulations.

The prospective primary participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

The prospective primary participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," provided by the department or agency entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the non-procurement portion of the "Lists of Parties Excluded from Federal

Procurement or Non procurement Programs" (Non-procurement List) which is compiled by the General Services Administration.

Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

If a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:

Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

Have not within a 3-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statement, or receiving stolen property.

Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in this certification; and

Have not within a 3-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

Where the prospective primary

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participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION APPLICABLE TO ALL SUBCONTRACTS, PURCHASE ORDERS AND OTHER LOWER TIER TRANSACTIONS OF \$25,000 OR MORE

By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

The terms "covered transaction," "debarred," "suspended," "ineligible," "primary covered transaction," "participant," "person," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations.

The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended,

declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the Non-procurement List.

Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

If a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this

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transaction by any Federal department or agency.

Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

PAYMENT OF PREVAILING WAGES:

Applicable to all Federal-aid (CDBG) construction contracts exceeding \$2,000 and to all related subcontracts:

All mechanics and laborers employed or working upon the site of the work will be paid unconditionally and not less often than once a week and without subsequent deduction or rebate on any account except such payroll deductions as are permitted by regulations (29 CFR 3) issued by the Secretary of labor under the Copeland Act (40 U.S.C. 276c) the full amounts of wages and bona fide fringe benefits or cash equivalents thereof due at time of payment. The payment shall be computed at wage rates not less than those contained in the wage determination of the Secretary of Labor, hereinafter called "the wage determination", which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor or its subcontractors and such laborers and mechanics. The wage determination shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers. For the purpose of this Section, contributions made, or costs reasonably anticipated for bona fide fringe benefits under Section 1 (b)(2) of the Davis-Bacon Act (40 U.S.C. 276a) on behalf of laborers or mechanics are considered wages paid. Regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period: Such laborers and mechanics shall be paid the appropriate wage rate and

fringe benefits on the wage determination for the classification of work actually performed, without regard to skill.

Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein, provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed.

All rulings and interpretations of the Davis-Bacon Act and related acts contained in 29 CFR 1, 3 and 5 are herein incorporated by reference in this contract.

PERSONNEL ACTIONS:

Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age, or disability. The following procedures shall be followed:

The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with his obligations under this contract, will attempt to resolve such complaints, and will take appropriate

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corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of his avenues of appeal.

The contractor will assist in locating, qualifying, and increasing the skills of minority group and women employees, and applicants for employment.

CONFORMANCE RATES:

The awarding agency shall require that any class of laborers or mechanics employed under the contract which is not listed in the wage determination shall be classified in conformance with the wage decision.

An additional classification, wage rate and fringe benefits may be approved only when the following criteria have been met:

- 1) The work to be performed by the additional classification is not performed by any other classification in the wage determination;
- 2) The additional classification is utilized in the area by the construction industry;
- 3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

If the contractor or subcontractor, laborers and mechanics, awarding agency and the contracting officer agree on the classification and conformance wage rate including the amount designated for fringe benefits where appropriate, the conformance rates shall be paid to all workers performing work in that classification from the first day on which work is performed in the classification.

In the event the contractor or subcontractors, laborers and mechanics, awarding agency and the contracting officer do not agree on the proposed classification

and wage rate including the amount designated for fringe benefits where appropriate, the contracting officer (OCRA Labor Standards Compliance Officer) shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. Said Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting agency or will notify within the 30-day period that additional time is necessary. Any work performed during the waiting period will be paid at the base wage and fringe benefit amount conditionally assigned by the contracting officer until a conformance rate is assigned by the Wage and Hour Administrator.

PAYMENT OF FRINGE BENEFITS:

Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor or subcontractors, as appropriate, shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly case equivalent thereof. If the contractor or subcontractor does not make payments to a trustee or other third person, he/she may consider as a part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, provided that the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met.

APPRENTICE PARTICIPATION:

Apprentices will be permitted to work at less than the predetermined rate for the work they perform when they are employed pursuant to and individually registered in a bona fide apprenticeship program duly registered with the DOL, Employment and Training Administration, Bureau of

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Apprenticeship and Training, or with a State apprenticeship agency recognized by the Bureau.

The allowable ratio of apprentices to journeyman-level employees on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any employee listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate listed in the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor or subcontractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman-level hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeyman-level hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator for the Wage and Hour Division determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

In the event the Bureau of Apprenticeship and Training, or a State apprenticeship agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor or subcontractor will no longer be permitted to

utilize apprentices at less than the applicable predetermined rate for the comparable work performed by regular employees until an acceptable program is approved.

OVERTIME REQUIREMENTS:

No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers, mechanics, watchmen, or guards (including apprentices) shall require or permit any laborer, mechanic, watchman, guard or apprentice in any workweek in which he/she is employed on such work, to work in excess of 40 hours in such workweek unless such laborer, mechanic, watchman, guard or apprentice receives compensation at a rate not less than one-and-one-half times his/her basic rate of pay for all hours worked in excess of 40 hours in such workweek.

WITHHOLDING PAYMENT FOR UNPAID WAGES:

The awarding agency shall upon its own action or upon written request of an authorized representative of the DOL withhold, or cause to be withheld, from the contractor or subcontractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements which is held by the same prime contractor, as much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

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**VIOLATIONS AND LIABILITY FOR UNPAID
WAGES AND LIQUIDATED DAMAGES:**

In the event of any violation of the requirements set forth in this document, the contractor, and any subcontractor responsible for the violation shall be liable to the affected employee for his/her unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States for liquidated damages.

STATEMENTS AND PAYROLLS:

Applicable to all Federally assisted construction contracts exceeding \$2,000 and to all related subcontracts, except for projects located on roadways classified as local roads or rural collectors, which are exempt.

The Contractor shall comply with the Copeland Regulations of the Secretary of Labor.

Payrolls and basic records relating thereto shall be maintained by the contractor and each subcontractor during the course of the work and preserved for a period of 3 years from the date of completion of the contract for all laborers, mechanics, apprentices, watchmen, helpers and guards working at the site of the work.

The payroll records shall contain the name and last four digits of the social security number of each such employee; his or her correct classification; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalent thereof the types described in Section 1(b)(2)(B) of the Davis Bacon Act); daily and weekly number of hours worked; deductions made; and actual wages paid. Whenever the Secretary of Labor has found that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1(b)(2)(B) of the Davis Bacon Act, the contractor and subcontractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is

financially responsible, that the plan or program has been communicated in writing to the laborers or mechanics affected, and show the cost anticipated or the actual cost incurred in providing benefits. Contractors or subcontractors employing apprentices under approved programs shall maintain written evidence of the registration of apprentices and ratios and wage rates prescribed in the applicable programs.

Each contractor and subcontractor shall furnish, each week in which any contract work is performed, to the awarding agency or an agent thereof, a certified payroll report of wages paid each of its employees. The payroll submitted shall set out accurately and completely all of the information required to be maintained. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal stock number 029-005-0014-1), U.S. Government Printing Office, Washington D.C. 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his/her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

That the payroll for the payroll period contains the information required to be maintained and that such information is correct and complete;

That such laborer or mechanic employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in the Regulations, 29 CFR 3;

That each laborer or mechanic has been paid not less than the applicable wage rate and fringe benefits or cash equivalent for the classification of work performed, as specified in the applicable wage

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determination incorporated into the contract.

The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance".

SECTION 4 Health and Safety

SAFETY AND ACCIDENT PREVENTION:

In the performance of this contract the contractor shall comply with all applicable Federal, State and local laws governing safety, health and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the awarding agency may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3333).

Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3333).

IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT:

(Applicable to all Federally assisted construction contracts and to all related subcontracts of \$100,000 or more.)

By submission of this bid or the execution of this contract, or subcontract, as appropriate, the bidder, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

That any facility that is or will be utilized in the performance of this contract, unless such contract is exempt under the Clean Air Act, as amended (42 U.S.C. 1857 et seq., as amended by Pub.L. 91-604), and under the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq. as amended by Pub.L. 92-500), Executive Order 11738, and regulations in implementation thereof (40 CFR 15) is not listed, on the date of contract award, on the U. S. Environmental Protection Agency (EPA) List of Violating Facilities pursuant to 40 CFR 15.20.

That the firm agrees to comply and remain in compliance with all the requirements of Section 114 of the Clean Air Act and Section 308 of the Federal Water Pollution Control Act and all regulations and guidelines listed thereunder.

That the firm shall promptly notify the awarding agency of the receipt of any communication from the Director, Office of Federal Activities, EPA, indicating that a facility that is or will be utilized for the contract is under consideration to be listed on the EPA List of Violating Facilities.

That the firm agrees to include or cause to be included the requirements of this Section in every nonexempt subcontract, and further agrees to take such action as the government may direct as a means of enforcing such requirements.

Equal Employment Opportunity is **THE LAW**

Private Employers, State and Local Governments, Educational Institutions, Employment Agencies and Labor Organizations

Applicants to and employees of most private employers, state and local governments, educational institutions, employment agencies and labor organizations are protected under Federal law from discrimination on the following bases:

RACE, COLOR, RELIGION, SEX, NATIONAL ORIGIN

Title VII of the Civil Rights Act of 1964, as amended, protects applicants and employees from discrimination in hiring, promotion, discharge, pay, fringe benefits, job training, classification, referral, and other aspects of employment, on the basis of race, color, religion, sex (including pregnancy), or national origin. Religious discrimination includes failing to reasonably accommodate an employee's religious practices where the accommodation does not impose undue hardship.

DISABILITY

Title I and Title V of the Americans with Disabilities Act of 1990, as amended, protect qualified individuals from discrimination on the basis of disability in hiring, promotion, discharge, pay, fringe benefits, job training, classification, referral, and other aspects of employment. Disability discrimination includes not making reasonable accommodation to the known physical or mental limitations of an otherwise qualified individual with a disability who is an applicant or employee, barring undue hardship.

AGE

The Age Discrimination in Employment Act of 1967, as amended, protects applicants and employees 40 years of age or older from discrimination based on age in hiring, promotion, discharge, pay, fringe benefits, job training, classification, referral, and other aspects of employment.

SEX (WAGES)

In addition to sex discrimination prohibited by Title VII of the Civil Rights Act, as amended, the Equal Pay Act of 1963, as amended, prohibits sex discrimination in the payment of wages to women and men performing substantially equal work, in jobs that require equal skill, effort, and responsibility, under similar working conditions, in the same establishment.

GENETICS

Title II of the Genetic Information Nondiscrimination Act of 2008 protects applicants and employees from discrimination based on genetic information in hiring, promotion, discharge, pay, fringe benefits, job training, classification, referral, and other aspects of employment. GINA also restricts employers' acquisition of genetic information and strictly limits disclosure of genetic information. Genetic information includes information about genetic tests of applicants, employees, or their family members; the manifestation of diseases or disorders in family members (family medical history); and requests for or receipt of genetic services by applicants, employees, or their family members.

RETALIATION

All of these Federal laws prohibit covered entities from retaliating against a person who files a charge of discrimination, participates in a discrimination proceeding, or otherwise opposes an unlawful employment practice.

WHAT TO DO IF YOU BELIEVE DISCRIMINATION HAS OCCURRED

There are strict time limits for filing charges of employment discrimination. To preserve the ability of EEOC to act on your behalf and to protect your right to file a private lawsuit, should you ultimately need to, you should contact EEOC promptly when discrimination is suspected:

The U.S. Equal Employment Opportunity Commission (EEOC), 1-800-669-4000 (toll-free) or 1-800-669-6820 (toll-free TTY number for individuals with hearing impairments). EEOC field office information is available at www.eeoc.gov or in most telephone directories in the U.S. Government or Federal Government section. Additional information about EEOC, including information about charge filing, is available at www.eeoc.gov.

Employers Holding Federal Contracts or Subcontracts

Applicants to and employees of companies with a Federal government contract or subcontract are protected under Federal law from discrimination on the following bases:

RACE, COLOR, RELIGION, SEX, NATIONAL ORIGIN

Executive Order 11246, as amended, prohibits job discrimination on the basis of race, color, religion, sex or national origin, and requires affirmative action to ensure equality of opportunity in all aspects of employment.

INDIVIDUALS WITH DISABILITIES

Section 503 of the Rehabilitation Act of 1973, as amended, protects qualified individuals from discrimination on the basis of disability in hiring, promotion, discharge, pay, fringe benefits, job training, classification, referral, and other aspects of employment. Disability discrimination includes not making reasonable accommodation to the known physical or mental limitations of an otherwise qualified individual with a disability who is an applicant or employee, barring undue hardship. Section 503 also requires that Federal contractors take affirmative action to employ and advance in employment qualified individuals with disabilities at all levels of employment, including the executive level.

DISABLED, RECENTLY SEPARATED, OTHER PROTECTED, AND ARMED FORCES SERVICE MEDAL VETERANS

The Vietnam Era Veterans' Readjustment Assistance Act of 1974, as amended, 38 U.S.C. 4212, prohibits job discrimination and requires affirmative action to employ and advance in employment disabled veterans, recently separated veterans (within

three years of discharge or release from active duty), other protected veterans (veterans who served during a war or in a campaign or expedition for which a campaign badge has been authorized), and Armed Forces service medal veterans (veterans who, while on active duty, participated in a U.S. military operation for which an Armed Forces service medal was awarded).

RETALIATION

Retaliation is prohibited against a person who files a complaint of discrimination, participates in an OFCCP proceeding, or otherwise opposes discrimination under these Federal laws.

Any person who believes a contractor has violated its nondiscrimination or affirmative action obligations under the authorities above should contact immediately:

The Office of Federal Contract Compliance Programs (OFCCP), U.S. Department of Labor, 200 Constitution Avenue, N.W., Washington, D.C. 20210, 1-800-397-6251 (toll-free) or (202) 693-1337 (TTY). OFCCP may also be contacted by e-mail at OFCCP-Public@dol.gov, or by calling an OFCCP regional or district office, listed in most telephone directories under U.S. Government, Department of Labor.

Programs or Activities Receiving Federal Financial Assistance

RACE, COLOR, NATIONAL ORIGIN, SEX

In addition to the protections of Title VII of the Civil Rights Act of 1964, as amended, Title VI of the Civil Rights Act of 1964, as amended, prohibits discrimination on the basis of race, color or national origin in programs or activities receiving Federal financial assistance. Employment discrimination is covered by Title VI if the primary objective of the financial assistance is provision of employment, or where employment discrimination causes or may cause discrimination in providing services under such programs. Title IX of the Education Amendments of 1972 prohibits employment discrimination on the basis of sex in educational programs or activities which receive Federal financial assistance.

INDIVIDUALS WITH DISABILITIES

Section 504 of the Rehabilitation Act of 1973, as amended, prohibits employment discrimination on the basis of disability in any program or activity which receives Federal financial assistance. Discrimination is prohibited in all aspects of employment against persons with disabilities who, with or without reasonable accommodation, can perform the essential functions of the job.

If you believe you have been discriminated against in a program of any institution which receives Federal financial assistance, you should immediately contact the Federal agency providing such assistance.

“EEO is the Law” Poster Supplement

Employers Holding Federal Contracts or Subcontracts Section Revisions

The Executive Order 11246 section is revised as follows:

RACE, COLOR, RELIGION, SEX, SEXUAL ORIENTATION, GENDER IDENTITY, NATIONAL ORIGIN

Executive Order 11246, as amended, prohibits employment discrimination based on race, color, religion, sex, sexual orientation, gender identity, or national origin, and requires affirmative action to ensure equality of opportunity in all aspects of employment.

PAY SECRECY

Executive Order 11246, as amended, protects applicants and employees from discrimination based on inquiring about, disclosing, or discussing their compensation or the compensation of other applicants or employees.

The Individuals with Disabilities section is revised as follows:

INDIVIDUALS WITH DISABILITIES

Section 503 of the Rehabilitation Act of 1973, as amended, protects qualified individuals with disabilities from discrimination in hiring, promotion, discharge, pay, fringe benefits, job training, classification, referral, and other aspects of employment. Disability discrimination includes not making reasonable accommodation to the known physical or mental limitations of an otherwise qualified individual with a disability who is an applicant or employee, barring undue hardship to the employer. Section 503 also requires that Federal contractors take affirmative action to employ and advance in employment qualified individuals with disabilities at all levels of employment, including the executive level.

The Vietnam Era, Special Disabled Veterans section is revised as follows:

PROTECTED VETERANS

The Vietnam Era Veterans’ Readjustment Assistance Act of 1974, as amended, 38 U.S.C. 4212, prohibits employment discrimination against, and requires affirmative action to recruit, employ, and advance in employment, disabled veterans, recently separated veterans (i.e., within three years of discharge or release from active duty), active duty wartime or campaign badge veterans, or Armed Forces service medal veterans.

Mandatory Supplement to EEOC P/E-1(Revised 11/09) “EEO is the Law” Poster:

If you believe that you have experienced discrimination contact OFCCP: 1-800-397-6251 | TTY 1-877-889-5627 | www.dol.gov.

EMPLOYEE RIGHTS

EMPLOYEE POLYGRAPH PROTECTION ACT

The Employee Polygraph Protection Act prohibits most private employers from using lie detector tests either for pre-employment screening or during the course of employment.

PROHIBITIONS

Employers are generally prohibited from requiring or requesting any employee or job applicant to take a lie detector test, and from discharging, disciplining, or discriminating against an employee or prospective employee for refusing to take a test or for exercising other rights under the Act.

EXEMPTIONS

Federal, State and local governments are not affected by the law. Also, the law does not apply to tests given by the Federal Government to certain private individuals engaged in national security-related activities.

The Act permits polygraph (a kind of lie detector) tests to be administered in the private sector, subject to restrictions, to certain prospective employees of security service firms (armored car, alarm, and guard), and of pharmaceutical manufacturers, distributors and dispensers.

The Act also permits polygraph testing, subject to restrictions, of certain employees of private firms who are reasonably suspected of involvement in a workplace incident (theft, embezzlement, etc.) that resulted in economic loss to the employer.

The law does not preempt any provision of any State or local law or any collective bargaining agreement which is more restrictive with respect to lie detector tests.

EXAMINEE RIGHTS

Where polygraph tests are permitted, they are subject to numerous strict standards concerning the conduct and length of the test. Examinees have a number of specific rights, including the right to a written notice before testing, the right to refuse or discontinue a test, and the right not to have test results disclosed to unauthorized persons.

ENFORCEMENT

The Secretary of Labor may bring court actions to restrain violations and assess civil penalties against violators. Employees or job applicants may also bring their own court actions.

THE LAW REQUIRES EMPLOYERS TO DISPLAY THIS POSTER WHERE EMPLOYEES AND JOB APPLICANTS CAN READILY SEE IT.



WAGE AND HOUR DIVISION
UNITED STATES DEPARTMENT OF LABOR

1-866-487-9243
TTY: 1-877-889-5627
www.dol.gov/whd



WH1462 REV 07/16

SAFETY AND HEALTH PROTECTION ON THE JOB

INTRODUCTION:

The intent of the Indiana Occupational Safety and Health Act of 1974, Indiana Code 22-8-1.1, is to assure, so far as possible, safe and healthful working conditions for the workers in the State.

The Indiana Department of Labor has primary responsibility for administering and enforcing the Act and the safety and health standards promulgated under its provisions.

Requirements of the Act include the following:

EMPLOYERS:

Each employer shall establish and maintain conditions of work which are reasonably safe and healthful for employees and free from recognized hazards that are causing or likely to cause death or serious physical harm to employees. The Act further requires that employers comply with the Occupational Safety and Health Standards, Rules, and Regulations.

EMPLOYEES:

All employees shall comply with Occupational Safety and Health Standards and all rules, regulations, and orders issued under the Act, which are applicable to their own actions and conduct.

INSPECTION:

The Act requires that an opportunity be provided for employees and their representatives to bring possible safety and health violations to the attention of the Department of Labor inspector in order to aid the inspection. This requirement may be fulfilled by allowing a representative of the employees and a representative of the employer to accompany the inspector during inspection. Where there is no employee representative, the inspector shall consult with a reasonable number of employees.

COMPLAINT:

Employees have the right to file a complaint with the Department of Labor. There shall be an inspection where reasonable grounds exist for the Department of Labor to believe there may be a hazard. Unless permission is given by the employees complaining to release their names, they will be withheld from the employer. Telephone Number (317) 232-2693.

The Act provides that no employer shall discharge, suspend, or otherwise discriminate in terms of conditions of employment against any employees for their failure or refusal to engage in unsafe practices or for filing a complaint, testifying, or otherwise acting to exercise their rights under the Act.

Employees who believe they have been discriminated against may file a complaint with the Department of Labor within 30 days of the alleged discrimination. Please note that extensions of the 30-day filing requirement may be granted under certain special circumstances, such as where the employer has concealed or misled the employee regarding the grounds for discharge. However, a grievance-arbitration proceeding, which is pending, would not be considered justification for an extension of the 30-day filing period. The Commissioner of Labor shall investigate said complaint and upon finding discrimination in violation of the Act, shall order the employer to provide necessary relief to the employees. This relief may include rehiring, reinstatement to the job with back pay, and restoration of seniority.

All employees are also afforded protection from discrimination under Federal Occupational Safety and Health Act and may file a complaint with the U.S. Secretary of Labor within 30 days of the alleged discrimination.

VIOLATION NOTICE:

When an alleged violation of any provision of the Act has occurred, the Department of Labor shall promptly issue a written order to the employer, who shall be required to post it prominently at or near the place where the alleged violation occurred until it is made safe and required safeguards are provided or 3 days, whichever is longer.

PROPOSED PENALTIES:

The Act provides for CIVIL penalties of not more than \$7,000 for each serious violation and CIVIL penalties of up to \$7,000 for each non-serious violation. Any employer who fails to correct a violation within the prescribed abatement period may be assessed a CIVIL penalty of not more than \$7,000 for each day beyond the abatement date during which such violation continues. Also, any employer who knowingly or repeatedly violates the Act may be assessed CIVIL penalties of not more than \$70,000 for each violation. A minimum penalty of \$5,000 may be imposed for each knowing violation. A violation of posting requirements can bring a penalty of up to \$7,000.

VOLUNTARY ACTIVITY:

The Act encourages efforts by labor and management, before the Department of Labor inspections, to reduce injuries and illnesses arising out of employment.

The Act encourages employers and employees to reduce workplace hazards voluntarily and to develop and improve safety and health programs in all workplaces and industries.

Such cooperative action would initially focus on the identification and elimination of hazards that could cause death, injury, or illness to employees and supervisors.

The Act provides a consultation service to assist in voluntary compliance and give recommendations for the abatement of cited violations. This service is available upon a written request from the employer to INSafe. Telephone Number (317) 232-2688.

COVERAGE:

The Act does not cover those hired for domestic service in or about a private home and those covered by a federal agency. Those exempted from the Act's coverage include employees in maritime services, who are covered by the U.S. Department of Labor, and employees in atomic energy activities who are covered by the Atomic Energy Commission.

NOTE:

Under a plan approved March 6, 1974, by the U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), the State of Indiana is providing job safety and health protection for workers throughout the State. OSHA will monitor the operation of this plan to assure that continued approval is merited. Any person may make a complaint regarding the State administration of this plan directly to the OSHA Regional Office, Regional Administrator, Region V, U.S. Department of Labor, Occupational Safety and Health Administration, 230 South Dearborn Street, Chicago, Illinois 60604, Telephone Number (312) 353-2220.

MORE INFORMATION:

INDIANA DEPARTMENT OF LABOR
402 West Washington Street, Room W195
Indianapolis, Indiana 46204
Telephone: (317) 232-2655
TT/Voice: (800) 743-3333
Fax: (317) 233-3790
Internet: <http://www.in.gov/dol>



EMPLOYERS: This poster must be displayed prominently in the workplace.

EMPLOYEE RIGHTS

UNDER THE DAVIS-BACON ACT

FOR LABORERS AND MECHANICS EMPLOYED ON FEDERAL OR FEDERALLY ASSISTED CONSTRUCTION PROJECTS

PREVAILING WAGES

You must be paid not less than the wage rate listed in the Davis-Bacon Wage Decision posted with this Notice for the work you perform.

OVERTIME

You must be paid not less than one and one-half times your basic rate of pay for all hours worked over 40 in a work week. There are few exceptions.

ENFORCEMENT

Contract payments can be withheld to ensure workers receive wages and overtime pay due, and liquidated damages may apply if overtime pay requirements are not met. Davis-Bacon contract clauses allow contract termination and debarment of contractors from future federal contracts for up to three years. A contractor who falsifies certified payroll records or induces wage kickbacks may be subject to civil or criminal prosecution, fines and/or imprisonment.

APPRENTICES

Apprentice rates apply only to apprentices properly registered under approved Federal or State apprenticeship programs.

PROPER PAY

If you do not receive proper pay, or require further information on the applicable wages, contact the Contracting Officer listed below:

or contact the U.S. Department of Labor's Wage and Hour Division.



WAGE AND HOUR DIVISION
UNITED STATES DEPARTMENT OF LABOR

1-866-487-9243
TTY: 1-877-889-5627
www.dol.gov/whd



WH1321 REV 10/17



**EQUAL HOUSING
OPPORTUNITY**

**We Do Business in Accordance With the Federal Fair
Housing Law**

(The Fair Housing Amendments Act of 1988)

**It is Illegal to Discriminate Against Any Person
Because of Race, Color, Religion, Sex,
Handicap, Familial Status, or National Origin**

In the sale or rental of housing or
residential lots

In the provision of real estate
brokerage services

In advertising the sale or rental
of housing

In the appraisal of housing

In the financing of housing

Blockbusting is also illegal

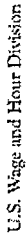
**Anyone who feels he or she has been
discriminated against may file a complaint of
housing discrimination:**

1-800-669-9777 (Toll Free)

1-800-927-9275 (TTY)

www.hud.gov/fairhousing

**U.S. Department of Housing and
Urban Development
Assistant Secretary for Fair Housing and
Equal Opportunity
Washington, D.C. 20410**



(over)

Date _____

I, _____ (Name of Signatory Party) _____ (Title)

do hereby state:

(1) That I pay or supervise the payment of the persons employed by

_____ (Contractor or Subcontractor) _____ on the

_____ (Building or Work) _____; that during the payroll period commencing on the

_____ day of _____, and ending the _____ day of _____, all persons employed on said project have been paid the full weekly wages earned, that no rebates have been or will be made either directly or indirectly to or on behalf of said

_____ (Contractor or Subcontractor) _____ from the full

weekly wages earned by any person and that no deductions have been made either directly or indirectly from the full wages earned by any person, other than permissible deductions as defined in Regulations, Part 3 (29 C.F.R. Subtitle A) issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat. 948, 63 Stat. 108, 72 Stat. 967; 76 Stat. 357, 40 U.S.C. § 3145), and described below:

(2) That any payrolls otherwise under this contract required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the applicable wage rates contained in any wage determination incorporated into the contract; that the classifications set forth therein for each laborer or mechanic conform with the work he performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with a State apprenticeship agency recognized by the Bureau of Apprenticeship and Training, United States Department of Labor, or if no such recognized agency exists in a State, are registered with the Bureau of Apprenticeship and Training, United States Department of Labor.

(4) That:
(a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS, OR PROGRAMS

☐ — in addition to the basic hourly wage rates paid to each laborer or mechanic listed in the above referenced payroll, payments of fringe benefits as listed in the contract have been or will be made to appropriate programs for the benefit of such employees, except as noted in section 4(c) below.

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

☐ — Each laborer or mechanic listed in the above referenced payroll has been paid, as indicated on the payroll, an amount not less than the sum of the applicable basic hourly wage rate plus the amount of the required fringe benefits as listed in the contract, except as noted in section 4(c) below.

(c) EXCEPTIONS

EXCEPTION (CRAFT)	EXPLANATION

REMARKS:

NAME AND TITLE

SIGNATURE

THE WILLFUL FALSIFICATION OF ANY OF THE ABOVE STATEMENTS MAY SUBJECT THE CONTRACTOR OR SUBCONTRACTOR TO CIVIL OR CRIMINAL PROSECUTION. SEE SECTION 1001 OF TITLE 18 AND SECTION 231 OF TITLE 31 OF THE UNITED STATES CODE.

How to Correctly Fill Out a WH-347 Payroll Form

The completion of the WH-347 Payroll Form is optional; contractors may utilize their own payroll system as long as it conforms to the WH-347 Payroll Form and contains all the necessary information. If you utilize WH-347 Payroll Form as a pdf, saving it electronically aids in making any needed corrections.

Check one of the boxes and list name of contractor or subcontractor

☒ **CONTRACTOR**

☐ **SUBCONTRACTOR**

The last day of the payroll period.

04/24/2010

Fill out completely with contractor or subcontractor address

385 West Drive, Madison WI 53703



WHEDA
U.S. Wage and Hour Division
Rev. Dec. 2008

U.S. Department of Labor
Employment Standards Administration
Wage and Hour Division

PAYROLL
(For Contractor's Optional Use; See instructions at www.dol.gov/esa/whd/forms/wh347instr.htm)
Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number.

OMB No.: 1215-0149
Expires: 12/31/2011

PROJECT OR CONTRACT NO.
3000

PROJECT AND LOCATION
Robin Street Apartments, Delafield WI 53018

(1) NAME AND INDIVIDUAL IDENTIFYING NUMBER (e.g., LAST FOUR DIGITS OF SOCIAL SECURITY NUMBER OF WORKER)	(2) SHORT-TERM EMPLOYMENT YES OR NO	(3) WORK CLASSIFICATION	(4) DAY AND DATE							(5) TOTAL HOURS	(6) GROSS AMOUNT EARNED	(7) DEDUCTIONS			(8) NET WAGES PAID FOR WEEK				
			Sun	Mon	Tue	Wed	Thurs	Fri	Sat			FICA	Medicare	Other					
Alex Driver - #####		Power Equipment Operator									2.00	\$1,422.34	\$161.00	\$185.15	\$156.97	\$50.31	\$85.00	\$0.00	\$1,374.03
		Ball Dancer Group 2									27.50	\$2,012.46							

Payrolls must be numbered sequentially and should be based on the weeks worked under a contract.

Type the word "Final" when the last payroll is submitted for the project.

Indicate the days and dates of the pay period. (should match week ending directly above)

The name and location of project.

The prime contractor should include the project number as listed in the loan

The last day of the payroll period.

Fill out completely with contractor or subcontractor address

List each worker's name.

Only laborers and mechanics performing construction work under the contract should be listed.

Please note: Business Owners need only include their name, work classification including "owner" and the daily total hours worked.

List hourly wage rate and fringes paid in cash (not those paid to plans)

Specify the net amount paid to the employee for the pay

(For Contractor's Optional Use): See instructions at www.dol.gov/esa/wh347instr.htm

Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number.

ADDRESS: 385 West Drive, Madison, WI 53703

PROJECT AND LOCATION: Robin Street Apartments, Delafield WI 53018

PROJECT OR CONTRACT NUMBER: 3000

NAME AND INDIVIDUAL IDENTIFYING NUMBER (e.g., LAST FOUR DIGITS OF SOCIAL SECURITY NUMBER)	WORK CLASSIFICATION	(4) DAY AND DATE							TOTAL HOURS	RATE OF PAY	GROSS AMOUNT OF PAY	(5) DEDUCTIONS			TOTAL DEDUCTIONS	NET WAGES PAID FOR WEEK
		HOURS WORKED EACH DAY										FICA	MEDICAID	OTHER		
		Sun	Mon	Tue	Wed	Thurs	Frid	Sat								
Alex Driver - #####	Power Equipment Operator Group 2	0	0	0	0	0	0	0	2.00	\$62.83	\$125.66	\$161.00	\$538.43	\$1,374.03		
Jason Worker - #####	General Laborer	0	0	0	0	0	0	0	4.00	\$32.72	\$130.88	\$136.06	\$27.71	\$1,233.07		
Steve Worker - #####	Apprentice Carpenter 1st 6 mo. at 40%	0	0	0	0	0	0	0	1.50	\$60.19	\$90.28	\$111.00	\$47.19	\$1,406.18		
Roy Wrench - #####	Plumber	0	0	0	0	0	0	0	40.00	\$32.72	\$1,308.80	\$85.18	\$307.71	\$757.01		
Bart Turner - #####	Steamfitter	0	0	0	0	0	0	0	20.00	\$67.88	\$1,357.60	\$163.46	\$480.16	\$1,563.04		
	Power Equipment Rotary Drill Group 4	0	0	0	0	0	0	0	20.00	\$34.41	\$688.20	\$142.48	\$35.98	\$1,023.27		

Must accurately reflect overtime and straight time hours worked under the contract.

Specify the gross earnings for the hours worked under the contract.

When completion of Form WH-347 is optional, it is mandatory for covered contractors and subcontractors performing work on Federal, State, or local construction contracts to furnish weekly a statement with respect to the wages paid each week to laborers and mechanics performing construction work on the project. The statement must include the following information: (1) the name of the contractor or subcontractor; (2) the name of the project; (3) the location of the project; (4) the date of the statement; (5) the name of the laborer or mechanic; (6) the work classification; (7) the daily total hours worked; (8) the daily wage rate; (9) the daily overtime rate; (10) the daily straight time rate; (11) the daily gross earnings; (12) the daily net earnings; (13) the daily deductions; (14) the daily total deductions; (15) the daily total gross earnings; (16) the daily total net earnings; (17) the daily total deductions; (18) the daily total gross earnings; (19) the daily total net earnings; (20) the daily total deductions; (21) the daily total gross earnings; (22) the daily total net earnings; (23) the daily total deductions; (24) the daily total gross earnings; (25) the daily total net earnings; (26) the daily total deductions; (27) the daily total gross earnings; (28) the daily total net earnings; (29) the daily total deductions; (30) the daily total gross earnings; (31) the daily total net earnings; (32) the daily total deductions; (33) the daily total gross earnings; (34) the daily total net earnings; (35) the daily total deductions; (36) the daily total gross earnings; (37) the daily total net earnings; (38) the daily total deductions; (39) the daily total gross earnings; (40) the daily total net earnings; (41) the daily total deductions; (42) the daily total gross earnings; (43) the daily total net earnings; (44) the daily total deductions; (45) the daily total gross earnings; (46) the daily total net earnings; (47) the daily total deductions; (48) the daily total gross earnings; (49) the daily total net earnings; (50) the daily total deductions; (51) the daily total gross earnings; (52) the daily total net earnings; (53) the daily total deductions; (54) the daily total gross earnings; (55) the daily total net earnings; (56) the daily total deductions; (57) the daily total gross earnings; (58) the daily total net earnings; (59) the daily total deductions; (60) the daily total gross earnings; (61) the daily total net earnings; (62) the daily total deductions; (63) the daily total gross earnings; (64) the daily total net earnings; (65) the daily total deductions; (66) the daily total gross earnings; (67) the daily total net earnings; (68) the daily total deductions; (69) the daily total gross earnings; (70) the daily total net earnings; (71) the daily total deductions; (72) the daily total gross earnings; (73) the daily total net earnings; (74) the daily total deductions; (75) the daily total gross earnings; (76) the daily total net earnings; (77) the daily total deductions; (78) the daily total gross earnings; (79) the daily total net earnings; (80) the daily total deductions; (81) the daily total gross earnings; (82) the daily total net earnings; (83) the daily total deductions; (84) the daily total gross earnings; (85) the daily total net earnings; (86) the daily total deductions; (87) the daily total gross earnings; (88) the daily total net earnings; (89) the daily total deductions; (90) the daily total gross earnings; (91) the daily total net earnings; (92) the daily total deductions; (93) the daily total gross earnings; (94) the daily total net earnings; (95) the daily total deductions; (96) the daily total gross earnings; (97) the daily total net earnings; (98) the daily total deductions; (99) the daily total gross earnings; (100) the daily total net earnings.

If part of a worker's weekly wage was earned on projects other than the project described on this payroll, enter the gross amount earned on this contract in the top half of column 7. Enter the gross amount earned during the week for all projects in the bottom half.

Alex Driver worked 29.5 hours on this contract and 12.5 hours on another contract.
The gross wages earned on this project, \$1,422.84, is entered in the top half of column 7.
The gross wages earned on all projects, \$2,012.46, is entered in the

(1) NAME AND INDIVIDUAL IDENTIFYING NUMBER (e.g., LAST FOUR DIGITS OF SOCIAL SECURITY NUMBER OF WORKER)	(2) PROJECT OR OTHER IDENTIFYING NUMBER	(3) WORK CLASSIFICATION	(4) DAY AND DATE							TOTAL HOURS	DATE OF PAY	GROSS WAGES EARNED	DEDUCTIONS				NET WAGES EARNED FOR WEEK
			Sun	Mon	Tue	Wed	Thurs	Fri	Sat				FICA	State withholding tax	Medicare	OTHER	
Alex Driver - #####	2	Power Equipment Bull Dozer Group 2	0	0	0	0	0	0	0	2.00	\$62.83	\$1,422.84	\$85.15	\$156.97	\$50.31	\$85.00	\$1,374.03
Jason Worker - #####	2	General Laborer	0	0	0	0	0	0	0	27.50	\$137.50	\$2,012.46	\$135.15	\$132.66	\$42.52	\$467.71	\$1,233.07
Sharon Wood - #####	3	Carpenter	0	0	0	0	0	0	0	1.50	\$60.19	\$1,887.49	\$151.00	\$126.35	\$47.19	\$481.31	\$1,406.18
Reggie Tree - #####	1	Apprentice Carpenter 1st 6 mo. at 40%	0	0	0	0	0	0	0	40.00	\$32.72	\$1,064.72	\$85.18	\$90.50	\$26.62	\$307.71	\$737.01
Roy Wrench - #####	5	Plumber	0	0	0	0	0	0	0	20.00	\$67.88	\$1,004.80					
Roy Wrench - #####	5	Steamfitter	0	0	0	0	0	0	0	20.00	\$69.13	\$1,038.40	\$163.46	\$118.51	\$51.08	\$480.16	\$1,562.04
Bert Turner - #####	1	Power Equipment Rotary Drill Group 4	0	0	0	0	0	0	0	24.00	\$60.80	\$2,043.20	\$111.14	\$122.33	\$35.98	\$475.53	\$1,023.27

If an employee performs multiple work classifications under the contract, use two or more lines to distinguish the different job classifications, hours worked, and hourly wage earned for each.

Combine the two classifications when recording the gross amount earned for this pay period, deductions, and net wages.

A registered apprentice performing work under a contract must be reported. The payroll must include the current pay scale & provide a copy of the apprenticeship agreement.

PAYROLL

Optional Use: See instructions at www.doh.gov/esa/whd/forms/wh347 prior to respond to the collection of information unless it displays a currently valid OMB control number.

Provide explanation of "other" deductions on signatory page.

NAME AND INDIVIDUAL IDENTIFYING NUMBER (e.g., LAST FOUR DIGITS OF SOCIAL SECURITY NUMBER OF WORKER)

Alex Driver - #####

Jason Worker - #####

Sharon Wood- #####

Reggie Tree - #####

Roy Wrench - #####

Roy Wrench - #####

Bart Turner - #####

WORK CLASSIFICATION

Power Equipment
Bull Dozer Group 2

General Laborer

Carpenter

Apprentice Carpenter
1st 6 mo. at 40%

Plumber

Steamfitter

Power Equipment
Rotary Drill Group 4

PROJECT AND LOCATION

Robin Street Apartments, Dairfield WI 53018

PROJECT OR CONTRACT NO.

3000

ADDRESS

385 West Drive, Madison WI 53703

DATE

1/24/2010

COPIES

50149

(1)	(2)	(3)	(4) DAY AND DATE							(5)	(6)	(7)	(8) DEDUCTIONS			(9)			
			Sun	Mon	Tue	Wed	Thurs	Fri	Sat				WITH- HOLDING TAX	FICA	State with- holding tax		Medicare	OTHER	TOTAL DEDUCTIONS
										2.00	\$62.83	\$1,422.84	\$161.00	\$185.15	\$156.97	\$50.31	\$85.00	\$638.43	\$1,374.03
										27.50	\$812.50	\$2,012.46	\$136.06	\$156.47	\$132.66	\$42.32		\$467.71	\$1,233.07
										4.00	\$49.20	\$1,700.78							\$1,406.18
										40.00	\$1,387.49	\$1,887.49	\$151.00	\$154.77	\$128.35	\$47.19		\$481.31	\$1,406.18
										40.00	\$33.72	\$1,064.72	\$85.18	\$105.41	\$90.50	\$26.62		\$307.71	\$757.01
										20.00	\$67.88	\$1,004.80							
										20.00	\$332.34	\$1,038.40	\$163.46	\$147.11	\$118.51	\$51.08		\$480.16	\$1,563.04
										20.00	\$344.12	\$2,043.20							
										24.00	\$60.80	\$719.28	\$115.14	\$142.48	\$122.33	\$35.98		\$415.93	\$1,023.27
										24.00	\$319.97	\$1,439.20							

Fringe benefits are not paid as cash to Bart Turner: explanation is included under "(c) exceptions" on signatory page.

We estimate that it will take approximately 15 minutes to complete this form. If you have any comments regarding these instructions, please contact the Bureau of Labor Statistics, Bureau of Economic Analysis, Washington, D.C. 20210

Date 04/28/2010

Tiffany Payer Payroll Supervisor
(Name of Signatory Party) (Title)

do hereby state:

(1) That I pay or supervise the payment of the persons employed by
Sample Construction Company on the
 (Contractor or Subcontractor)
Robin Street Apartments, Delatfield WI that during the payroll period commencing on the
 (Building or Work)
 18 day of 4 2010 and ending the 24 day of 4 2010
 all persons employed on said project have been paid the full weekly wages earned, that no rebates have
 been or will be made either directly or indirectly to or on behalf of said
Sample Construction Company from the full
 (Contractor or Subcontractor)
 weekly wages earned by any person and that no deductions have been made either directly or indirectly
 except as required by law, from the wages earned by any person in payment of the wages of any person.
 3109 C.F.R. 31.104-10, the Secretary of Labor under the Copeland Act, as amended (48 Stat. 944,
 63 Stat. 108, 72 Stat. 887, 78 Stat. 357, 40 U.S.C. § 3145), and described below:
AGC Driver - \$855 for child support

Explanation of "other"

(2) That any payrolls otherwise under this contract required to be submitted for the above period are
 correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the
 applicable wage rates contained in any wage determination incorporated into the contract; that the
 classifications set forth therein for each laborer or mechanic conform with the work he performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide
 apprenticeship program registered with a State apprenticeship agency recognized by the Bureau of
 Apprenticeship and Training, United States Department of Labor, or if no such recognized agency exists in a
 State, are registered with the Bureau of Apprenticeship and Training, United States Department of Labor.

(4) That:
 (a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS, OR PROGRAMS
☐ - in addition to the basic hourly wage rates paid to each laborer or mechanic listed in
 the above referenced payroll, payments of fringe benefits as listed in the contract
 have been or will be made to appropriate programs for the benefit of such
 employees, except as noted in section 4(c) below.

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH
☒ - Each laborer or mechanic listed in the above referenced payroll has been paid,
 as indicated on the payroll, an amount not less than the sum of the applicable
 basic hourly wage rate plus the amount of the required fringe benefits as listed
 in the contract, except as noted in section 4(c) below.

(c) EXCEPTIONS

EXCEPTION (category)	EXPLANATION
Power Equipment Relaty Dnt Group 4	paid directly to plan: health & dental at \$12.50 per hour and Pension at \$8.25 per hour
Explanation of exception to fringe benefits	

NAME AND TITLE
Robert Sample, Owner
 SIGNATURE

THE WILFUL FALSIFICATION OF ANY OF THE ABOVE STATEMENTS MAY SUBJECT THE CONTRACTOR OR
 SUBCONTRACTOR TO A CRIMINAL PROSECUTION IN ACCORDANCE WITH TITLE 18 AND SECTION 3571 OF TITLE
 18 OF THE UNITED STATES CODE.

Federal Labor Standards Provisions

U.S. Department of Housing and Urban Development Office of Labor Relations

Applicability

The Project or Program to which the construction work covered by this contract pertains is being assisted by the United States of America and the following Federal Labor Standards Provisions are included in this Contract pursuant to the provisions applicable to such Federal assistance.

A. 1. (i) Minimum Wages. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR 5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period.

Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFR 5.5(a)(1)(ii) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible, place where it can be easily seen by the workers.

(ii) (a) Any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. HUD shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met:

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

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

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(b) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB control number 1215-0140.)

(c) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

(d) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(ii)(b) or (c) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

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

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part

of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program. Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

2. Withholding. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract in the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper, employed or working on the site of the work, all or part of the wages required by the contract, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the contractor, disburse such amounts withheld for and on account of the contractor or subcontractor to the respective employees to whom they are due. The Comptroller General shall make such disbursements in the case of direct Davis-Bacon Act contracts.

3. (i) Payrolls and basic records. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section 1(b)(2)(B) of the Davis-bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5 (a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been

communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs. (Approved by the Office of Management and Budget under OMB Control Numbers 1215-0140 and 1215-0017.)

(ii) (a) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i) except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this subparagraph for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to HUD or its designee. (Approved by the Office of Management and Budget under OMB Control Number 1215-0149.)

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

(1) That the payroll for the payroll period contains the information required to be provided under 29 CFR 5.5 (a)(3)(ii), the appropriate information is being maintained under 29 CFR 5.5(a)(3)(i), and that such information is correct and complete;

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

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

(c) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by subparagraph A.3.(ii)(b).

(d) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under subparagraph A.3.(i) available for inspection, copying, or transcription by authorized representatives of HUD or its designee or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the contractor, sponsor, applicant or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and Trainees.

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

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

(ii) **Trainees.** Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by, formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by

the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) **Equal employment opportunity.** The utilization of apprentices, trainees and journeymen under 29 CFR Part 5 shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR Part 3 which are incorporated by reference in this contract

6. Subcontracts. The contractor or subcontractor will insert in any subcontracts the clauses contained in subparagraphs 1 through 11 in this paragraph A and such other clauses as HUD or its designee may by appropriate instructions require, and a copy of the applicable prevailing wage decision, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this paragraph.

7. Contract termination; debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act Requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract

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

10. (i) Certification of Eligibility. By entering into this contract the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be

awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001. Additionally, U.S. Criminal Code, Section 1010, Title 18, U.S.C., "Federal Housing Administration transactions", provides in part: "Whoever, for the purpose of . . . influencing in any way the action of such Administration . . . makes, utters or publishes any statement knowing the same to be false . . . shall be fined not more than \$5,000 or imprisoned not more than two years, or both."

11. Complaints, Proceedings, or Testimony by Employees. No laborer or mechanic to whom the wage, salary, or other labor standards provisions of this Contract are applicable shall be discharged or in any other manner discriminated against by the Contractor or any subcontractor because such employee has filed any complaint or instituted or caused to be instituted any proceeding or has testified or is about to testify in any proceeding under or relating to the labor standards applicable under this Contract to his employer.

B. Contract Work Hours and Safety Standards Act. The provisions of this paragraph B are applicable where the amount of the prime contract exceeds \$100,000. As used in this paragraph, the terms "laborers" and "mechanics" include watchmen and guards.

(1) **Overtime requirements.** No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which the individual is employed on such work to work in excess of 40 hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.

(2) **Violation; liability for unpaid wages; liquidated damages.** In the event of any violation of the clause set forth in subparagraph (1) of this paragraph, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in subparagraph (1) of this paragraph, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages required by the clause set forth in subparagraph (1) of this paragraph.

(3) **Withholding for unpaid wages and liquidated damages.** HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contract, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act which is held by the same prime contractor such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in subparagraph (2) of this paragraph.

(4) **Subcontracts.** The contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraph (1) through (4) of this paragraph and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in subparagraphs (1) through (4) of this paragraph.

C. Health and Safety. The provisions of this paragraph C are applicable where the amount of the prime contract exceeds \$100,000.

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

(2) The Contractor shall comply with all regulations issued by the Secretary of Labor pursuant to Title 29 Part 1926 and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act, (Public Law 91-54, 83 Stat 96). 40 USC 3701 et seq.

(3) The contractor shall include the provisions of this paragraph in every subcontract so that such provisions will be binding on each subcontractor. The contractor shall take such action with respect to any subcontractor as the Secretary of Housing and Urban Development or the Secretary of Labor shall direct as a means of enforcing such provisions.

STATEMENT OF COMPLIANCE

Date _____

I, _____, do hereby state:
(Name of signatory party) (Title)

(1) That I pay or supervise the payment of the persons employed by _____ on the
(Contractor or Subcontractor)
_____ that during the payroll commencing on the
(Building or work)

_____ day of _____ and ending the _____ day of _____, all persons employed on said project have been paid the full weekly wages earned, that no rebates have been or will be made either directly or indirectly to or on behalf of said Contractor or Subcontractor from the full weekly wages earned by any person and that no deductions have been made either directly or indirectly from the full wages earned by any person, other than permissible deductions as defined in Regulations, Part 3 (29 CFR Subtitle A), issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat., 949.63 Stat. 108, 72 Stat. 967; 76 Stat. 357; 40 U.S.C. 276c), and described below:

(2) That any payrolls otherwise under this contract required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the applicable wage rates contained in any wage determination incorporated into the contract; that the classifications set forth therein for each laborer or mechanic conform with the work he performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with a State apprenticeship agency recognized by the Bureau of Apprenticeship and Training, United States Department of Labor, or if no such recognized agency exists in a State, are registered with the Bureau of Apprenticeship and Training, United States Department of Labor.

(4) That:

(a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS, OR PROGRAMS

☐ In addition to the basic hourly wage rates paid to each laborer or mechanic listed in the above referenced payroll, payments of fringe benefits as listed in the contract have been or will be made to appropriate programs for the benefit of such employees, except as noted in Section 4(c) below.

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

☐ Each laborer or mechanic listed in the above referenced payroll has been paid as indicated on the payroll, an amount not less than the sum of the applicable basic hourly wage rate plus the amount of the required fringe benefits as listed in the contract, except as noted in Section 4(c) below.

(c) - EXCEPTIONS

EXCEPTION (CRAFT)	EXPLANATION

Remarks _____

Name and Title	Signature
_____	_____

The willful falsification of any of the above statements may subject the contractor or subcontractor to civil or criminal prosecution. See Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

Contractor's Certification

Concerning Labor Standards and Prevailing Wage Requirements

This is to certify that: _____

(Contractor's Company Name & Address)

has executed a contract with _____
(Grantee)for the construction of _____
(Project)identified as Project Number _____ and acknowledges that:
(Grant #)

1. The Federal Labor Standards Provisions (HUD-4010) are attached to the contract;
2. Correction of any infractions of the Federal Labor Standards Provisions, including infractions by any subcontractor or lower tier subcontractor is this contractor's responsibility;
3. Neither this contractor, any subcontractor or any affiliates have been declared ineligible to participate in federally funded construction projects;
4. Contractor agrees to obtain and forward to the Grantee or Grantee's Representative within ten (10) days after the execution of any subcontract, a Subcontractor's Certification concerning Federal Labor Standards Provisions and Prevailing Wage requirements.

Contractor's Federal ID# (or SSN) _____

Type of Entity (Check One) ☐ Single Proprietorship ☐ Partnership
 ☐ Corporation ☐ Other Organization

List below the name, title and address of the owner, partner, or officers of the entity:

Name	Title	Address
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Signature of Owner or Officer: _____

Date Signed: _____

Telephone Number: _____

This form is no longer required by the U.S. Department of Housing and Urban Development but is required by OCRA on federally funded construction projects.

Subcontractor's Certification
Concerning Labor Standards and Prevailing Wage Requirements

This is to certify that: _____
(Subcontractor's Name & Address)

has executed a subcontract with _____
(Prime Contractor)

in the amount of \$ _____ for _____
(Nature of Work)

on Project Number _____ and acknowledges that:
(Grant #)

1. The Federal Labor Standards Provisions (HUD-4010) are attached to the contract;
2. Neither this subcontractor or any second or third tier subcontractors or any affiliates have been declared ineligible to participate in federally funded construction projects;
3. Contractor agrees to provide this completed document to the Prime Contractor within ten (10) days after the execution of any subcontract and to adhere to the Federal Labor Standards Provisions in the execution of this subcontract.

Subcontractor is a:

Type of entity: (Check one) _____ Single Proprietorship _____ Partnership
_____ Corporation _____ Other Organization

List below the name, title and address of the owner, partner, or officers of the entity:

Name	Title	Address
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Signature of Owner or Officer of the Subcontractor: _____

Date Signed: _____

Telephone Number: _____

This form is no longer required by the U.S. Department of Housing and Urban Development but is required by OCRA on federally funded construction projects.

Section 3 Compliance Form

(Submit this form with your Semi-Annual Reports & at Project's Completion.)

General Information

Grantee:	Grant Number:
Prime Contractor:	Prime Contractor EIN:

Project Information

1. Does the project involve any contracts that exceed \$200,000?		
	☐	Yes. Section 3 applies to the Grantee, its subrecipient (if applicable), and contractors with contracts exceeding \$200,000 or subcontracts. (Complete remainder of form.)
	☐	No. Section 3 does not apply to the Grantee and its subrecipient (if applicable). (Complete remainder of form with respect to these entities.)
2. Indicate the efforts made to direct the employment and other economic opportunities generated by HUD financial assistance for housing and community development programs, to the greatest extent feasible, toward low and very low income persons, particularly those who are recipients of government assistance for housing (check all that apply):		
	☐	Attempted to recruit low-income residents through local advertising media, signs prominently displayed at the project site, contracts with community organizations and public or private agencies operating within the metropolitan area or nonmetropolitan county in which the Section 3 covered program or project is located or similar methods.
	☐	Advertising the training and employment positions by distributing flyers (which identify the positions to be filled, the qualifications required, and where to obtain additional information about the application process) to housing developments where low and very low income persons (as these terms are defined in Sec. 135.34) reside.
	☐	Contacting resident councils, resident management corporations, or other resident organizations, where they exist, in the housing development or developments where low and very low income persons reside, and community organizations in HUD assisted neighborhoods, to request the assistance of these organizations in notifying residents of the training and employment positions to be filled.
	☐	Other. Describe:

Form Continued

Grantee:	Grant Number:
Prime Contractor:	Prime Contractor EIN:

3. The date reported to OCRA in this section must be a compilation of information throughout the grant time frame pertaining to the Grantee and each applicable contractor or subcontractor (including a subrecipient or grant administrator, if applicable).

Name of Contractors (If prime contract is over \$200,000 ALL subcontractors working for the prime must be listed below). Engineering contracts over \$200,000.00 must all be reported	Total number of hours worked by ALL employees on the project.	Total number of hours worked by SECTION 3 workers on the project.	Total number of hours worked by TARGETED SECTION 3 workers on the project.	Total percentage of hours worked by SECTION 3 workers on the project.	Total percentage of hours worked by TARGETED SECTION 3 workers on the project.

Signature of Contractor:	
Name of Contractor:	
Date:	

Signature of Chief Elected Official:	
Name of Chief Elected Official:	
Date:	

Civil Rights Section

Form 8

Instructions

Number 2. Grantee and Contractor must describe all attempts made to contract with Section 3 business concerns and to hire Section 3 residents if jobs were available.

Column A: (Mandatory Field) List all Prime contractors with contracts greater than \$200,000.00 as well as any Sub-Contractors working underneath those prime contractors.

Column B: (Mandatory Field) Enter the total number of hours worked by ALL employees for the contractor during the FULL duration of the project from Award to Closeout (or up to the current reporting period). Include staff hours for part-time and full-time positions.

Column C: (Mandatory Field) Enter the total number of hours worked by Section 3 employees for the contractor during the FULL duration of the project from Award to Closeout (or up to the current reporting period). Include staff hours for part-time and full-time positions.

Column D: (Mandatory Field) Enter the total number of hours worked by Targeted Section 3 employees for the contractor during the FULL duration of the project from Award to Closeout (or up to the current reporting period). Include staff hours for part-time and full-time positions.

Column E: Enter the percentage of the total staff hours worked by Section 3 employees and trainees (including new hires) connected with this award. Include staff hours for part-time and full-time positions.

Column F: Enter the percentage of the total staff hours worked by Targeted Section 3 employees and trainees (including new hires) connected with this award. Include staff hours for part-time and full-time positions.

Definitions:

Section 3 Worker - A Section 3 Worker is someone who meets one of the following criteria. If they were hired in the past 5 years, and met the criteria at their date of hire, then they are still considered a Section 3 worker:

- A Low or Very-Low Income level individual according to HUD standards.
- A Youth Build Participant
- Employed by a Section 3 Business Concern

Targeted Section 3 Worker - A Targeted Section 3 Worker is someone who meets one of the following criteria. If they were hired in the past 5 years, and met the criteria at their date of hire, then they are still considered a Targeted Section 3 worker:

- Employed by a Section 3 Business Concern
- Resident of Public Housing or Section 8 Assisted Housing
- A resident of another project managed by the Public Housing Administration
- A Youth Build Participant

Section 3 Business Concern - A business who has documented over the last 3 months that they are one of the following:

- 51% or more owned/controlled by low- or very low-income persons.
- Greater than 75% labor hours are performed over prior three-month period performed by low- or very low-income workers.
- Greater than or equal to 51% owned/controlled by current residents of public housing or Section 8-assisted housing.

Superseded General Decision Number: IN20230008

State: Indiana

Construction Type: Building

Counties: Daviess and Martin Counties in Indiana.

BUILDING CONSTRUCTION PROJECTS (does not include residential construction consisting of single family homes and apartments up to and including 4 stories).

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least \$17.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2024.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least \$12.90 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2024.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <http://www.dol.gov/whd/govcontracts>.

1	03/01/2024
2	04/05/2024
3	04/19/2024
4	05/17/2024
5	06/07/2024

BRIN0005-002 06/01/2023

	Rates	Fringes
BRICKLAYER		
BRICKLAYER; STONE MASON & POINTER, CAULKER, CLEANER...	\$ 36.24	17.39
MARBLE and TILE SETTER.....	\$ 36.24	17.39
TERRAZZO FINISHER.....	\$ 23.38	13.15
TILE and MARBLE FINISHER....	\$ 24.33	13.16

CARP0224-008 04/01/2024

	Rates	Fringes
CARPENTER (Including Drywall)....	\$ 31.48	25.32

ELEC0016-001 04/01/2023

	Rates	Fringes
ELECTRICIAN (Including Alarm Installation and HVAC Control Wiring).....		
	\$ 41.04	18.94

ENGI0181-025 04/01/2019

MARTIN COUNTY

	Rates	Fringes
Power equipment operators:		
Backhoe.....	\$ 34.98	16.50

LAB00561-004 04/01/2023

DAVIESS COUNTY

	Rates	Fringes
LABORER (Unskilled).....	\$ 27.12	18.10

* LAB00741-005 06/01/2024

MARTIN COUNTY

	Rates	Fringes
LABORER (Unskilled).....	\$ 26.88	18.00

PAIN0156-005 04/01/2024

DAVIESS COUNTY

	Rates	Fringes
PAINTER.....	\$ 29.62	19.32

FOOTNOTE A:

All Structures over 40? \$0.75/ hour above base wage
 All Structures over 75? \$1.50/ hour above base wage
 All Structures over 100? \$2.50/ hour above base wage

 PLAS0692-026 04/01/2024

DAVIESS & MARTIN COUNTIES

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 31.25	19.71

 PLUM0136-005 04/01/2024

	Rates	Fringes
PLUMBER (Including HVAC Work)....	\$ 43.82	21.20
PIPEFITTERS.....	\$ 40.82	20.92

 ROOF0106-003 04/01/2024

	Rates	Fringes
ROOFER.....	\$ 34.12	20.27

 SHEE0020-021 07/01/2023

	Rates	Fringes
Sheet metal worker (Including HVAC Duct Work).....	\$ 34.58	29.98

 SUIN1996-003 04/22/1996

	Rates	Fringes
Elevator Constructor.....	\$ 19.90	5.57

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

=====

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Unlisted classifications needed for work not included within

the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

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

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in

the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

State Adopted Rate Identifiers

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

WAGE DETERMINATION APPEALS PROCESS

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

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage

payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

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

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

=====

END OF GENERAL DECISION"

END OF SECTION

SECTION 00 52 00
AGREEMENT FORM

PART 1 GENERAL

1.1 FORM OF AGREEMENT

1.2 The Agreement to be executed is attached following this page.

1.3 RELATED REQUIREMENTS

A. Section 00 72 00 - General Conditions.

B. Section 00 73 00 - Supplementary Conditions.

1.4 MODIFICATIONS TO THE AGREEMENT FORM

A. RD Instruction 1942-A (Guide 27 - Attachment 3), attached at the end of this document.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

DRAFT AIA® Document A101™ – 2017

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

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

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

« Shoals Library Foundation »« »
« 404 High Street, Shoals, IN 47581 »
« »
« »

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

« »« »
« »
« »
« »

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

« Shoals Library Addition and Renovation »
« 404 High Street, Shoals, IN 47581 »
« »

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

« RQAW | DCCM »« »
« 8770 North St, Ste 110, Fishers, IN 46038 »
« »
« »

The Owner and Contractor agree as follows.

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

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

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

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

TABLE OF ARTICLES

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

EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

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

ARTICLE 2 THE WORK OF THIS CONTRACT

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

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

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

(Check one of the following boxes.)

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

« »

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

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

§ 3.3 Substantial Completion

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

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

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

[« »] By the following date: « »

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

Portion of Work	Substantial Completion Date

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

ARTICLE 4 CONTRACT SUM

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

§ 4.2 Alternates

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

Item	Price

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

Item	Price	Conditions for Acceptance

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

Item	Price

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

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

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

« »

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

« »

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

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

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

« »

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the « » day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the « » day of the « » month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than « » (« ») days after the Architect receives the Application for Payment.

(Federal, state or local laws may require payment within a certain period of time.)

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

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

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

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

- .1 That portion of the Contract Sum properly allocable to completed Work;
- .2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- .3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

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

- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- .4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and
- .5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

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

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

« »

§ 5.1.7.1.1 The following items are not subject to retainage:
(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

« »

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

« »

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

« »

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

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

§ 5.2 Final Payment

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

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

« »

§ 5.3 Interest

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

« » % « »

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

« »

« »

« »

« »

§ 6.2 Binding Dispute Resolution

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

(Check the appropriate box.)

☐ Arbitration pursuant to Section 15.4 of AIA Document A201–2017

☒ Litigation in a court of competent jurisdiction

☐ Other (Specify)

« »

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

ARTICLE 7 TERMINATION OR SUSPENSION

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

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

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

« »

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

ARTICLE 8 MISCELLANEOUS PROVISIONS

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

§ 8.2 The Owner’s representative:

(Name, address, email address, and other information)

« »

« »

« »

« »

« »

« »

§ 8.3 The Contractor’s representative:

(Name, address, email address, and other information)

« »

« »

« »

« »

« »

« »

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

§ 8.5 Insurance and Bonds

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

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

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

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

« »

§ 8.7 Other provisions:

« »

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

- .1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor
- .2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds
- .3 AIA Document A201™–2017, General Conditions of the Contract for Construction
- .4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:

(Insert the date of the E203-2013 incorporated into this Agreement.)

« »

- .5 Drawings

Number	Title	Date

- .6 Specifications

Section	Title	Date	Pages

- .7 Addenda, if any:

Number	Date	Pages

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

- .8 Other Exhibits:

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

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

« »

[« »] The Sustainability Plan:

Title	Date	Pages

[« »] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.9 Other documents, if any, listed below:

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

« »

ATTACHMENT TO AIA DOCUMENT A101-2017, *Standard Form of Agreement Between Owner and Contractor*

The provisions of this Attachment shall delete, modify and supplement the provisions contained in the "*Standard Form of Agreement Between Owner and Contractor*," AIA Document A101-2017 Edition. The provisions contained in this attachment shall supersede any conflicting provisions of the AIA Document. The term "Agency", as used in this Attachment, shall mean the United States of America, acting through the United States Department of Agriculture.

When the project is not subject to the Build America, Buy America Act the provisions in bold do not apply.

ARTICLE 3, DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

Delete paragraph 3.1 and associated option boxes in their entirety and replace with the following:

3.1 The date of commencement shall be contained in the Notice to Proceed.

Replace subparagraph 3.3.3 with the following:

3.3.3 If the work is not substantially complete on or before this date, or within this period of time, or extension thereof granted by the Owner, damage will be sustained by the Owner and that it is and will be impracticable and extremely difficult to fix the actual damage which the Owner will sustain in the event of and by reason of such delays. The Contractor shall pay to the Owner liquidated damages in the sum of \$_____ for each calendar day of delay. Any sums that may be due the Owner as liquidated damages may be deducted from any monies due or to become due the Contractor under the Contract or may be collected from the Contractor's surety.

ARTICLE 5, PAYMENTS

Add the following after the words "Payment issued by the Architect" in subparagraph 5.1.1: "using AIA Document G702, 'Application and Certificate for Payment,' or Form RD 1924-18, 'Partial Payment Estimate'".

Add the following to the end of subparagraph 5.1.1: "Agency concurrence is required on all Applications of Payment before payment is made".

Insert "ten" and "10" in the appropriate spaces in the last sentence in subparagraph 5.1.3.

Insert the following retainage description and clauses in subparagraph 5.1.7.1:

The amount retained shall be 10% of the value of Work until 50% of the Work has been completed or a withholding of equal or

greater value, such as, 5% for the full duration of the project. If 10% is held, at 50% completion, further partial payments shall be made in full to the Contractor and no additional amounts may be retained unless the Architect certifies that the Work is not proceeding satisfactorily but amounts previously retained shall not be paid to the Contractor. At 50% completion or any time thereafter when the progress of the Work is not satisfactory, additional amounts may be retained, but in no event shall the total retainage be more than 10% of the value of Work completed. Alternate industry-standard retainage proposals may be considered by RD when:

.1 The retainage proposal is mandated by the State in which the project is located.

.2 The retainage proposal does not add risk to the applicant and the Agency.

ARTICLE 8, MISCELLANEOUS PROVISIONS

Add the following subparagraphs and clauses to paragraph 8.7:

8.7.1 This agreement and any amendments to this agreement shall not be in full force and effect until concurred with in writing by a duly authorized representative of the Agency. The concurrence so evidenced by the Agency shall in no way commit the Agency to render financial assistance to the Owner and is without liability to the Agency for any payment thereunder, but in the event such assistance is provided, the concurrence shall signify that the provisions of this Agreement and any amendments to this Agreement are consistent with Agency requirements.

8.7.2 Build America, Buy America Act

Domestic Preference Requirements for Federal Financial Assistance to Non-Federal Entities. Federal Financial Assistance to Non-Federal Entities, defined pursuant to 2 CFR 200.1 and 2 CFR 184, as any State, local government, Indian tribe, Institution of Higher Education, or nonprofit organization, shall be governed by the requirements of Section 70914 of the Build America, Buy America Act (BABAA), under Title IX of the Infrastructure Investment and Jobs Act, Pub. L. 177-58. Any requests for waiver of these requirements must be submitted pursuant to USDA's guidance available online at [USDA Buy America Waivers for Federal Financial Assistance | USDA.](#)

8.7.2.1 This agreement is for services related to a project that is subject to the Build America, Buy America Act (BABAA) requirements under Title IX of the Infrastructure Investment and Jobs Act ("IIJA"), Pub. L. 177-58. Absent an approved waiver, all iron, steel, manufactured products, and construction materials used in this project must be produced in the United States, as further outlined by the Office of Management and Budget's regulation (reference 2 CFR 200, 2 CFR 184) on the application of Buy America

**Preference in Federal Financial Assistance Programs for
Infrastructure.**

8.7.2.2 The Contractor shall be responsible for:

- .1 Providing costs and revisions thereof that reflect compliance with BABAA requirements.
- .2 Providing only iron, steel, construction materials and manufactured products that meet BABAA requirements. Installation of materials or products that are not compliant with BABAA requirements shall be considered defective work.
- .3 Including manufacturer's certification for BABAA requirements with all applicable submittals. If a specific manufacturer is used in the bidding, a statement that the manufacturer will comply with BABAA requirements must be included with the bid submission. Contractor shall comply with BABAA requirements, including coordination with manufacturers, distributors, and suppliers to correct deficiencies in any BABAA documentation.
- .4 Providing manufacturer's certification for BABAA requirements with any change order for any new construction materials or manufactured products required by the change.
- .5 Certifying by submitting an application for payment, based in whole or in part on furnishing construction materials or manufactured products; that such materials and products, to the Contractor's knowledge, are compliant with BABAA requirements.
- .6 Ensuring that the Architect / Engineer has been provided an approved manufacturer's certification or waiver prior to items being delivered to the project site.
- .7 Certifying upon completion that all work and materials are in compliance with BABAA requirements.

ARTICLE 9, ENUMERATION OF CONTRACT DOCUMENTS

The following documents should be referenced, if applicable; in paragraph 9.1, clause .9:

Attachment to the *Standard Form of Agreement Between Owner and Contractor* (this Attachment)
Attachment to the General Conditions of the Contract for Construction (RD Instruction 1942-A, Guide 27, Attachment 4)
Advertisement For Bids (RD Instruction 1942-A, Guide 19, Attachment 1)
Instructions to Bidders, AIA A701-2018
Attachment to the Instructions to Bidders (RD Instruction 1942-A, Guide 27, Attachment 2)
Bid Form
Bid Bond
Payment Bond
Performance Bond
Certification for Contracts, Grants and Loans (RD Instruction 1940-Q, Exhibit A-1)
Disclosure of Lobbying Activities (Form SF-LLL)
Compliance Statement (Form RD 400-6)

PAGE 8, OWNER AND CONTRACTOR SIGNATURE PAGE

Delete the signature block and replace with the following:

IN WITNESS WHEREOF, the parties hereto have executed, or caused to be executed by their duly authorized officials, this Agreement in duplicate on the respective dates indicated below:

OWNER:

ATTEST: _____	By _____
Type Name _____	Type Name _____
Title _____	Title _____
Date _____	Date _____

CONTRACTOR:

ATTEST: _____	By _____
Type Name _____	Type Name _____
Title _____	Title _____
Date _____	Date _____

AGENCY CONCURRENCE:

By _____

Type Name _____

Title _____

Date _____

The concurrence so evidenced by the Agency shall in no way commit the Agency to render financial assistance to the Owner and is without liability to the Agency for any payment hereunder, but in the event such assistance is provided, the concurrence shall signify the provisions of this Agreement are consistent with Agency requirements.

oOo

July 11, 2023

DRAFT AIA® Document A101™ – 2017

Exhibit A

Insurance and Bonds

This Insurance and Bonds Exhibit is part of the Agreement, between the Owner and the Contractor, dated the « » day of « » in the year « »
(In words, indicate day, month and year.)

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

« Shoals Library Addition and Renovation »
« 404 High Street, Shoals, IN 47581 »

THE OWNER:
(Name, legal status and address)

« Shoals Library Foundation »« »
« 404 High Street, Shoals, IN 47581 »

THE CONTRACTOR:
(Name, legal status and address)

« »« »
« »

TABLE OF ARTICLES

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

ARTICLE A.1 GENERAL

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

ARTICLE A.2 OWNER'S INSURANCE

§ A.2.1 General

Prior to commencement of the Work, the Owner shall secure the insurance, and provide evidence of the coverage, required under this Article A.2 and, upon the Contractor's request, provide a copy of the property insurance policy or policies required by Section A.2.3. The copy of the policy or policies provided shall contain all applicable conditions, definitions, exclusions, and endorsements.

§ A.2.2 Liability Insurance

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

ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An Additions and Deletions Report that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

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

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

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§ A.2.3 Required Property Insurance

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

§ A.2.3.1.1 **Causes of Loss.** The insurance required by this Section A.2.3.1 shall provide coverage for direct physical loss or damage, and shall not exclude the risks of fire, explosion, theft, vandalism, malicious mischief, collapse, earthquake, flood, or windstorm. The insurance shall also provide coverage for ensuing loss or resulting damage from error, omission, or deficiency in construction methods, design, specifications, workmanship, or materials. Sub-limits, if any, are as follows:

(Indicate below the cause of loss and any applicable sub-limit.)

Causes of Loss

Sub-Limit

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

(Indicate below type of coverage and any applicable sub-limit for specific required coverages.)

Coverage

Sub-Limit

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

§ A.2.3.1.4 **Deductibles and Self-Insured Retentions.** If the insurance required by this Section A.2.3 is subject to deductibles or self-insured retentions, the Owner shall be responsible for all loss not covered because of such deductibles or retentions.

§ A.2.3.2 **Occupancy or Use Prior to Substantial Completion.** The Owner's occupancy or use of any completed or partially completed portion of the Work prior to Substantial Completion shall not commence until the insurance company or companies providing the insurance under Section A.2.3.1 have consented in writing to the continuance of coverage. The Owner and the Contractor shall take no action with respect to partial occupancy or use that would cause cancellation, lapse, or reduction of insurance, unless they agree otherwise in writing.

§ A.2.3.3 Insurance for Existing Structures

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

§ A.2.4 Optional Extended Property Insurance.

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

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

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

☐ ☐

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

☐ ☐

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

☐ ☐

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

☐ ☐

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

☐ ☐

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

☐ ☐

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

☐ ☐

§ A.2.5 Other Optional Insurance.

The Owner shall purchase and maintain the insurance selected below.

(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance.)

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

« »

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

Coverage

Limits

ARTICLE A.3 CONTRACTOR'S INSURANCE AND BONDS

§ A.3.1 General

§ A.3.1.1 **Certificates of Insurance.** The Contractor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Article A.3 at the following times: (1) prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. An additional certificate evidencing continuation of commercial liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment and thereafter upon renewal or replacement of such coverage until the expiration of the periods required by Section A.3.2.1 and Section A.3.3.1. The certificates will show the Owner as an additional insured on the Contractor's Commercial General Liability and excess or umbrella liability policy or policies.

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

§ A.3.1.3 **Additional Insured Obligations.** To the fullest extent permitted by law, the Contractor shall cause the commercial general liability coverage to include (1) the Owner, the Architect, and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 07 04, CG 20 37 07 04, and, with respect to the Architect and the Architect's consultants, CG 20 32 07 04.

§ A.3.2 Contractor's Required Insurance Coverage

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

« »

§ A.3.2.2 Commercial General Liability

§ A.3.2.2.1 Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than « » (\$ « ») each occurrence, « » (\$ « ») general aggregate, and « » (\$ « ») aggregate for products-completed operations hazard, providing coverage for claims including

- .1 damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person;
- .2 personal injury and advertising injury;
- .3 damages because of physical damage to or destruction of tangible property, including the loss of use of such property;
- .4 bodily injury or property damage arising out of completed operations; and

.5 the Contractor's indemnity obligations under Section 3.18 of the General Conditions.

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

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

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

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

§ A.3.2.5 Workers' Compensation at statutory limits.

§ A.3.2.6 Employers' Liability with policy limits not less than « » (\$ « ») each accident, « » (\$ « ») each employee, and « » (\$ « ») policy limit.

§ A.3.2.7 Jones Act, and the Longshore & Harbor Workers' Compensation Act, as required, if the Work involves hazards arising from work on or near navigable waterways, including vessels and docks

§ A.3.2.8 If the Contractor is required to furnish professional services as part of the Work, the Contractor shall procure Professional Liability insurance covering performance of the professional services, with policy limits of not less than « » (\$ « ») per claim and « » (\$ « ») in the aggregate.

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

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

§ A.3.2.11 Insurance for maritime liability risks associated with the operation of a vessel, if the Work requires such activities, with policy limits of not less than « » (\$ « ») per claim and « » (\$ « ») in the aggregate.

§ A.3.2.12 Insurance for the use or operation of manned or unmanned aircraft, if the Work requires such activities, with policy limits of not less than « » (\$ « ») per claim and « » (\$ « ») in the aggregate.

§ A.3.3 Contractor's Other Insurance Coverage

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

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

« »

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

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

- [« »] § A.3.3.2.1 Property insurance of the same type and scope satisfying the requirements identified in Section A.2.3, which, if selected in this section A.3.3.2.1, relieves the Owner of the responsibility to purchase and maintain such insurance except insurance required by Section A.2.3.1.3 and Section A.2.3.3. The Contractor shall comply with all obligations of the Owner under Section A.2.3 except to the extent provided below. The Contractor shall disclose to the Owner the amount of any deductible, and the Owner shall be responsible for losses within the deductible. Upon request, the Contractor shall provide the Owner with a copy of the property insurance policy or policies required. The Owner shall adjust and settle the loss with the insurer and be the trustee of the proceeds of the property insurance in accordance with Article 11 of the General Conditions unless otherwise set forth below:
(Where the Contractor's obligation to provide property insurance differs from the Owner's obligations as described under Section A.2.3, indicate such differences in the space below. Additionally, if a party other than the Owner will be responsible for adjusting and settling a loss with the insurer and acting as the trustee of the proceeds of property insurance in accordance with Article 11 of the General Conditions, indicate the responsible party below.)

« »

- [« »] § A.3.3.2.2 **Railroad Protective Liability Insurance**, with policy limits of not less than « » (\$ « ») per claim and « » (\$ « ») in the aggregate, for Work within fifty (50) feet of railroad property.
- [« »] § A.3.3.2.3 **Asbestos Abatement Liability Insurance**, with policy limits of not less than « » (\$ « ») per claim and « » (\$ « ») in the aggregate, for liability arising from the encapsulation, removal, handling, storage, transportation, and disposal of asbestos-containing materials.
- [« »] § A.3.3.2.4 Insurance for physical damage to property while it is in storage and in transit to the construction site on an "all-risks" completed value form.
- [« »] § A.3.3.2.5 Property insurance on an "all-risks" completed value form, covering property owned by the Contractor and used on the Project, including scaffolding and other equipment.
- [« »] § A.3.3.2.6 **Other Insurance**
(List below any other insurance coverage to be provided by the Contractor and any applicable limits.)

Coverage**Limits****§ A.3.4 Performance Bond and Payment Bond**

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

(Specify type and penal sum of bonds.)

Type

Penal Sum (\$0.00)

Payment Bond

Performance Bond

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

ARTICLE A.4 SPECIAL TERMS AND CONDITIONS

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

<< >>

END OF SECTION

SECTION 00 60 00
PROJECT FORMS

Affidavit of Compliance

Contractor and all subcontractors shall complete this Affidavit of Compliance (“Affidavit”) and submit documentation as require pursuant to *An Ordinance Establishing Responsible and Responsive Bidder Requirements on Public Works Projects*. Contractor must submit this Affidavit and all related evidence with its bid. Contractor shall be responsible for providing this Affidavit to all subcontractors who will perform work on the project. All subcontractors’ Affidavits and supporting documentation must be submitted no later than the date and time of the contract award. Failure to comply with all submission requirements may result in a determination that the Contractor is not a responsible and responsive bidder.

For the remainder of this Affidavit, “Contractor” refers to the general contractor and all subcontractors. Each item must be answered. If a question is not applicable, answer “NA”. If the answer is none, answer “none”.

The certifications set forth in this Affidavit and all documents attached hereto shall become a part of any contract awarded to the Contractor. Furthermore, Contractor shall comply with these certifications during the term and/or performance of the contract.

The undersigned _____, as _____ and on behalf
(Name) (Title)
of _____ having been duly sworn under oath certifies that:
(Contractor)

Business Organization

The form of business organization of the Contractor is (check one):

☐ Sole Proprietor or Partnership ☐ LLC
☐ Corporation ☐ Independent Contractor (Individual)

If bidder/subcontractor is a corporation, indicate the state and the date of incorporation:

Authorized to do business in the State of Indiana: Yes [] No []

Describe supporting documentation attached: _____

Federal Employer I.D. #: _____

Social Security # (if an individual or sole proprietor): _____

The Contractor, or agent, partner, employee or officer of the Contractor, is not debarred, suspended, proposed for debarment or declared ineligible from contracting with any unit of state or local government. Yes ☐ No ☐

EOE Compliance

Contractor is in compliance with provisions of Section 2000e of Chapter 21, Title 42 of the United States Code and Federal Executive Order No. 11246 as amended by Executive Order No. 11375 (known as the Equal Opportunity Employer provisions). Yes ☐ No ☐

Subcontractors

Contractor disclosed the name and address of each subcontractor for whom the contractor has accepted a bid and/or intends to hire on any part of the project (Form A). Yes ☐ No ☐

Contractor provided this *Affidavit of Compliance* to all of the above-referenced subcontractors.

No ☐

Yes ☐

Certificate of Insurance

Attached are certificates of insurance showing the following coverage:

General Liability	Yes ☐ No ☐
Worker's Compensation	Yes ☐ No ☐
Automobile Liability	Yes ☐ No ☐

Common Construction Wage Compliance

Contractor has complied with all provisions of the Common Construction Wage law and federal Davis-Bacon and related Acts, and all rules and regulations therein, for the past five (5) years. Yes ☐ No ☐

Contractor has reviewed the applicable prevailing wage law, including the Common Construction Wage law and federal Davis-Bacon and related Acts. Yes ☐ No ☐

Contractor will pay the applicable common construction wage or prevailing wage laws. Yes ☐ No ☐

Contractor will strictly comply with applicable common construction wage or prevailing wage laws. Yes ☐ No ☐

Contractor has not been found by the Indiana Department of Labor to be in violation of the Common Construction Wage law twice within a three year period.
("Yes" indicates compliance with the Act): Yes ☐ No ☐

If the above answer is "No", list the date(s) of the Department's finding of a violation:

Participation in Approved Apprenticeship Program(s)

Contractor participates in apprenticeship and training programs applicable to the work to be performed on the project, which are approved by and registered with the United States Department of Labor's Office of Apprenticeship, or its successor organizations. Yes ☐ No ☐

Describe supporting documentation attached (e.g. Standards of Apprenticeship, Apprenticeship Agreement):

Drug Testing

Contractor has a written plan for employee drug testing;

Yes [] No []

OR

Contractor has signed a collective bargaining agreement that establishes an employee drug testing program.

Yes [] No []

Employee Classification

Contractor's employees who will perform work on the project are properly classified as an employee or independent contractor under all applicable state and federal laws and local ordinances (Form B).

Yes [] No []

Worker's Compensation

Contractor's employees who will perform work on the project are:

Covered under a current worker's compensation policy:

Yes [] No []

Properly classified under such policy:

Yes [] No []

Describe supporting documentation attached:

Fringe Benefits

Contractor's employees who will perform work on the project are covered by a health and welfare plan. Yes ☐ No ☐

Contractor's employees who will perform work on the project are covered by a retirement plan. Yes ☐ No ☐

List of employees attached (Form B). Yes ☐ No ☐

Describe supporting documentation attached (e.g., plan documents, SPDs, or employee statement declining coverage):

Professional or Trade Licenses:

Contractor will possess all applicable professional and trade licenses required for performing the Contract work. Yes ☐ No ☐

License	Number	Date Issued	Current Expiration	Holder of License

If any of the above license(s) have been revoke or suspended, state the date and reason for suspension/revocation.

Documentation Attached (Contractor must initial next to each item):

_____ **Form A:** Name and address of subcontractors from whom Contractor has accepted a bid or intends to hire to perform work on any part of the project. **NOTE:** All subcontractors shall complete and submit an Affidavit of Compliance no later than the date and time of the contract award.

_____ **Form B:** List of individuals who will perform work on the project on behalf of the Contractor, verifying that each individual is properly classified as an employee or independent contractor. Contractor also verifies that all Contractor's employees are covered under a current worker's compensation policy, properly classified under the worker's compensation policy, and covered by a health and welfare and retirement plan.

_____ **Certificate of Good Standing**
(or other evidence of compliance with laws pre-requisite to doing business in the state)

_____ **Certificate of Insurance**

_____ **Standards of Apprenticeship/Apprentice Agreements**

_____ **Fringe Benefit Coverage** (Health & Welfare/Retirement)

_____ **Employee Drug Testing Plan** (or applicable provision from CBA in effect)

_____ **Worker's Compensation Coverage**

_____ **Professional or Trade Licenses**

Additional Information Required

If required in the bid specifications, Contractor shall complete items I and/or II below:

- I. Record of past three (3) years experience on public construction projects.

[illegible]

- II. List any determinations by a court or governmental agency for violations of federal, state or local laws, including but not limited to violations of contracting or antitrust laws, tax or licensing laws, environmental laws, the Occupational Safety and Health Act (OSHA), the National Labor Relations Act (NLRA), or federal Davis-Bacon and related Acts.

Date	Law	Determination	Penalty

Form A

Subcontractors who will Perform Work on the Project

[illegible]

Form B

Individuals who will perform work on the project

List all individuals who will perform work on this project with the following information:

1. Individual is an employee (E) or independent contractor (I);
2. Individual's trade classification (indicate apprenticeship status where appropriate);
3. Employee (E) is covered under Contractor's current worker's compensation (WC) policy;
4. Employee (E) is covered under a health and welfare (H&W) plan and retirement plan provided by the employer(ER) or declined coverage (Declined).

[illegible]

VERIFICATION

I certify that I am authorized to execute this Affidavit of Compliance on behalf of the Contractor set forth on page one (1), that I have personal knowledge of all the information set forth herein and that all statements, representations, information and documents provided in or with this Affidavit and attachments hereto are true and accurate.

The Contractor may report any change in any of the facts stated in this Affidavit within fourteen (14) days of the effective date of such change by completing and submitting a new Affidavit. Failure to comply with this requirement is grounds for the Contractor to be deemed a non-responsible and non-responsive bidder.

Signature of Authorized Officer

Name of Authorized Officer (Print or Type)

Title

Telephone Number

State of Indiana

County of _____

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

Notary Public Signature & Seal



CONTRACTOR'S BID FOR PUBLIC WORK - FORM 96

State Form 52414 (R2 / 2-13) / Form 96 (Revised 2013)

Prescribed by State Board of Accounts

PART I

(To be completed for all bids. Please type or print)

Date (month, day, year): _____

1. Governmental Unit (Owner): _____

2. County : _____

3. Bidder (Firm): _____

Address: _____

City/State/ZIPcode: _____

4. Telephone Number: _____

5. Agent of Bidder (if applicable): _____

Pursuant to notices given, the undersigned offers to furnish labor and/or material necessary to complete the public works project of _____

(Governmental Unit) in accordance with plans and specifications prepared by _____

_____ and dated _____ for the sum of

_____ \$ _____

The undersigned further agrees to furnish a bond or certified check with this bid for an amount specified in the notice of the letting. If alternative bids apply, the undersigned submits a proposal for each in accordance with the notice. Any addendums attached will be specifically referenced at the applicable page.

If additional units of material included in the contract are needed, the cost of units must be the same as that shown in the original contract if accepted by the governmental unit. If the bid is to be awarded on a unit basis, the itemization of the units shall be shown on a separate attachment.

The contractor and his subcontractors, if any, shall not discriminate against or intimidate any employee, or applicant for employment, to be employed in the performance of this contract, with respect to any matter directly or indirectly related to employment because of race, religion, color, sex, national origin or ancestry. Breach of this covenant may be regarded as a material breach of the contract.

CERTIFICATION OF USE OF UNITED STATES STEEL PRODUCTS

(If applicable)

I, the undersigned bidder or agent as a contractor on a public works project, understand my statutory obligation to use steel products made in the United States (I.C. 5-16-8-2). I hereby certify that I and all subcontractors employed by me for this project will use U.S. steel products on this project if awarded. I understand that violations hereunder may result in forfeiture of contractual payments.

ACCEPTANCE

The above bid is accepted this _____ day of _____, _____, subject to the following conditions: _____

Contracting Authority Members:

_____	_____
_____	_____
_____	_____

PART II

(For projects of \$150,000 or more – IC 36-1-12-4)

Governmental Unit: _____

Bidder (Firm) _____

Date (month, day, year): _____

These statements to be submitted under oath by each bidder with and as a part of his bid.
Attach additional pages for each section as needed.

SECTION I EXPERIENCE QUESTIONNAIRE

1. What public works projects has your organization completed for the period of one (1) year prior to the date of the current bid?

Contract Amount	Class of Work	Completion Date	Name and Address of Owner

2. What public works projects are now in process of construction by your organization?

Contract Amount	Class of Work	Expected Completion Date	Name and Address of Owner

3. Have you ever failed to complete any work awarded to you? _____ If so, where and why?

4. List references from private firms for which you have performed work.

SECTION II PLAN AND EQUIPMENT QUESTIONNAIRE

1. Explain your plan or layout for performing proposed work. *(Examples could include a narrative of when you could begin work, complete the project, number of workers, etc. and any other information which you believe would enable the governmental unit to consider your bid.)*

2. Please list the names and addresses of all subcontractors *(i.e. persons or firms outside your own firm who have performed part of the work)* that you have used on public works projects during the past five (5) years along with a brief description of the work done by each subcontractor.

3. If you intend to sublet any portion of the work, state the name and address of each subcontractor, equipment to be used by the subcontractor, and whether you will require a bond. However, if you are unable to currently provide a listing, please understand a listing must be provided prior to contract approval. Until the completion of the proposed project, you are under a continuing obligation to immediately notify the governmental unit in the event that you subsequently determine that you will use a subcontractor on the proposed project.

4. What equipment do you have available to use for the proposed project? Any equipment to be used by subcontractors may also be required to be listed by the governmental unit.

5. Have you entered into contracts or received offers for all materials which substantiate the prices used in preparing your proposal? If not, please explain the rationale used which would corroborate the prices listed.

SECTION III CONTRACTOR'S FINANCIAL STATEMENT

Attachment of bidder's financial statement is mandatory. Any bid submitted without said financial statement as required by statute shall thereby be rendered invalid. The financial statement provided hereunder to the governing body awarding the contract must be specific enough in detail so that said governing body can make a proper determination of the bidder's capability for completing the project if awarded.

SECTION IV CONTRACTOR'S NON – COLLUSION AFFIDAVIT

The undersigned bidder or agent, being duly sworn on oath, says that he has not, nor has any other member, representative, or agent of the firm, company, corporation or partnership represented by him, entered into any combination, collusion or agreement with any person relative to the price to be bid by anyone at such letting nor to prevent any person from bidding nor to include anyone to refrain from bidding, and that this bid is made without reference to any other bid and without any agreement, understanding or combination with any other person in reference to such bidding.

He further says that no person or persons, firms, or corporation has, have or will receive directly or indirectly, any rebate, fee, gift, commission or thing of value on account of such sale.

SECTION V OATH AND AFFIRMATION

I HEREBY AFFIRM UNDER THE PENALTIES FOR PERJURY THAT THE FACTS AND INFORMATION CONTAINED IN THE FOREGOING BID FOR PUBLIC WORKS ARE TRUE AND CORRECT.

Dated at _____ this _____ day of _____, _____

(Name of Organization)

By _____

(Title of Person Signing)

ACKNOWLEDGEMENT

STATE OF _____)
COUNTY OF _____) ss

Before me, a Notary Public, personally appeared the above-named _____ and swore that the statements contained in the foregoing document are true and correct.

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

Notary Public

My Commission Expires: _____

County of Residence: _____

BID OF

(Contractor)

(Address)

FOR
PUBLIC WORKS PROJECTS
OF

Filed _____, _____

Action taken _____

COMPLIANCE STATEMENT

This statement relates to a proposed contract with _____

(Name of borrower or grantee)

who expects to finance the contract with assistance from either the Rural Housing Service (RHS), Rural Business-Cooperative Service (RBS), or the Rural Utilities Service (RUS) or their successor agencies, United States Department of Agriculture (whether by a loan, grant, loan insurance, guarantee, or other form of financial assistance). I am the undersigned bidder or prospective contractor, I represent that:

1. I ☐ have, ☐ have not, participated in a previous contract or subcontract subject to Executive Order 11246 (regarding equal employment opportunity) or a preceding similar Executive Order.
2. If I have participated in such a contract or subcontract, I ☐ have, ☐ have not, filed all compliance reports that have been required to file in connection with the contract or subcontract.

☐ If the proposed contract is for \$50,000 or more: or ☐ If the proposed nonconstruction contract is for \$50,000 or more and I have 50 or more employees, I also represent that:
3. I ☐ have, ☐ have not previously had contracts subject to the written affirmative action programs requirements of the Secretary of Labor.
4. If I have participated in such a contract or subcontract, ☐ I have, ☐ have not developed and placed on file at each establishment affirmative action programs as required by the rules and regulations of the Secretary of Labor.

I understand that if I have failed to file any compliance reports that have been required of me, I am not eligible and will not be eligible to have my bid considered or to enter into the proposed contract unless and until I make an arrangement regarding such reports that is satisfactory to either the RHS, RBS or RUS, or to the office where the reports are required to be filed.

I also certify that I do not maintain or provide for my employees any segregated facilities at any of my establishments, and that I do not permit my employees to perform their services at any location, under my control, where segregated facilities are maintained. I certify further that I will not maintain or provide for my employees any segregated facilities at any of my establishments, and that I will not permit my employees to perform their services at any location, under my control, where segregated facilities are maintained. I agree that a breach of this certification is a violation of the Equal Opportunity clause in my contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and wash rooms, restaurants and other eating areas time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise. I further agree that (except where I have obtained identical certifications for proposed subcontractors for specific time periods) I will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause; that I will retain such certifications in my files; and that I will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have submitted identical certifications for specific time periods):

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays the valid OMB control number. The valid OMB control number for this information collection is 0575-0018. The time required to complete this information collection is estimated to average 10 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

**NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENTS FOR
CERTIFICATIONS OF NON-SEGREGATED FACILITIES**

A certification of Nonsegregated Facilities, as required by the May 9, 1967, order (32F.R. 7439, may 19, 1967) on Elimination of Segregated Facilities, by the Secretary of Labor, must be submitted prior to the award of a subcontract exceeding \$ 10,000 which is not exempt from the provisions of the Equal Opportunity clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually).

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

DATE _____

(Signature of Bidder or Prospective Contractor)

Address (including Zip Code)

CERTIFICATION FOR CONTRACTS, GRANTS AND LOANS

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

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

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

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

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

(name)

(date)

(title)

oOo

DISCLOSURE OF LOBBYING ACTIVITIES

Complete this form to disclose lobbying activities pursuant to 31 U.S.C. 1352

Approved by OMB
0348-0046

(See reverse for public burden disclosure.)

1. Type of Federal Action: ☐ a. contract ☐ b. grant ☐ c. cooperative agreement ☐ d. loan ☐ e. loan guarantee ☐ f. loan insurance		2. Status of Federal Action: ☐ a. bid/offer/application ☐ b. initial award ☐ c. post-award		3. Report Type: ☐ a. initial filing ☐ b. material change For Material Change Only: year _____ quarter _____ date of last report _____	
4. Name and Address of Reporting Entity: ☐ Prime ☐ Subawardee Tier _____, if known: Congressional District, if known: 4c			5. If Reporting Entity in No. 4 is a Subawardee, Enter Name and Address of Prime: Congressional District, if known:		
6. Federal Department/Agency:			7. Federal Program Name/Description: CFDA Number, if applicable: _____		
8. Federal Action Number, if known:			9. Award Amount, if known: \$ _____		
10. a. Name and Address of Lobbying Registrant (if individual, last name, first name, MI):			b. Individuals Performing Services (including address if different from No. 10a) (last name, first name, MI):		
11. Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.			Signature: _____ Print Name: _____ Title: _____ Telephone No.: _____ Date: _____		
Federal Use Only:				Authorized for Local Reproduction Standard Form LLL (Rev. 7-97)	

INSTRUCTIONS FOR COMPLETION OF SF-LLL, DISCLOSURE OF LOBBYING ACTIVITIES

This disclosure form shall be completed by the reporting entity, whether subawardee or prime Federal recipient, at the initiation or receipt of a covered Federal action, or a material change to a previous filing, pursuant to title 31 U.S.C. section 1352. The filing of a form is required for each payment or agreement to make payment to any lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with a covered Federal action. Complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identify the type of covered Federal action for which lobbying activity is and/or has been secured to influence the outcome of a covered Federal action.
2. Identify the status of the covered Federal action.
3. Identify the appropriate classification of this report. If this is a followup report caused by a material change to the information previously reported, enter the year and quarter in which the change occurred. Enter the date of the last previously submitted report by this reporting entity for this covered Federal action.
4. Enter the full name, address, city, State and zip code of the reporting entity. Include Congressional District, if known. Check the appropriate classification of the reporting entity that designates if it is, or expects to be, a prime or subaward recipient. Identify the tier of the subawardee, e.g., the first subawardee of the prime is the 1st tier. Subawards include but are not limited to subcontracts, subgrants and contract awards under grants.
5. If the organization filing the report in item 4 checks "Subawardee," then enter the full name, address, city, State and zip code of the prime Federal recipient. Include Congressional District, if known.
6. Enter the name of the Federal agency making the award or loan commitment. Include at least one organizational level below agency name, if known. For example, Department of Transportation, United States Coast Guard.
7. Enter the Federal program name or description for the covered Federal action (item 1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number for grants, cooperative agreements, loans, and loan commitments.
8. Enter the most appropriate Federal identifying number available for the Federal action identified in item 1 (e.g., Request for Proposal (RFP) number; Invitation for Bid (IFB) number; grant announcement number; the contract, grant, or loan award number; the application/proposal control number assigned by the Federal agency). Include prefixes, e.g., "RFP-DE-90-001."
9. For a covered Federal action where there has been an award or loan commitment by the Federal agency, enter the Federal amount of the award/loan commitment for the prime entity identified in item 4 or 5.
10. (a) Enter the full name, address, city, State and zip code of the lobbying registrant under the Lobbying Disclosure Act of 1995 engaged by the reporting entity identified in item 4 to influence the covered Federal action.

(b) Enter the full names of the individual(s) performing services, and include full address if different from 10 (a). Enter Last Name, First Name, and Middle Initial (MI).
11. The certifying official shall sign and date the form, print his/her name, title, and telephone number.

According to the Paperwork Reduction Act, as amended, no persons are required to respond to a collection of information unless it displays a valid OMB Control Number. The valid OMB control number for this information collection is OMB No. 0348-0046. Public reporting burden for this collection of information is estimated to average 10 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0046), Washington, DC 20503.

U.S. DEPARTMENT OF AGRICULTURE

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions

This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 7 CFR Part 3017, Section 3017.510, Participants' responsibilities. The regulations were published as Part IV of the January 30, 1989, **Federal Register** (pages 4722-4733). Copies of the regulations may be obtained by contacting the Department of Agriculture agency with which this transaction originated.

(BEFORE COMPLETING CERTIFICATION, READ INSTRUCTIONS ON REVERSE)

- (1) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.
- (2) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

Organization Name

PR/Award Number or Project Name

Name(s) and Title(s) of Authorized Representative(s)

Signature(s)

Date

Instructions for Certification

1. By signing and submitting this form, the prospective lower tier participant is providing the certification set out on the reverse side in accordance with these instructions.
2. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.
3. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
4. The terms "covered transaction," "debarred," "suspended," "ineligible," "lower tier covered transaction," "participant," "person," "primary covered transaction," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations.
5. The prospective lower tier participant agrees by submitting this form that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.
6. The prospective lower tier participant further agrees by submitting this form that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.
7. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that it is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the Nonprocurement List.
8. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
9. Except for transactions authorized under paragraph 5 of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

END OF SECTION

SECTION 00 72 00
GENERAL CONDITIONS

FORM OF GENERAL CONDITIONS

- 1.1 The General Conditions applicable to this contract is attached following this page.

RELATED REQUIREMENTS

- 2.1 SECTION 00 73 00 - Supplementary Conditions.

SUPPLEMENTARY CONDITIONS

- 3.1 REFER TO DOCUMENT 00 73 00 - Supplementary Conditions FOR AMENDMENTS TO THESE GENERAL CONDITIONS.

DRAFT AIA® Document A201™ – 2017

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

« Shoals Library Addition and Renovation »
« 404 High Street, Shoals, IN 47581 »

THE OWNER:

(Name, legal status and address)

« Shoals Library Foundation »« »
« 404 High Street, Shoals, IN 47581 »

THE ARCHITECT:

(Name, legal status and address)

« RQAW | DCCM »« »
« 8770 North St, Suite 110, Fishers, IN 46038 »

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

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

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

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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 protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™-2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™-2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™-2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk

and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

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

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

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 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.

END OF SECTION

SECTION 00 73 00
SUPPLEMENTARY CONDITIONS

PART 1 GENERAL

1.1 SUMMARY

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

1.2 RELATED SECTIONS

- A. Section 00 50 00 - Contracting Forms and Supplements.

1.3 REFERENCE STANDARDS

- A. RD Instruction 1942-A (Guide 27 - Attachment 4).

1.4 MODIFICATIONS TO GENERAL CONDITIONS

- A. See attachment to this section.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

ATTACHMENT TO AIA DOCUMENT A201-2017, *General Conditions of the Contract for Construction*

The provisions of this attachment shall delete, modify and supplement the provisions contained in the "*General Conditions of the Contract for Construction*," AIA Document A201-2017 Edition. The provisions contained in this attachment will supersede any conflicting provisions of the AIA Document. The term "Agency," as used in this Attachment, shall mean the United States of America, acting through the United States Department of Agriculture.

When the project is not subject to the Build America, Buy America Act the provisions in bold do not apply.

ARTICLE 1, GENERAL PROVISIONS

Add the following subparagraphs to paragraph 1.1:

1.1.9 Build America, Buy America Act (BABAA) - Requirements instituted by the Bipartisan Infrastructure Law of 2021 mandating domestic preference that all iron and steel, manufactured products, and construction materials are produced in the United States.

1.1.9.1 Construction Materials - Those articles, materials, or supply - other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives - that are or consist primarily of: non-ferrous metals, plastic and polymer-based products, glass, lumber or drywall.

1.1.9.2 Manufactured Product - Items assembled out of components, or otherwise made or processed from raw materials into finished products. Manufactured products must be manufactured (assembled) in the United States, and the cost of components that were mined, produced, or manufactured in the United States must be greater than 55 percent of the total cost of all components of the project.

1.1.9.3 Manufacturer's Certification - Documentation provided by a Manufacturer, certifying that the items provided by Manufacturer meet the domestic preference requirements of BABAA.

ARTICLE 2, OWNER

Delete subparagraph 2.3.6 and substitute the following:

2.3.6 The Owner shall furnish to the Contractor, free of charge, _____ copies of the Contract Documents necessary for execution of the Work. Additional copies will be available from the Architect at the cost of reproduction and handling.

ARTICLE 3: CONTRACTOR

Add the following subparagraph to paragraph 3.7:

3.7.3.1 The Contractor shall comply with the Federal Requirement for Domestic Preference: Iron and steel products, Manufactured Products, and Construction Materials used in this project shall comply with the Build America, Buy America Act (BABAA) requirements mandated by Title IX of the Infrastructure Investment and Jobs Act ("IIJA"), Pub. L. 117-58. Installation of materials or products that are not compliant with BABAA requirements shall be considered defective work.

ARTICLE 4, ARCHITECT

Add the following to subparagraph 4.1.1: The term "Architect" means the Architect, or the Engineer when the nature of the work is within the authority granted engineers by the State licensure law, or an authorized representative of the Architect or Engineer.

ARTICLE 5, SUBCONTRACTORS

Add the following to the end of subparagraph 5.2.2: "The Contractor shall not contract with any person or entity declared ineligible under Federal laws or regulations from participating in federally assisted construction projects or to whom the Owner has made reasonable objection. The Contractor shall not be required to contract with anyone to whom the Contractor has reasonable objection".

ARTICLE 7, CHANGES IN THE WORK

Delete the words ", Construction Change Directive" from subparagraph 7.1.1.

Insert the words ", Agency " after the word "Owner," and delete the words "A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor" in subparagraph 7.1.2.

Delete the words "Construction Change Directive" from subparagraph 7.1.3.

Delete subparagraph 7.2.1, associated clauses, and substitute the following:

7.2.1 A Change Order is a written order to the Contractor utilizing AIA Document G701, 'Change Order', or Form RD 1924-7, 'Contract Change Order', signed by the Owner, Architect, Contractor, and the Agency representative. It is issued after the execution of the Contract, authorizing a change in the Work or an adjustment in the Contract Sum or the Contract Time. The Contract Sum and the Contract Time may be changed only by Change Order. The Contractor's signing of a Change Order indicates complete agreement therein.

Add subparagraph 7.2.2, and associated clauses as follows:

7.2.2 Methods used in determining adjustments to the Contract Sum may include any of the following:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluating.
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon.

Add the following sentence to the beginning of subparagraph 7.3.1: "A Construction Change Directive may be used only for a change in response to an emergency as described in paragraph 10.4".

Delete subparagraph 7.3.2 in its entirety.

Add the sentence "When the use of a Construction Change Directive is justified" where appropriate to subparagraphs 7.3.3, 7.3.6, 7.3.7, 7.3.9, and 7.3.10.

ARTICLE 8, TIME

Delete subparagraph 8.1.2 in its entirety and replace with the following:

8.1.2 The date of commencement shall be contained in the Notice to Proceed.

Add the following subparagraphs:

8.2.4 The Notice to Proceed shall be issued within twenty (20) calendar days of the execution of the Agreement by the Owner. Should there be reasons why the Notice to Proceed cannot be issued within such period, the time may be extended by mutual agreement of the Owner and Contractor, with the concurrence of the Agency. If the Notice to Proceed has not been issued within the twenty (20) calendar day period or within the period mutually agreed, the

Contractor may terminate the Agreement without further liability on the part of either party.

8.3.4 As outlined in the Agreement, the Contractor agrees to pay liquidated damages to the Owner for each calendar day of delay.

ARTICLE 9, PAYMENTS AND COMPLETION

Delete subparagraph 9.3.1.1 and substitute the following:

9.3.1.1 Work performed and materials supplied under a Change Order may be included for payment only after the Change Order has been approved by all appropriate parties and concurred with by the Agency.

Add the following sentence to the end of subparagraph 9.4.1: "All Certificates for Payment shall be prepared using AIA Document G702, 'Application and Certificate for Payment' or Form RD 1924-18, 'Partial Payment Estimate'."

Add the following subparagraph:

9.6.9 No progress payments will be made that deplete the retainage, nor place in escrow any funds that are required for retainage, nor invest the retainage for the benefit of the Contractor. Retainage will not be adjusted until after construction is substantially complete.

Replace the word "seven" with the words "fifteen (15)" in the first sentence of subparagraph 9.7.

Delete subparagraph 9.8.5, after the first sentence, and substitute the following: "When the Work has been substantially completed, except for Work which cannot be completed because of weather conditions, lack of materials or other reasons, which, in the judgment of the Owner, are valid reasons for non-completion, the Owner may make additional payments, retaining at all times an amount sufficient to cover the estimated cost of the Work still to be completed. The Owner shall provide a copy of the Certificate of Substantial Completion to the Agency".

Delete subparagraphs 9.9.1 in its entirety and replace with the following subparagraph and clauses:

9.9.1 The Contractor agrees to the use and occupancy of a portion or unit of the Project before formal acceptance by the Owner under the following conditions:

.1 A "Certificate of Substantial Completion" shall be prepared and executed as provided

in subparagraph 9.8.4, except that when, in the opinion of the Architect, the Contractor is chargeable with unwarranted delay in completing the Work or other Contract requirements, the signature of the Contractor will not be required. The Certificate of Substantial Completion shall be accompanied by a written endorsement of the Contractor's insurance carrier and surety permitting occupancy by the Owner during the remaining period of the Project Work. Occupancy and use by the Owner shall not commence until authorized by public authorities having jurisdiction over the Work.

- .2 Occupancy by the Owner shall not be construed by the Contractor as being an acceptance of that part of the Project to be occupied.
- .3 The Contractor shall not be held responsible for any damage to the occupied part of the Project resulting from the Owner's occupancy.
- .4 Occupancy by the Owner shall not be deemed to constitute a waiver of existing claims in behalf of the Owner or Contractor against each other.
- .5 If the Project consists of more than one building, and one of the buildings is to be occupied, the Owner, prior to occupancy of that building, shall secure permanent property insurance on the building to be occupied and necessary permits which may be required for use and occupancy.

Add the following sentence to the end of subparagraph 9.9.3: "Use and occupancy by the Owner prior to Project acceptance does not relieve the Contractor of responsibility to maintain all insurance and bonds required of the Contractor under the Contract Documents until the Project is completed and accepted by the Owner".

ARTICLE 11, INSURANCE AND BONDS

Add the following subparagraphs and clauses:

11.1.1.1 Insurance shall be:

- .1 Written with a limit of liability of not less than \$500,000 for all damages arising out of bodily injury, including death, at any time resulting therefrom, sustained by any one person in any one accident; and a limit of liability of not less than \$500,000 aggregate for any such damages sustained by two or more persons in any one accident. Insurance shall be written with a limit of liability of not less than \$200,000 for all property damage sustained by any one person in any one accident; and a limit of liability of not less than \$200,000 aggregate for any such damage sustained by two or more persons in any one accident, or
- .2 Written with a combined bodily injury and damage liability of not less than \$700,000 per occurrence; and with an aggregate of not less than \$700,000 per occurrence.
- .3 Insurance policies shall be written with limits of liability consistent with those insurance liability limits contained in the Contract Documents but not less than limits prescribed in 11.1.1.1.1 and 11.1.1.1.2.

Delete subparagraph 11.1.2 in its entirety and substitute the following subparagraphs:

11.1.2 The Contractor shall furnish the Owner bonds covering faithful performance of the Contract and payment of obligations arising thereunder within ten (10) calendar days after receipt of the Notice of Award. The surety company executing the bonds must hold a certificate of authority as an acceptable surety on Federal bonds as listed in Treasury Circular 570 and be authorized to transact business in the State where the Project is located. The bonds (using the forms included in the Bidding Documents) shall each be equal to the amount of the Contract. The United States, acting through Rural Development, will be named as co-obligee on all surety unless prohibited by State law. The cost of these bonds shall be included in the Contract Sum.

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

11.1.2.2 If at any time a surety on any such bond is declared bankrupt or loses its right to do business in the State in which the work is to be performed or

is removed from the list of surety companies accepted on Federal Bonds, the Contractor shall within ten (10) calendar days after notice from the Owner to do so, substitute an acceptable bond in such form and sum and signed by such other surety or sureties as may be satisfactory to the Owner. The premiums of such bond shall be paid by any Contractor. No further payment shall be deemed due nor shall be made until the new surety or sureties shall have furnished an acceptable bond to the Owner.

ARTICLE 13, MISCELLANEOUS PROVISIONS

Add the following paragraphs, subparagraphs, and clauses:

13.6 This Agreement and any amendments to this Agreement shall not be in full force and effect until concurred with in writing by a duly authorized representative of the Agency. The concurrence so evidenced by the Agency shall in no way commit the Agency to render financial assistance to the Owner and is without liability to the Agency for any payment thereunder, but in the event such assistance is provided, the concurrence shall signify that the provisions of this Agreement and any amendments to this Agreement are consistent with Agency requirements.

13.7 Lands and Rights-of Way

13.7.1 Prior to the start of construction, the Owner shall obtain all lands and rights-of-way necessary for the execution and completion of work to be performed under this contract.

13.8 Equal Opportunity Requirements

Non-discrimination in Employment by Federally Assisted Construction Contractors, by Executive Order 11246.

13.8.1 This section summarizes Executive Order 11246, which prohibits employment discrimination and requires employers holding non-exempt Federal contracts and subcontracts and federally-assisted construction contracts and subcontracts in excess of \$10,000 to take affirmative action to ensure equal employment opportunity without regard to race, color, religion, sex, or national origin. The Executive Order requires, as a condition for the approval of any federally assisted construction contract, that the applicant incorporate nondiscrimination and affirmative action clauses into its non-exempt federally assisted construction contracts.

13.8.2 Executive Order 11246, is administered and enforced by the Office of Federal Contract Compliance Programs (OFCCP), an agency in the U.S. Department of Labor's Employment Standards Administration. OFCCP has issued regulations at 41 CFR chapter 60 implementing the Executive Order. The regulations at 41 CFR part 60-4 establish the procedures which the Agency, as an administering agency, must follow when making grants, contracts, loans, insurance or guarantees involving federally assisted construction which is not exempt from the requirements of Executive Order 11246. The regulations which apply to Federal or federally assisted construction contractors also are published at 41 CFR part 60-4.

13.8.3 OFCCP has established numerical goals for minority and female utilization in construction work. The goals are expressed in percentage terms for the contractor's aggregate workforce in each trade. OFCCP has set goals for minority utilization based on the percentage of minorities in the civilian labor force in the relevant area. There is a single nationwide goal of 6.9 percent for utilization of women. The goals apply to all construction work in the covered geographic area, whether or not it is federal, federally assisted or non-federal. A notice advises bidders of the applicable goals for the area where the project is to be located.

13.8.4 The non-discrimination requirements of Executive Order 11246 shall apply to all construction contractor's or subcontractor's employees who are engaged in on-site construction including those construction employees who work on a non-Federal or non-Federally assisted construction site.

13.8.4.1 Agency officials will notify the appropriate Regional Director of OFCCP that an Agency financed construction contract has been awarded, and that the equal opportunity clauses are included in the contract documents.

13.8.4.2 The Regional Director, OFCCP-DOL, will enforce the non-discrimination requirements of Executive Order 11246.

13.8.5 The prospective contractor or subcontractor must comply with the Immigration Reform and Control Act of 1986, by completing and retaining Form I-9, "Employment Eligibility Verification," for employees hired. This form is available from the Immigration and Naturalization Service, and Department of Justice.

13.8.6 The prospective contractor or subcontractor must submit Form RD 400-6, "Compliance Statement," to the applicant and an Agency official as part of the bid package, prior to any contract bid negotiations and comply with the Executive Order 11246 as stated in the contract documents.

13.9 Statutes

13.9.1 The Contractor and each Subcontractor shall comply with the following statutes (and with regulations issued pursuant thereto, which are incorporated herein by reference):

13.9.1.1 Copeland Anti-Kickback Act (18 U.S.C. 874) as supplemented in Department of Labor regulations (29 CFR part 3). This Act provides that each Contractor shall be prohibited from inducing, by any means, any person in connection with construction to give up any part of the compensation to which the person is otherwise entitled.

13.9.1.2 Clean Air Act (42 U.S.C. 7414), section 114, and Water Pollution Control Act (33 U.S.C. 1813), section 308. Under Executive Order 11738 and Environmental Protection Agency (EPA) regulations 40 C.F.R. part 15, all Contracts in excess of \$100,000 are required to comply with these Acts. The Acts require the Contractor to:

- .1 Notify the Owner of the receipt of any communication from EPA indicating that a facility to be utilized in the performance of the Contract is under consideration to be listed on the EPA list of Violating Facilities.
- .2 Certify that any facility to be utilized in the performance of any nonexempt Contractor or Subcontractor is not listed on the EPA list of Violating Facilities as of the date of the Contract Award.
- .3 Include or cause to be included the above criteria and requirements of paragraphs .1

and .2 in every nonexempt subcontract, and that the Contractor will take such action as the Government may direct as a means of enforcing such provisions.

13.9.1.3 Restrictions on Lobbying (Public Law 101-121, section 319) as supplemented in Department of Agriculture regulations (2 CFR part 418). This statute applies to the recipients of contracts or subcontracts that exceed \$100,000 at any tier under a Federal loan that exceeds \$150,000 or a Federal grant that exceeds \$100,000. If applicable, the Contractor must complete a certification form on lobbying activities related to the specific Federal loan or grant that is a funding source for this contract. The certification and disclosure forms shall be provided by the Owner.

13.10 Records

13.10.1 If the Contract is based on a negotiated Bid, the Owner, the Agency, the Comptroller General of the United States, or any of their duly authorized representatives, shall have access to any books, documents, papers, and records of the Contractor which are pertinent to a specific Federal loan program for the purpose of making audit, examination, excerpts, and transcriptions. The Contractor shall maintain records for at least three years after the Owner makes final payment and all other pending matters are closed.

13.11 Environmental Requirements

13.11.1 Mitigation Measures - The contractor shall comply with applicable mitigation measures established in the environmental assessment for the project. These may be obtained from the Agency representative.

13.11.2 The Contractor, when constructing a Project involving trenching, excavating, or other earth moving activity, shall comply with the following environmental constraints:

13.11.2.1 Endangered Species, Historic Preservation, Human Remains and Cultural Items, Hazardous Materials, and Paleontology - Any excavation or other earth moving activity by

the Contractor that provides evidence of the presence of endangered or threatened species or their critical habitat, uncovers a historical or archaeological artifact, human remains or cultural items, hazardous materials, a fossil or other paleontological materials will require the Contractor to:

- .1 Temporarily stop work;
- .2 Provide immediate notice to the Architect and the Agency, and in the case of potentially hazardous materials, provide immediate notice to local first responders and take such measures as necessary to protect the public and workers;
- .3 Take reasonable measures as necessary to protect the discovered materials or protected resource;
- .4 Abide by such direction as provided by the Agency, or Agencies responsible for resource protection or hazardous materials management; and
- .5 Resume work only upon notice from the Architect and the Agency.

13.11.2.2 Historic Preservation - Applicants shall ensure that Contractors maintain a copy of the following inadvertent discovery plan onsite for review:

- .1 If during the course of any ground disturbance related to any Project, any post review discovery, including but not limited to, any artifacts, foundations, or other indications of past human occupation of the area are uncovered, shall be protected by complying with 36 CFR § 800.13(b) (3) and (c) and shall include the following:
- .2 All Work, including vehicular traffic, shall

immediately stop within a 50 ft. radius around the area of discovery. The Contractor shall ensure barriers are established to protect the area of discovery and notify the Architect or Engineer to contact the appropriate RD personnel. The Architect or Engineer shall engage a Secretary of the Interior (SOI) qualified professional archeologist to quickly assess the nature and scope of the discovery; implement interim measures to protect the discovery from looting and vandalism; and establish broader barriers if further historic and/or precontact properties, can reasonably be expected to occur.

.3 The RD personnel shall notify the appropriate RD environmental staff member, the Federal Preservation Officer (FPO), and State Historic Preservation Office (SHPO) immediately. Indian tribe(s) or Native Hawaiian Organization (NHOs) that have an interest in the area of discovery shall be contacted immediately. The SHPO may require additional tribes or NHOs who may have an interest in the area of discovery also be contacted. The notification shall include an assessment of the discovery provided by the SOI qualified professional archeologist.

.4 When the discovery contains burial sites or human remains, the Contractor shall immediately notify the appropriate RD personnel who will contact the RD environmental staff member, FPO, and the SHPO. The relevant law enforcement authorities shall be immediately contacted by onsite personnel to reduce delay times, in accordance with

tribal, state, or local laws including 36 CFR Part 800.13; 43 CFR Part 10, Subpart B; and the Advisory Council on Historic Preservation's Policy Statement Regarding treatment of Burial Sites, Human Remains, or Funerary Objects (February 23, 2007).

.5 When the discovery contains burial sites or human remains, all construction activities, including vehicular traffic shall stop within a 100 ft. radius of the discovery and barriers shall be established. The evaluation of human remains shall be conducted at the site of discovery by a SOI qualified professional. Remains that have been removed from their primary context and where that context may be in question may be retained in a secure location, pending further decisions on treatment and disposition. RD may expand this radius based on the SOI professional's assessment of the discovery and establish broader barriers if further subsurface burial sites, or human remains can reasonably be expected to occur. RD, in consultation with the SHPO and interested tribes or NHOs, shall develop a plan for the treatment of native human remains.

.6 Work may continue in other areas of the undertaking where no historic properties, burial sites, or human remains are present. If the inadvertent discovery appears to be a consequence of illegal activity such as looting, the onsite personnel shall contact the appropriate legal authorities immediately if the landowner has not already done so.

.7 Work may not resume in the area of the discovery until a notice to proceed has been issued by RD. RD shall not issue the notice to proceed until it has determined that the appropriate local protocols and consulting parties have been consulted.

.8 Inadvertent discoveries on federal and tribal land shall follow the processes required by the federal or tribal entity.

13.11.3 Lead-Based Paint - The Contractor and Owner shall comply with applicable Agency requirements of the Lead-Based Paint Poisoning Prevention Act, as amended (42 U.S.C. 4821), and the Residential Lead-Based Paint Hazard Reduction Act of 1992 (42 U.S.C. 4851) for rehabilitation work on residential property built prior to 1978.

13.12 Debarment and Suspension

13.12.1 The Contractor shall comply with the requirements of 2 CFR part 417, which pertains to the debarment or suspension of a person from participating in a Federal program or activity.

13.13 Build America, Buy America Act

Domestic Preference Requirements for Federal Financial Assistance to Non-Federal Entities. Federal Financial Assistance to Non-Federal Entities, defined pursuant to 2 CFR 200.1 as any State, local government, Indian tribe, Institution of Higher Education, or nonprofit organization, shall be governed by the requirements of Section 70914 of the Build America, Buy America Act (BABAA), under Title IX of the Infrastructure Investment and Jobs Act, Pub. L. 177-58. Any requests for waiver of these requirements must be submitted pursuant to USDA's guidance available online at [USDA Buy America Waivers for Federal Financial Assistance | USDA](#).

13.13.1 This agreement is for services related to a project that is subject to the Build America, Buy America Act (BABAA) requirements under Title IX of the Infrastructure Investment and Jobs Act ("IIJA"), Pub. L. 177-58. Absent an approved waiver, all iron, steel, manufactured products, and construction materials used in this project must be produced in the United States, as further outlined by the Office

of Management and Budget's regulation (reference 2 CFR 200) on the application of Buy America Preference in Federal Financial Assistance Programs for Infrastructure.

13.13.2 The Contractor or Construction Manager shall be responsible for:

- .1 Providing costs and revisions thereof that reflect compliance with BABAA requirements.
- .2 Providing only iron, steel, construction materials and manufactured products that meet BABAA requirements. Installation of materials or products that are not compliant with BABAA requirements shall be considered defective work.
- .3 Including manufacturer's certification for BABAA requirements with all applicable submittals. If a specific manufacturer is used in the bidding or subcontractor pricing, a statement that the manufacturer will comply with BABAA requirements must be included with the bid or GMP submission. Contractor or Construction Manager shall comply with BABAA requirements, including coordination with manufacturers, distributors, and suppliers to correct deficiencies in any BABAA documentation.
- .4 Providing manufacturer's certification for BABAA requirements with any change order for any new construction materials or manufactured products required by the change.
- .5 Certifying by submitting an application for payment, based in whole or in part on furnishing construction materials or manufactured products; that such materials and products, to the Contractor's or Construction Manager's knowledge, are compliant with BABAA requirements.
- .6 Ensuring that the Architect / Engineer has been provided an approved manufacturer's certification or waiver prior to items being delivered to the project site.
- .7 Certifying upon completion that all work and materials are in compliance with

BABAA requirements.

ARTICLE 15 CLAIMS AND DISPUTES

Add the words "may be" after "on the parties but" in the last sentence of subparagraph 15.2.5.

Replace the word "shall" with the word "may" in the first sentence, first occurrence of subparagraph 15.3.2.

Add the subparagraph: 15.4.1.2 The arbitrators will select a hearing location as close to the Owner's current place of business as possible.

o0o

END OF SECTION

SECTION 01 10 00 SUMMARY

PART 1 GENERAL

1.1 PROJECT

- A. Project Name: Shoals Library Addition and Renovation
- B. Architect's Name: RQAW | DCCM.
- C. The Project consists of the construction of an addition to and small renovation of the Shoals Public Library in Shoals, IN..

1.2 CONTRACT DESCRIPTION

- A. Contract Type: A single prime contract based on a Stipulated Price as described in Document 00 52 00 - Agreement Form.

1.3 DESCRIPTION OF ALTERATIONS WORK

- A. Scope of demolition and removal work is indicated on drawings and specified in Section 02 41 00.
- B. Scope of alterations work is indicated on drawings.

1.4 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.

1.5 CONTRACTOR USE OF SITE AND PREMISES

- A. 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.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 21 00
ALLOWANCES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Cash allowances.

1.2 CASH ALLOWANCES

- A. Costs Included in Cash Allowances: Cost of product to Contractor or subcontractor, less applicable trade discounts, less cost of delivery to site , less applicable taxes .
- B. Differences in costs will be adjusted by Change Order.

1.3 ALLOWANCES SCHEDULE

- A. Allowance #1: (CONTINGENT ON ALTERNATE #1 BEING ACCEPTED.) Install R-38 fiberglass batt insulation between existing roof level joists. Install gypsum board on underside of joists. Include stipulated sum of \$20,000.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 23 00
ALTERNATES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Document 00 21 13 - Instructions to Bidders: Instructions for preparation of pricing for Alternates.
- B. Document 00 43 23 - Alternates Form: List of Alternates as supplement to Bid Form.

1.3 ACCEPTANCE OF Alternates

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

1.4 SCHEDULE OF Alternates

- A. Alternate No. 1 - Existing upper floor refinishing: paint, wood trim, flooring, ceiling, lighting:
 - 1. Alternate Item: Section 06 03 00 - Conservation Treatment of Period Wood, Section 09 93 00 - Staining and Transparent Finishing
- B. Alternate No. 2 - Refinish existing exterior wood trim, including soffits, fasciae, and window exterior trim.:
 - 1. Alternate Item: Section 06 03 00 - Conservation Treatment of Period Wood.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 25 00
SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Procedural requirements for proposed substitutions.

1.2 RELATED REQUIREMENTS

- A. Section 00 21 13 - Instructions to Bidders: Restrictions on timing of substitution requests.
- B. Section 00 43 25 - Substitution Request Form - During Procurement: Required form for substitution requests made prior to award of contract (During procurement).
- C. Section 00 63 25 - Substitution Request Form - During Construction: Required form for substitution requests made after award of contract (During construction).
- D. Section 01 30 00 - Administrative Requirements: Submittal procedures, coordination.

1.3 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

3.1 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.
 6. Agrees to reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.
- B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
1. Note explicitly any non-compliant characteristics.
- 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.

3.2 SUBSTITUTION PROCEDURES DURING PROCUREMENT

- A. Submittal Time Restrictions:
1. Section 00 21 13 - Instructions to Bidders specifies time restrictions and the documents required for submitting substitution requests during the bidding period.
- B. Submittal Form (before award of contract):
1. Submit substitution requests by completing the form in Section 00 43 25; see this section for additional information and instructions. Use only this form; other forms of submission are unacceptable.

3.3 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

- A. Submittal Form (after award of contract):
1. Submit substitution requests by completing the form in Section 00 63 25; see this section for additional information and instructions. Use only this form; other forms of submission are unacceptable.
- B. Submit request for Substitution for Cause immediately upon discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
- C. Substitutions will not be considered under one or more of the following circumstances:
1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
 2. Without a separate written request.
 3. When acceptance will require revisions to Contract Documents.

3.4 RESOLUTION

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

3.5 ACCEPTANCE

- A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

3.6 CLOSEOUT ACTIVITIES

- A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

END OF SECTION

SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. General administrative requirements.
- B. Preconstruction meeting.
- C. Site mobilization meeting.
- D. Progress meetings.
- E. Construction progress schedule.
- F. Progress photographs.
- G. Number of copies of submittals.
- H. Requests for Interpretation (RFI) procedures.
- I. Submittal procedures.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: General product requirements.

1.3 GENERAL ADMINISTRATIVE REQUIREMENTS

- A. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.
- B. Make the following types of submittals to Architect:
 - 1. Requests for Interpretation (RFI).
 - 2. Requests for substitution.
 - 3. Shop drawings, product data, and samples.
 - 4. Test and inspection reports.
 - 5. Design data.
 - 6. Manufacturer's instructions and field reports.
 - 7. Applications for payment and change order requests.
 - 8. Progress schedules.
 - 9. Coordination drawings.
 - 10. Correction Punch List and Final Correction Punch List for Substantial Completion.
 - 11. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PRECONSTRUCTION MEETING

- A. Schedule 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.
 - 8. Review of Critical Details:
 - a. Underslab to Below Grade
 - b. Below Grade to Wall
 - c. Wall to Window (Jamb, Head, Sill)
 - d. Wall to Roof
 - e. Roof to Window
 - f. Canopies
 - g. Dissimilar Substrates
 - h. Expansion and Control Joints
 - i. Protrusions/Penetrations/Signage
- 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.

3.2 SITE MOBILIZATION MEETING

- A. Schedule meeting at the Project site prior to Contractor occupancy.
- B. Attendance Required:
 - 1. Contractor.
 - 2. Owner.
 - 3. Architect.
 - 4. Contractor's superintendent.
 - 5. Major subcontractors.
- C. Agenda:
 - 1. Use of premises by Owner and Contractor.

2. Owner's requirements.
 3. Construction facilities and controls provided by Owner.
 4. Temporary utilities provided by Owner.
 5. Survey and building layout.
 6. Security and housekeeping procedures.
 7. Schedules.
 8. Application for payment procedures.
 9. Procedures for testing.
 10. Procedures for maintaining record documents.
 11. Requirements for start-up of equipment.
 12. Inspection and acceptance of equipment put into service during construction period.
- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.3 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the work at maximum monthly intervals.
- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required:
1. Contractor.
 2. Owner.
 3. Architect.
 4. Contractor's superintendent.
 5. Major subcontractors.
- D. Agenda:
1. Review minutes of previous meetings.
 2. Review of work progress.
 3. Field observations, problems, and decisions.
 4. Identification of problems that impede, or will impede, planned progress.
 5. Review of submittals schedule and status of submittals.
 6. Review of RFIs log and status of responses.
 7. Maintenance of progress schedule.
 8. Corrective measures to regain projected schedules.
 9. Planned progress during succeeding work period.
 10. Coordination of projected progress.
 11. Maintenance of quality and work standards.
 12. Effect of proposed changes on progress schedule and coordination.
 13. Other business relating to work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.4 CONSTRUCTION PROGRESS SCHEDULE

- 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. Within 10 days after joint review, submit complete schedule.
- E. Submit updated schedule with each Application for Payment.

3.5 PROGRESS PHOTOGRAPHS

- A. Submit new photographs at least twice a month, within 3 days after being taken.
- B. Photography Type: Digital; electronic files.
- C. Provide photographs of site and construction throughout progress of work produced by an experienced photographer, acceptable to Architect.
- D. In addition to periodic, recurring views, take photographs of each of the following events:
 - 1. Excavations in progress.
 - 2. Foundations in progress and upon completion.
 - 3. Structural framing in progress and upon completion.
 - 4. Final completion, minimum of ten (10) photos.
- E. Views:
 - 1. Provide non-aerial photographs from four cardinal views at each specified time, until date of Substantial Completion.
 - 2. Consult with Architect for instructions on views required.
 - 3. Provide factual presentation.
 - 4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.
- F. Digital Photographs: 24 bit color, minimum resolution of 1280 by 960 ("1 megapixel"), in JPG format; provide files unaltered by photo editing software.
 - 1. Delivery Medium: Via email.
 - 2. File Naming: Include project identification, date and time of view, and view identification.
 - 3. PDF File: Assemble all photos into printable pages in PDF format, with 2 to 3 photos per page, each photo labeled with file name; one PDF file per submittal.

3.6 REQUESTS FOR INTERPRETATION (RFI)

- A. Definition: A request seeking one of the following:
 - 1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or

- system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
2. A resolution to an issue which has arisen due to field conditions and affects design intent.
- B. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
1. Prepare a separate RFI for each specific item.
 - a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
 - b. Do not forward requests which solely require internal coordination between subcontractors.
 2. Prepare using an electronic version of the form appended to this section.
 3. Combine RFI and its attachments into a single electronic file. PDF format is preferred.
- C. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
 2. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
 - a. Approval of submittals (use procedures specified elsewhere in this section).
 - b. Approval of substitutions (see Section - 01 60 00 - Product Requirements)
 - c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
 - d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
 3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
 4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
 - a. The Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Architect, and any of its consultants, due to processing of such RFIs.
- D. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
1. Official Project name and number, and any additional required identifiers established in Contract Documents.
 2. Owner's, Architect's, and Contractor's names.
 3. Discrete and consecutive RFI number, and descriptive subject/title.
 4. Issue date, and requested reply date.
 5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
 6. Annotations: Field dimensions and/or description of conditions which have engendered the request.

7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.
- E. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.
- F. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
 1. Indicate current status of every RFI. Update log promptly and on a regular basis.
 2. Note dates of when each request is made, and when a response is received.
 3. Highlight items requiring priority or expedited response.
 4. Highlight items for which a timely response has not been received to date.
 5. Identify and include improper or frivolous RFIs.
- G. Review Time: Architect will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
 1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.
- H. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
 1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
 2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
 3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
 4. Notify Architect within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.7 SUBMITTAL SCHEDULE

- A. Submit to Architect for review a schedule for submittals in tabular format.
 1. Submit at the same time as the preliminary schedule specified in Section - 01 32 16 - Construction Progress Schedule.
 2. Coordinate with Contractor's construction schedule and schedule of values.
 3. Format schedule to allow tracking of status of submittals throughout duration of construction.

3.8 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
 1. Product data.
 2. Shop drawings.

3. Samples for selection.
 4. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
 - C. Samples will be reviewed for aesthetic, color, or finish selection.
 - D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - Closeout Submittals.

3.9 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.

3.10 SUBMITTALS FOR PROJECT CLOSEOUT

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 78 00 - Closeout Submittals:
 1. Project record documents.
 2. Operation and maintenance data.
 3. Warranties.
 4. Bonds.
 5. Other types as indicated.
- D. Submit for Owner's benefit during and after project completion.

3.11 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.

3.12 SUBMITTAL PROCEDURES

A. General Requirements:

1. Use a separate transmittal for each item.
2. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
3. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
4. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
5. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
 - a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
6. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
 - a. Deliver submittals to Architect at business address.
7. Schedule submittals to expedite the Project, and coordinate submission of related items.
 - a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
 - b. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 7 days.
 - c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Architect's approval, allow an additional 30 days.
8. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
9. Provide space for Contractor and Architect review stamps.
10. When revised for resubmission, identify all changes made since previous submission.
11. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
12. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
13. Submittals not requested will be recognized, and will be returned "Not Reviewed",

B. Product Data Procedures:

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

C. Shop Drawing Procedures:

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

D. Samples Procedures:

1. Transmit related items together as single package.

2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.

3.13 SUBMITTAL REVIEW

- A. Submittals for Review: Architect will review each submittal, and approve, or take other appropriate action.
- B. Submittals for Information: Architect will acknowledge receipt and review. See below for actions to be taken.
- C. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
 1. Notations may be made directly on submitted items and/or listed on appended Submittal Review cover sheet.
- D. Architect's and consultants' actions on items submitted for review:
 1. Authorizing purchasing, fabrication, delivery, and installation:
 - a. "Approved", or language with same legal meaning.
 - b. "Approved as Noted, Resubmission not required", or language with same legal meaning.
 - 1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
 - c. "Approved as Noted, Resubmit for Record", or language with same legal meaning.
 - 1) Resubmit corrected item, with review notations acknowledged and incorporated. Resubmit separately, or as part of project record documents.
 - 2) Non-responsive resubmittals may be rejected.
 2. Not Authorizing fabrication, delivery, and installation:
 - a. "Revise and Resubmit".
 - 1) Resubmit revised item, with review notations acknowledged and incorporated.
 - b. "Rejected".
 - 1) Submit item complying with requirements of Contract Documents.
- E. Architect's and consultants' actions on items submitted for information:
 1. Items for which no action was taken:
 - a. "Received" - to notify the Contractor that the submittal has been received for record only.
 2. Items for which action was taken:
 - a. "Reviewed" - no further action is required from Contractor.

END OF SECTION

SECTION 01 35 91
PERIOD TREATMENT PROCEDURES

PART 1 - GENERAL

1.1 Section Includes

- A. Construction procedures appropriate for working with historic sites and structures.

1.2 Related Requirements

- A. Section 02 03 42 - Removal and Salvage of Period Construction Materials.

1.3 Definitions

- A. Consolidate: Strengthen loose or deteriorated materials in situ.
- B. Dismantle: Disassemble and detach items by hand from existing construction to the limits indicated, using small hand tools and small one-hand power tools, to protect nearby historic surfaces, and legally dispose of dismantled items off-site, unless indicated to be salvaged or reinstalled.
- C. Existing to Remain: Existing items that are not to be removed or dismantled. Protect materials as indicated.
- D. Historic: Spaces, areas, rooms, surfaces, materials, finishes, and overall appearance subject to preservation, rehabilitation, restoration, and reconstruction procedures defined in NPS (THP). Designation "HF" and words such as "historic," "historic fabric," "historic materials," "historic building materials," 'historic character,' or words of similar meaning indicate that the material or feature is considered to have aspects that require period treatment procedures.
- E. In-Kind: Matching existing in physical and visual aspects including, but not limited to, material, form, color, texture, and workmanship.
- F. Preserve: Apply measures to sustain existing form, integrity, and materials of a historic property; may include preliminary measures to protect and stabilize the property.
- G. Protect: Take precautions to keep historic materials of the building from damage or injury.
- H. Refinish: Remove existing finishes from base material and apply new finish to match original or as otherwise indicated.
- I. Remove: Detach or dismantle items from existing construction and dispose of them off-site, unless items are indicated to be salvaged or reinstalled.
- J. Remove and Reinstall: Detach or dismantle items from existing construction in a manner to prevent damage. Clean and prepare for reuse and reinstall in original location or in other location where indicated.
- K. Remove and Salvage: Detach or dismantle items from existing construction in a manner to prevent damage. Clean, package, label, and deliver salvaged items to Owner in ready-for-reuse

condition.

- L. Repair: Correct damage and defects, retaining existing materials, features, and finishes and employing as few new materials as possible. Includes patching, piecing-in, splicing, consolidating, or reinforcing or upgrading materials with appropriate and approved materials and methods.
- M. Replace: Remove, duplicate, and reinstall entire item with new material. Use original item as the pattern unless noted otherwise.
- N. Replicate or Reproduce: Fabricate a new item in exact detail, materials, and finish as the original, unless otherwise indicated; referred to as replicas or reproductions.
- O. Restore: Return to original condition; return to the condition extant during the period of interpretation.
- P. Retain: Existing to remain; keep existing items that are not to be removed or dismantled.
- Q. Reversible: New construction work, treatment, or processes that can be removed or undone in the future without damaging historic materials.
- R. Stabilize: Provide reinforcement of unsafe or deteriorated items and maintain the present, essential form; reestablish weather-resistant enclosure.
- S. Strip: Remove existing finish down to base material, unless otherwise indicated.

1.4 Reference Standards

- A. NPS (THP) - The Secretary of The Interior's Standards For the Treatment of Historic Properties with Guidelines For Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings; 2017.

1.5 Submittals

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Restoration specialist's qualification statement.
- C. Existing Conditions Documentation: Prior to commencement of period treatment activities, document with digital photography, digital videography, digital photogrammetry, or similar means the existing exterior walls, interior walls, windows, doors, roofs and roofing, interior finishes, trim, decorative elements, and building services equipment and distribution systems indicated as subject to period treatment.
- D. Project Record Documents:
 - 1. Record of conditions encountered before, during, and after completion of work.

1.6 Quality Assurance

- A. Restoration Specialist Qualifications: Company specializing in restoration work, with at least three years of documented experience in comparable projects, and employing personnel skilled in the procedures and operations required by project scope of work.

- B. Craftspersons: Perform specific cleaning, repairing, and refinishing tasks; have demonstrated applicable successful experience in past historical preservation and restoration projects.
- C. Documents at Project Site: Maintain at the project site a copy of each referenced document for execution requirements.

1.7 Delivery, Storage, and Handling

- A. Storage and Protection:
 - 1. Use and reuse materials original to the existing structure wherever practical. Store removed materials under cover, inside, and protect from damage.
 - 2. Label specific pieces or items to be removed. Label consistently and inconspicuously indicating original location, and document original position.
 - 3. Protect materials during storage and construction from rain, snow, or groundwater and from soiling with earth or other materials.
 - a. Store cementitious materials off ground, under cover, and in a dry location. Protect liquid components from freezing.
 - b. Comply with manufacturer's recommendations for minimum and maximum temperature requirements for storage.
 - 4. Store restoration and cleaning chemicals off-site or in metal cabinets on-site. Do not leave cans open or out of the cabinet overnight. Do not store in unlabeled containers.

1.8 Field Conditions

- A. Smoking and use of tobacco products by personnel performing work on or about designated period treatment areas is not allowed.
- B. Environmental Requirements:
 - 1. Wet or Humid Weather:
 - a. Do not remove exterior elements of structures when raining or rain is forecasted.
 - b. Do not apply primer, paint, putty, or epoxy when the relative humidity is above 80 percent and in accordance with manufacturer's recommendations.
 - c. Do not repair exterior features in rain or fog.
 - 2. Hot Weather: Work in the shade when the temperature is above 75 degrees F (23.9 degrees C). Shield features or areas from excessive heat with protective netting or tarpaulins.
 - a. Hot Weather Maximum Application Ambient Temperatures:
 - 1) Paint: 85 degrees F (29.44 degrees C).
 - 2) Putty: 80 degrees F (26.67 degrees C).
 - 3) Epoxy: 80 degrees F (26.67 degrees C).
 - 3. Cold Weather: Do not perform exterior wet work when the air temperature is below 40 degrees F (4.4 degrees C).
 - a. Cold Weather Minimum Application Ambient Temperatures:
 - 1) Paint: 50 degrees F (10 degrees C).
 - 2) Putty: 50 degrees F (10 degrees C).
 - 3) Epoxy: 55 degrees F (12.78 degrees C).
 - b. Do not begin cleaning, patching, and similar work when frost or freezing temperatures are forecasted.
- C. Exterior Cleaning Procedures: Perform cleaning and rinsing of the exterior elements only during daylight hours.

- D. Protection of Existing Elements: In accordance with manufacturer's recommendations for use of proposed products and procedures and compatibility with adjacent historic building materials, components, and vegetation.

PART 2 - PRODUCTS

2.1 Protection Products

- A. Adhesive Walk-Off, Tacky Mats: Mats with multiple layers of disposable, adhesive-coated sheets.

2.2 Cleaning Materials

- A. General: Do not use incompatible materials that may contribute to damage of the element being cleaned.
- B. Use products specifically intended by the manufacturer for cleaning historic materials or elements.

2.3 Repair Materials

- A. General: Do not use incompatible materials contributing to damage of repaired elements.
- B. Matching: Unless otherwise required, use new materials that match historic materials in type, design, dimension, texture, detailing, and external appearance.

2.4 Refinishing Materials

- A. General: Do not use incompatible materials that may contribute to damage of the element being refinished.
- B. Matching: Unless otherwise required, use new materials that match historic materials in type, design, texture, detailing, and external appearance.

PART 3 - EXECUTION

3.1 Preparation

- A. Dismantling: Follow the reverse order of original construction to the extent practicable.

3.2 Period Treatment Special Procedures

- A. Selective removal and salvage of identified historic items and materials and removal of rubbish and debris.
 - 1. Perform work in accordance with requirements of Section 02 03 42.
 - 2. Historic items and materials are indicated on drawings.
- B. Review proposed procedures for each type of element with Architect. Obtain approval from Architect before commencing work.

- C. Salvage as much existing material of each element as practicable; repair, consolidate, and restore rather than renew.
- D. Repair rather than replace architectural features wherever possible. Repair or replace missing features with accurate duplications.
- E. Use reversible processes wherever possible.
- F. Use methods that do not significantly change the aesthetic effect of existing elements.
- G. Document condition of items being worked on before, during, and after work is completed.
- H. Protect existing materials and substrates from damage.
- I. Protect existing elements and features removed, cleaned, and reused from material damage.
 - 1. Label salvaged items and features and store at project site, in designated location; protect from damage.
- J. Exterior Work Procedures: Protect parts of the facility not included in this work from damage.
 - 1. Do not attach scaffolding, ladders, and working platforms to building unless approved in writing by the Architect.
- K. Interior Work Procedures: Protect parts of the facility not being cleaned or repaired from effects of this work.
 - 1. Provide enclosures to protect against spread of dust, debris, and water at or beyond the work area.
 - 2. Mask or cover adjacent surfaces and permanent equipment. Secure coverings; do not use adhesive type tape or nails. Do not use impervious sheeting.

END OF SECTION

SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Testing and inspection agencies and services.
- B. Contractor's construction-related professional design services.
- C. Control of installation.
- D. Mock-ups.
- E. Defect Assessment.

1.2 Testing and Inspection Agencies and Services

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 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.

3.2 MOCK-UPS

- A. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.

- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. Architect will use accepted mock-ups as a comparison standard for the remaining Work.
- D. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.

3.3 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.

3.4 DEFECT ASSESSMENT

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

END OF SECTION

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

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

1.2 RELATED REQUIREMENTS

- A. Section 01 51 00 - Temporary Utilities.

1.3 TEMPORARY UTILITIES - See Section 01 51 00

- A. Provide and pay for all electrical power, lighting, water, heating and cooling, and ventilation required for construction purposes.
- B. Existing facilities may not be used.

1.4 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.

1.5 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.

1.6 FENCING

- A. Construction: Contractor's option.
- B. Provide 6 foot (1.8 m) high fence around construction site; equip with vehicular and pedestrian gates with locks.

1.7 INTERIOR ENCLOSURES

- A. Provide temporary partitions and ceilings as indicated to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.
- B. Construction: Framing and reinforced polyethylene sheet materials with closed joints and sealed edges at intersections with existing surfaces:

1.8 SECURITY

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

1.9 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 PROJECT IDENTIFICATION

- A. Provide project identification sign of design and construction. The required sign template has been appended to the end of this section.
- B. Erect on site at location established by Architect.
- C. No other signs are allowed without Owner permission except those required by law.

1.11 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 (10 m) from existing and new structures.

1.12 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

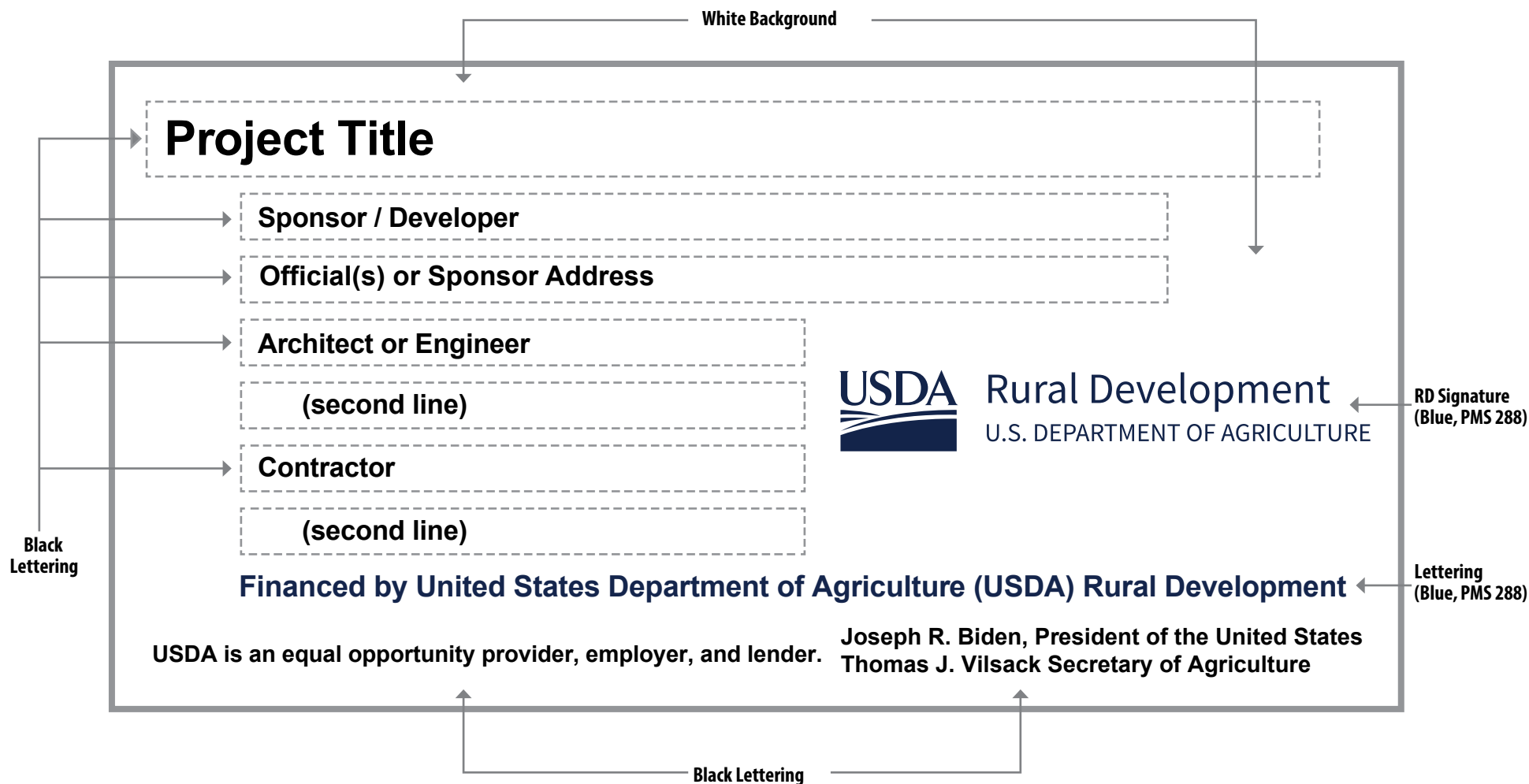
- A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.
- B. Remove underground installations to a minimum depth of 2 feet (600 mm). Grade site as indicated.
- C. Clean and repair damage caused by installation or use of temporary work.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

TEMPORARY CONSTRUCTION SIGN FOR RURAL DEVELOPMENT PROJECTS

Recommended Fonts: Helvetica or Arial



SIGN DIMENSIONS : 1200 mm x 2400 mm x 19 mm (approx. 4' x 8' x 3/4")
PLYWOOD PANEL (APA RATED A-B GRADE-EXTERIOR)

END OF SECTION

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. General product requirements.
- B. Re-use of existing products.
- C. Transportation, handling, storage and protection.
- D. Product option requirements.
- E. Substitution limitations.
- F. Maintenance materials, including extra materials, spare parts, tools, and software.

1.2 RELATED REQUIREMENTS

- A. Section 01 25 00 - Substitution Procedures: Substitutions made during procurement and/or construction phases.
- B. Section 01 40 00 - Quality Requirements: Product quality monitoring.
- C. Section 01 74 19 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

1.3 REFERENCE STANDARDS

1.4 SUBMITTALS

- A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
 - 1. Submit within 15 days after date of Agreement.
 - 2. For products specified only by reference standards, list applicable reference standards.
- B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
 - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.1 EXISTING PRODUCTS

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.
- B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.
- C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

2.2 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by Contract Documents.
- B. See Section 01 40 00 - Quality Requirements, for additional source quality control requirements.
- C. Use of products having any of the following characteristics is not permitted:
 - 1. Containing lead, cadmium, or asbestos.

2.3 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.

2.4 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

3.1 SUBSTITUTION LIMITATIONS

- A. See Section 01 25 00 - Substitution Procedures.

3.2 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.

3.3 STORAGE AND PROTECTION

- A. Provide protection of stored materials and products against theft, casualty, or deterioration.
- B. 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 01 74 19.
 - 1. Structural Loading Limitations: Handle and store products and materials so as not to exceed static and dynamic load-bearing capacities of project floor and roof areas.
- C. Store and protect products in accordance with manufacturers' instructions.
- D. Store with seals and labels intact and legible.
- E. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- F. For exterior storage of fabricated products, place on sloped supports above ground.
- G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- H. Comply with manufacturer's warranty conditions, if any.
- I. Do not store products directly on the ground.
- J. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

- K. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- L. Prevent contact with material that may cause corrosion, discoloration, or staining.
- M. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- N. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 70 00
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

- A. Section 07 84 00 - Firestopping.

1.2 QUALIFICATIONS

- A. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

1.3 PROJECT CONDITIONS

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

PART 2 PRODUCTS

2.1 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.1 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.

3.2 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.

3.3 LAYING OUT THE WORK

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Architect of any discrepancies discovered.
- C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- D. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
- F. Utilize recognized engineering survey practices.
- G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
 - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations; and _____.
 - 2. Grid or axis for structures.
 - 3. Building foundation, column locations, ground floor elevations, and _____.
- H. Periodically verify layouts by same means.
- I. Maintain a complete and accurate log of control and survey work as it progresses.

3.4 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.

3.5 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. Perform whatever cutting and patching is necessary to:
 - 1. Complete the work.
 - 2. Fit products together to integrate with other work.
 - 3. Provide openings for penetration of mechanical, electrical, and other services.
 - 4. Match work that has been cut to adjacent work.
 - 5. Repair areas adjacent to cuts to required condition.
 - 6. Repair new work damaged by subsequent work.
 - 7. Remove samples of installed work for testing when requested.
 - 8. Remove and replace defective and non-complying work.
- C. Execute work by methods 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.
- D. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- E. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- F. Restore work with new products in accordance with requirements of Contract Documents.
- G. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- H. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 84 00, to full thickness of the penetrated element.
- I. Patching:
 - 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
 - 2. Match color, texture, and appearance.
 - 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.6 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.

3.7 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.

3.8 ADJUSTING

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

3.9 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.

3.10 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.
- I. Provide service and maintenance of components indicated in specification sections.
- J. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.
- K. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- L. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- M. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION

SECTION 01 78 00
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Project record documents.
- B. Operation and maintenance data.
- C. Warranties and bonds.

1.2 RELATED REQUIREMENTS

- A. Section 01 30 00 - 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.

1.3 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 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
 - 1. Changes made by Addenda and modifications.
- F. Record Drawings: Legibly mark each item to record actual construction including:
 - 1. Field changes of dimension and detail.
 - 2. Details not on original Contract drawings.

3.2 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.

3.3 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 02 01 00
MAINTENANCE OF EXISTING CONDITIONS

PART I - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Protection of existing buildings, facilities, utilities and site improvements to remain.
2. Verification of existing utilities, site improvements and site conditions.

B. Related Sections:

1. Division 02 Section "Selective Site Demolition".

1.2 SUBMITTALS

A. Shop Drawings: submit drawings showing details of any proposed construction which is necessary to protect existing construction and utilities.

B. Engineering Design:

1. If required by job conditions, Contractor shall retain the services of a licensed Professional Engineer registered in the state in which the project is located to design temporary and permanent installations as required to protect existing improvements and conditions.
2. All information required for the design shall be the Contractor's responsibility to obtain.
3. Submit design drawings and calculations to the Architect/Engineer for review. Review by the Architect/Engineer shall not relieve Contractor of full responsibility for design or work. The purpose of the Architect/Engineer review shall be only to protect the Owner from inadequate or insufficient protection for existing improvements and conditions. By reviewing the design, the Architect/Engineer assumes no responsibility for the design or adequacy thereof.
4. Underpinning calculations, if required, shall be reviewed by the Geotechnical Engineer.
5. All design drawings and calculations submitted shall be signed and sealed by the Contractor's Engineer.

1.3 PROJECT CONDITIONS

A. Existing Site Conditions:

1. The Drawings do not propose to show all existing improvements on the site.
2. Information shown on the Drawings was obtained from drawings of previous construction projects and/or a site survey provided by the Owner.

3. Recorded information concerning existing construction is available for examination in the Architect/Engineer office.
 4. Existing structures:
 - a. Bottom of existing footing elevations are unknown.
 - b. Loads on existing footings and foundations are unknown.
 - c. Dimensions of existing foundations are unknown.
 5. Information regarding existing subsurface conditions is unconfirmed. See Division 00 Section "Geotechnical Data" for available information regarding Geotechnical Data and soils information.
 6. Information concerning the approximate locations of known existing underground utilities is shown on the Drawings. Depths and locations of existing utilities are unconfirmed.
 7. Utilities include all underground and above ground piping, conduits, cables and related structures and appurtenances. Utilities also include sewers.
- B. Contractor is responsible for field verifying all existing site conditions.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:

1. Contractor may use materials and systems recognized as suitable for protection of existing improvements and conditions.
2. Untreated wood may only be used for temporary protection, bracing, supports, shores, etc.
3. The Owner or Architect/Engineer may prohibit certain materials and systems if they interfere with the Owner's operations.

PART 3 - EXECUTION

3.1 PREPARATION

A. Pre-Bid Site Inspection:

1. Bidders shall examine the site, inspect existing buildings, review existing plans and become familiar with all conditions under which the contract work will be performed.
2. This shall be completed during the bidding phase in order that bids include all costs for protection of existing improvements and conditions.
3. Contractor shall notify Architect/Engineer during the bidding phase of any discrepancies in bidding documents, existing conditions documents and field conditions.

4. No later claim for extra compensation will be allowed, unless it is determined by the Owner and Architect/Engineer to be unforeseen conditions.

B. Pre-Construction Verification of Existing Conditions:

1. Contractor shall verify all existing site conditions and improvements prior to construction, which includes field verifying locations of existing utilities and all other existing above grade and below grade improvements which may affect proposed construction activities.
2. Contractor shall notify Architect/Engineer immediately with conflicts or discrepancies from existing field conditions, existing conditions documentation and proposed new construction.
3. These verifications are to be done well in advance of construction activities in order to allow time for revising design if required.

3.2 GENERAL

- A. Contractor shall have underground utilities marked prior to beginning any excavation or other underground work in area of proposed activity.
- B. Provide all permanent and temporary construction necessary to protect existing improvements and conditions as required by construction activities.
- C. Install all protection in a manner which will not interfere with the Owner's operations or adjacent work.
- D. If at any time movement or other failure is observed in existing improvements or conditions, cease operations, provide all additional protection necessary to stabilize and retain said existing installations and notify Owner immediately.

3.3 JOB COMPLETION

- A. Upon completion of construction activities, leave the site in a neat and orderly condition.
- B. Restore all areas disrupted by construction activities, which were to remain and not be altered, to their original condition at no additional cost to Owner.

END OF SECTION

SECTION 02 03 42
REMOVAL AND SALVAGE OF PERIOD CONSTRUCTION MATERIALS

PART 1 GENERAL

- 1.1 Section Includes
 - A. Specified procedures required for preservation, rehabilitation, restoration, and reconstruction treatment areas.
 - B. Historic items and materials are indicated on drawings.
- 1.2 Related Requirements
 - A. Section 01 35 91 - Period Treatment Procedures for general historic preservation project requirements.
 - B. Section 02 41 00 - Demolition: Selective demolition of nonhistoric, built site elements.
- 1.3 Submittals
 - A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

- 3.1 Period Treatment, General
 - A. See Section 013591 for special procedure requirements related to elements and features of historical significance and value.
- 3.2 General Procedures
 - A. Drawings indicating existing construction, building services, and site utilities are based on casual field observation and existing record documents only.
 - 1. Report discrepancies to Architect before disturbing existing historic elements.
 - 2. Beginning of work constitutes acceptance of existing conditions that are apparent upon examination at that time.
 - B. Separate spaces in which removals and salvage operations are conducted from occupied spaces.
 - 1. Provide, erect, and maintain temporary dustproof partitions; see Section 01 50 00.
 - C. See Section 02 41 00 for selective demolition of nonhistoric elements.

3.3 Environmental Controls

- A. Comply with federal, state, and local regulations pertaining to water, air, solid waste, recycling, chemical waste, sanitary waste, sediment, and noise pollution.

3.4 Items to Be Salvaged

- A. General: Salvage elements and components to the maximum extent possible. Maintain a chain of custody of salvaged materials, including the condition of such materials before and after salvage operations.
- B. Masonry Elements: Remove intact and salvage masonry elements indicated on drawings.
- C. Finishes: Protect special or historic finishes and finish elements indicated on drawings.

3.5 Materials to Be Removed

- A. Remove existing nonhistoric elements as indicated and as required to allow direct access to period construction elements indicated to be restored or salvaged for reuse.
- B. Protect existing historic elements.
 - 1. Prevent movement of structure; provide temporary, removable shoring and bracing if necessary.
 - 2. Perform cutting to accomplish removals neatly, minimizing overcutting.

3.6 Materials to Be Recycled

- A. Recycle removed nonhistoric materials to the maximum extent possible. Remove recyclable materials by hand wherever possible.
- B. Recycle items indicated on drawings.

3.7 Cleaning

- A. Upon completion of work, clean dust, dirt, and debris caused by salvage and demolition operations from portions of existing structure to remain and adjacent areas. Remove and transport debris and rubbish in a manner that prevents spillage on streets or adjacent areas. Obey local regulations regarding hauling and disposal.

SECTION 02 41 00
DEMOLITION

PART 1 GENERAL

1.1 SECTION INCLUDES

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

1.2 RELATED REQUIREMENTS

- A. Section 01 10 00 - Summary: Limitations on Contractor's use of site and premises.
- B. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- C. Section 01 70 00 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

1.3 DEFINITIONS

- A. Demolition: Dismantle, raze, destroy or wreck any building or structure or any part thereof.
- B. Remove: Detach or dismantle items from existing construction and dispose of them off site, unless items are indicated to be salvaged or reinstalled.
- C. Remove and Salvage: Detach or dismantle items from existing construction in a manner to prevent damage. Clean, package, label and deliver salvaged items to Owner in ready-for-reuse condition.
- D. Remove and Reinstall: Detach or dismantle items from existing construction in a manner to prevent damage. Clean and prepare for reuse and reinstall where indicated.
- E. Existing to Remain: Designation for existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

1.4 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Site Plan: Indicate:
 - 1. Areas for temporary construction and field offices.
- C. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.1 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.

3.2 EXISTING UTILITIES

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

3.3 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. Remove existing work as indicated and required to accomplish new work.
 - 1. Remove items indicated on drawings.
- C. 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.
- D. 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.

3.4 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 02 41 13
SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition of existing site improvements made obsolete by this project, as indicated or implied by the contract documents.
2. Removal of demolition items and debris from site.
3. Protection of items to remain.
4. Abandonment of items indicated in contract documents.
5. Removal, storage and protection of items to be salvaged.
6. The removal of asbestos or lead containing products is not included in this scope of work. If such materials are discovered during demolition, notify the Owner immediately.

B. Related Sections:

1. Division 31 Section "Site Clearing".

1.2 REQUIREMENTS

A. General:

1. Proper access and function of existing facility operations must be maintained at all times.
2. Demolition activities shall not interfere with or interrupt the operations of the facility, employees or the public.
3. A complete and operable utility system must be maintained at all times.
4. Sufficient parking and site access must be maintained at all times.
5. The route for construction traffic and the removal of debris shall be limited to specific areas. See Drawings for further information.
6. Contractor is solely responsible for providing all permanent and temporary means to ensure site access, utility services and other required conditions are maintained at all times.

B. Miscellaneous:

1. On-site burning is not permitted.
2. Blasting or any other use of explosives is not permitted.
3. Use of heavy vibratory or other similar means that cause excessive nuisance to the public or compromise safety of existing facilities is not permitted.
4. Comply with NFPA 241 (latest edition).

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Concrete: If required, shall comply with Division 32 Section "Site Concrete".
- B. Flowable Fill: If required, shall comply with Division 31 Section "Flowable Fill".
- C. All other materials not specifically described but required for proper completion of the Work, shall be selected by the Contractor subject to approval of the Architect/Engineer and Owner.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Refer to Division 02 Section "Maintenance of Existing Conditions" for verification and maintenance of existing site conditions.
- B. Coordination:
 - 1. Contact Owner prior to site mobilization to discuss and verify site access and routing requirements. Prepare a schedule if requested by Owner.
 - 2. Before commencing the work of this Section, verify with the Architect/Engineer and Owner all items to be removed, all items to remain and all items to be salvaged.

3.2 GENERAL

- A. Protection:
 - 1. Demolition shall be done in such a manner to protect adjacent materials.
 - 2. Use all necessary and appropriate means to prevent the spread of dust during demolition.
 - 3. Protect employees and public from dust, noise, light, vibration, odor and all other types of nuisances and hazards.
 - 4. Protect all existing items to remain. If such items are damaged, they shall be repaired or replaced by the Contractor to the Owner's satisfaction at no additional cost to Owner.
 - 5. Items to be demolished as indicated in contract documents or made obsolete per field conditions shall be removed and disposed of off the project site. Abandoning such items in place shall not be permitted unless specifically indicated in the contract documents or approved by Architect/Engineer and Owner.
 - 6. Avoid overloading of existing structures by either a build-up of demolished items or by impact loading of demolished items on the existing structure.
 - 7. Bracing and shoring and other similar and appropriate mean shall be used where necessary to avoid collapse or other compromising of structures or materials.

B. Demolition:

1. Items indicated in contract documents to be demolished shall be removed, demounted or disconnected in the best possible manner to ensure that no damage will result to other adjacent items or surfaces to remain.
2. Abandoning demolished items in place is not permitted unless specifically indicated in the contract documents or approved by Architect/Engineer and Owner.
3. For items indicated or approved as being abandoned in place, the means of abandonment shall be reviewed and approved by the Architect/Engineer and Owner prior to abandonment.
4. Phase demolition as described in the contract documents, as required per field conditions and per Owner's request.

C. Salvage:

1. Protect items to be salvaged during removal, handling and storage.
2. All reusable items salvaged during demolition operations shall be retained for the Owner's inspection. Only items so inspected and rejected by the Owner shall be disposed. All other such items shall be turned over to the Owner.

D. Cleaning:

1. Areas in which demolition and salvage work are being done shall be cleaned daily.
2. All dirt, dust, debris, unsalvageable and non-reusable items and similar items shall be removed from the project site daily.
3. Under no circumstances shall such refuse be allowed to collect for longer periods.
4. Refuse shall not be allowed to block or otherwise impair circulation in corridors, stairs, sidewalks or other traffic areas at any time.

E. Disposal:

1. Except for items or materials indicated to be reused, salvaged, reinstalled or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them at an EPA-approved landfill.

3.3 JOB COMPLETION

- A. At the completion of demolition activities, ensure all demolition debris is removed from site. Restore adjacent areas to original condition and repair any damaged items to Owner's satisfaction at no additional cost to Owner.

END OF SECTION

SECTION 03 10 00
CONCRETE FORMWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Furnish, install, and remove all formwork for all cast-in-place concrete as shown or implied on the Contract Documents.
2. Design of formwork, shoring and reshoring.

B. Related Sections:

1. Division 03 Section: Concrete Reinforcement
2. Division 03 Section: Cast-in-Place Concrete

1.2 QUALITY ASSURANCE

A. Qualifications of Workmen:

1. Provide at least one person who shall be present at all times during execution of this portion of the Work.
2. This workman shall be thoroughly familiar with the type of materials being installed, the referenced standards, and the requirements of this work.
3. This workman shall direct all work performed under this Section.

B. Codes and Standards:

1. In addition to complying with all pertinent codes and regulations, comply with all pertinent recommendations and maintain tolerances contained in "Recommended Practice for Concrete Formwork," publication ACI 347-Latest Edition of the American Concrete Institute.
2. Where provisions of pertinent codes and standards conflict with the requirements of this Section of the Project Manual, the more stringent provisions shall govern.
3. Tolerance limits per ACI 117-Latest Edition.
 - a. Form concrete and set screeds or bulkheads so maximum variation in slab elevation in any bay does not exceed 1/2 inch.

C. Design:

1. Design of formwork, shoring and reshoring by a Professional Engineer of the State where the project is located.

1.3 PRODUCT HANDLING

A. Protection:

1. Use all means necessary to protect formwork materials before, during, and after installation and to protect the installed work and materials of all other trades.
2. Special precautions, as required to protect permanent steel forms and formwork for exposed concrete, shall be utilized after erection.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Form Lumber:

1. All form lumber in contact with exposed concrete shall be new or of sufficient quality to insure an unblemished texture.
2. All form lumber shall be one of the following or a combination thereof.
 - a. Plywood, board lumber, hardwood, or other material of grade or quality to best suit each particular usage.

B. Steel Forms:

1. Steel is an acceptable material for formwork.
2. Steel forms shall be "like new" producing a clean, smooth, unblemished texture for concrete exposed in the finished structure. Do not use damaged forms.

C. Corrugated Steel Permanent Form:

1. Where shown on the Contract Drawings, provide and install galvanized 26 gauge corrugated steel forms.
 - a. Nominal depth: 1"
 - b. Minimum section modulus: 0.075 inch-cubed per 1 foot width
 - c. Minimum tensile strength: 80,000 psi
2. This permanent steel form acts only as form, unlike the products defined in Division 05 Section: Composite Metal Decking, which also provide positive moment reinforcement.

D. Fiber Forms:

1. Fiber forms may be utilized to construct round columns/piers.
2. Seamless forms shall be used for concrete exposed in the finished structure.
3. Standard seamed tubes are permissible for non-exposed concrete.

E. Form Release Agent: Provide non-staining and non-emulsifiable form release agent.

1. Standards:

- a. Release agent shall be similar to Magic Kote by Dayton Superior.
- b. Acceptable manufacturer: BASF Construction Chemicals, W.R. Meadows

F. Bracing/Shoring/Studs:

1. Such supports shall be selected for economy consistent with safety requirements and the quality required in the finished work. The Contractor is responsible for the design, illustration, safety, and serviceability of all formwork.

2.2 TIES/SPREADERS/ACCESSORIES

A. Type:

1. All form ties shall be a type which does not leave an open hole through the concrete and which permits neat and solid patching at every hole.
2. Spreaders shall be commercially manufactured devices compatible with the system.

B. Design:

1. When forms are removed, ties remaining within the concrete shall be not less than 1" from the surface.
2. Utilize ties with removable plastic cones where concrete will be exposed in the finished structure.

C. Wire Ties and Wood Spreaders:

1. Do not use wire ties and wood spreaders.

D. Other Materials:

1. All other materials not specifically described but required for proper completion of concrete formwork, shall be as selected by the Contractor subject to advance acceptance by the Architect/Engineer.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection:

1. Prior to all work of this Section, carefully inspect the installed work of all trades and verify that all such work is complete to the point where form installation may properly commence.
2. Review the Contract Documents, including Addenda and Post Bid Revisions, as applicable, to determine all Contract requirements/details.

3. Verify that forms may be constructed in accordance with all pertinent codes and regulations, the referenced standards, and the original design.

B. Discrepancies:

1. In the event of discrepancy, immediately notify the Architect/Engineer.
2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 CONSTRUCTION OF FORMS

A. General:

1. Construct all required forms to be substantial, sufficiently tight to prevent leakage of mortar.
2. The design and engineering of the formwork shall be the responsibility of the Contractor.
3. Formwork shall be designed for wet concrete and construction loads, lateral pressures, wind loads, and all other loads anticipated during construction.
4. Provide shoring and bracing as required to prevent undue deflection or bulging of concrete.
5. Provide removable sections at the base of forms, where required, to permit removal of debris, water, etc., from the formwork for walls and deep beams.

B. Layout:

1. Form for all required cast-in-place concrete to the shapes, sizes, lines and dimensions indicated on the drawings.
2. Exercise particular care in the layout of forms to ensure the proper finish structure size and shape.
3. Make proper provision for all openings, offsets, recesses, anchorage, blocking, and other features of the Work as shown or required.
4. Carefully examine the Contract Documents and consult with other trades as required to insure proper provisions for openings, reglets, chases, and other items in the forms.
5. Camber forms as required to allow for form deflections, slippage, and settlement of shores during concrete placement.

C. Embedded Items:

1. Set all required steel frames, angles, grilles, bolts, reglets, inserts, pipe, conduit, and other such items required to be anchored in the concrete before the concrete is placed.

D. Bracing and Shoring:

1. Properly brace and tie the forms together so as to maintain position and shape and to ensure safety to personnel.
2. Construct all bracing, supporting members, and centering of ample size and strength to safely carry, without excessive deflection, all dead and live loads to which they may be subjected.

3. Properly space the forms apart and securely tie them together, using metal spreader ties that give positive tying and accurate spreading.
4. All shoring shall extend to adequate foundations.
5. Shores supporting successive stories shall be placed directly over those below or be so designed and placed to prevent overload on the structure below.
6. The Contractor is responsible for both the proper design and installation of all bracing and shoring, to properly ensure the safety and serviceability of the structure.

E. Tolerances:

1. Construct all forms straight, true, plumb, and square within the tolerances recommended by ACI 347.
2. Formed surfaces shall be Class A.
 - a. Abrupt irregularities in formed surfaces exposed to view in final construction shall not exceed 1/8 inch.
3. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
 - a. Level Alignment: Variance in elevation of top of slab in any structural bay shall not exceed 1/2 inch.

F. Wetting:

1. Keep forms sufficiently wetted to prevent joints opening up before concrete is placed, except as recommended in ACI 306 R-78, "Recommended Practice for Cold Weather Concreting."

G. Construction Joints:

1. Refer to Division 03 Section: Cast-In-Place-Concrete of this Project Manual.

3.3 PLYWOOD FORMS

A. Assembly:

1. Nail the plywood panels directly to studs and apply in a manner to minimize the number of joints.

B. Joints:

1. Make all panel joints tight butt joints with all edges true and square.

3.4 FOOTING FORMS

A. Side Forms:

1. All footing sides shall be formed unless otherwise specifically authorized by the Architect/Engineer.

3.5 REUSE OF FORMS

A. Requirements:

1. Reuse of forms shall in no way delay or change the schedule for placement of concrete from the schedule obtainable if all forms were new.
2. Reuse of forms shall in no way impart less structural stability to the forms, nor less acceptable appearance to finished concrete.

3.6 CLEAN-UP

A. General:

1. Before concrete is placed the forms shall be cleaned of all debris, ice, snow, frost, and standing water.
2. Remove all loose earth materials from the surfaces of earth forms.

3.7 REMOVAL OF FORMS

A. General:

1. Forms shall be removed in such manner to ensure complete safety of the structure.
2. Formwork for columns, walls, and other parts not supporting the weight of the concrete may be removed as soon as the concrete has hardened sufficiently to resist damage from removal operations with the following minimums:
 - a. Formwork for walls and columns shall remain in place a minimum of two (2) days during which the temperature of the air surrounding the concrete must be above 50°F.
 - b. This minimum time period represents a cumulative number of days or fractions thereof.
 - c. Such formwork for concrete placed during cold weather with surrounding air temperatures below 50°F shall remain in place one day after the artificial heating and/or freeze protection is discontinued/ removed.
3. Forms and falsework supporting any vertical loads shall remain in place until the members have acquired sufficient strength to safely support their weight and any superimposed loads. Such forming shall remain in place until the concrete has attained its specified 28 day strength as indicated by the test cylinders unless reshores are installed in sufficient quantities to transmit the loads to adequate foundations without over stressing the partially cured structure. The requirements of ACI 305 and 306 must also be met before forms may be removed.
4. Forms for load bearing superstructure concrete shall never be removed earlier than seven (7) days after the concrete is placed.

5. Removal of forms and falsework is the responsibility of the Contractor, and the Contractor shall bear the full responsibility for this operation.
6. Concrete damaged by too early removal of forms or falsework shall be repaired or replaced as directed by the Architect/Engineer.
7. Concrete exposed by form removal during the curing period shall be cured by one of the methods specified in Division 03 Section: Cast-In-Place-Concrete.
8. Note that curing compound is not permitted in certain locations. In these cases, curing is to be by an alternate method. See Cast-in-Place Concrete specification for alternate methods.
9. In no case shall the superimposed load on relatively new concrete exceed 50 pounds per square foot unless proper shoring to suitable foundations is installed as required by the Architect/Engineer.

B. Removal

1. Use all means necessary to protect workmen, passers-by, the installed work and materials of other trades, and the complete safety of the structure.
2. Cut nails and similar fasteners off flush and leave all surfaces smooth and clean.
3. Remove metal spreader ties on exposed concrete by removing or snapping off inside the wall surface and pointing up and rubbing the resulting pockets to match the surrounding areas.

END OF SECTION 03 10 00

SECTION 03 20 00
CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Furnish and install all bar supports, inserts, anchor bolts, welded wire fabric, reinforcing bars and all other items to be embedded in the cast-in-place concrete, not specifically indicated to be by others, as shown or implied on the Contract Documents.

B. Related Sections:

1. Division 03 Section: Concrete Formwork
2. Division 03 Section: Cast-in-Place Concrete
3. Division 03 Section: Epoxy Grout

1.2 QUALITY ASSURANCE

A. Qualifications of Workmen:

1. Provide at least one person who shall be present at all times during execution of this portion of the work.
2. This workman shall be thoroughly familiar with the type of materials being installed and the best methods for their installation.
3. This workman shall direct all work performed under this Section.

B. Codes and Standards:

1. In addition to complying with all pertinent codes and regulations, comply with all pertinent recommendations contained in ACI 315 – Manual of Standard Practice for Detailing Reinforced Concrete Structures and ACI 318 - Building Code Requirements for Reinforced Concrete.
2. Where provisions of pertinent codes and standards conflict with this Section of the Project Manual, the more stringent provisions shall govern.

1.3 SUBMITTALS

A. Shop Drawings:

1. Submit shop drawings to the Architect/Engineer defining details of concrete reinforcement in accordance with Division 01 Section: Submittals of this Project Manual.
2. Reinforcing for concrete walls shall be shown on scale elevations of the walls.

3. The Contractor may release shop drawings for fabrication at his discretion; however, the Contractor shall bear all financial responsibility for changes to the shop drawings up to the time they are marked "Furnish as Submitted." Actual field installation shall only be made with shop drawings marked "Furnish as Submitted."
4. Where hooks are indicated on the Contract Drawings, provide standard hooks unless otherwise noted.
5. All accessories necessary for support of reinforcing steel shall be shown in plan. Do not schedule accessories.

B. Certifications:

1. Submit a certification that all material used is in accordance with the requirements of this Section.

1.4 PRODUCT HANDLING

A. Protection:

1. Use all means necessary to protect concrete reinforcement before, during, and after installation and to protect the installed work and materials of all other trades.
2. Store in a manner to prevent excessive rusting and fouling with dirt, grease, and other bond-breaking coatings.

B. Replacements:

1. In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Reinforcing Bars and Dowels:

1. Conform to ASTM A615, Grade 60.
2. Reinforcing that is to be welded shall conform to ASTM A615, Grade 40.
3. Epoxy coated bars (required only where noted) shall meet the requirements of ASTM A884.

B. Welded Wire Fabric:

1. Conform to ASTM A1064, 6 x 6 x W 2.1x W 2.1, or as indicated on the drawings. Welded wire fabric shall be furnished in the flat sheet form in lieu of roll form.
2. Epoxy coated welded wire fabric (required only where noted) shall meet the requirements of ASTM A884.

C. Other Embedded Items:

1. Provide standard manufactured products as approved by the Architect/Engineer.

D. Bar Supports:

1. Conform to the requirements of the "Manual of Standard Practice," published by the Concrete Reinforcing Steel Institute.
2. Accessories shall be plastic protected Class "C" for all concrete exposed in the finished structure, except as specified below.
3. Accessories shall be Class "A," bright basic, for unexposed concrete.
4. Utilize Class "E," stainless steel bar supports, for exterior concrete to be finished by sand blasting.
5. Do not use continuous high chairs. Use individual high chairs laced with bottom cross bars plus #5 support bars. (Minimum of 2 rows of supports for all reinforcing.)
6. Supports must be capable of supporting construction loads without failing. Contractor to furnish additional supports at no cost to the Owner if in the Architect/Engineer's estimation the supports are not adequate.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection:

1. Prior to installation of the work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
2. Verify that concrete reinforcement may be installed in strict accordance with all pertinent codes and regulations and original design.

B. Discrepancies:

1. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 PREPARATION

A. General:

1. Remove all dirt, oil, paint, loose rust, and other foreign materials from the concrete reinforcement prior to replacement.

3.3 PLACING

A. Reinforcing Bars:

1. Place reinforcing steel accurately in conformance with shop drawings stamped "Furnish as Submitted" by the Architect/Engineer.
2. Positively secure reinforcing to bar supports and tie or otherwise anchor bars to prevent displacement by construction loads or by the placing of concrete.
3. Splice bars with a minimum lap of 40 bar diameters, unless otherwise indicated. Use mechanical splicers/couplers where quantity of reinforcement restricts placement of concrete if lapped splices are utilized. Install mechanical splice as recommended by manufacturer.
4. Splice bars only at locations indicated on the Contract Documents and shop drawings.
5. Both shop and field bending shall be accomplished without heating the bars.
6. Minor placing adjustments can be made to avoid interference with other reinforcement and/or embedded devices. The final arrangement, however, is subject to review and acceptance of the Architect/Engineer.
7. Immediately notify the Architect/Engineer if reinforcing cannot be installed as detailed on the "Furnish as Submitted" shop drawings. No cutting of reinforcing should occur unless the Architect/Engineer has reviewed and allowed such cuts.

B. Embedded Devices:

1. Set hangers, anchor bolts, inserts, and other embedded devices accurately in place.
2. Make sure all such devices are installed so that work to be attached thereto will be properly received.
3. Keep devices straight and true-to-line.

C. Welded Wire Fabric:

1. Splice the welded wire fabric by lapping each section at least two meshes wide plus one wire with the adjacent section, but not less than 8".
2. Extend fabric into all openings, doorways, and the like, unless otherwise indicated.
3. Reinforce all equipment pads with 6x6-W2.1xW2.1 welded wire fabric unless otherwise indicated.
4. Support the welded wire fabric in slab-on-grade, with #4 continuous bars spaced at 2'-6" o.c. (maximum in one direction) and supported on concrete brick spaced at 2'-6" o.c.

3.4 CLEANING REINFORCING

A. Final Cleaning:

1. Prior to casting concrete, all loose mill and rust scale, oil, mud, ice, and other foreign coatings which destroy and/or reduce bond between the reinforcement and concrete shall be removed.
2. Wire brushing and/or other suitable methods shall be used to complete cleaning operations.

3.5 INSPECTION

A. Scheduling:

1. Notify the Architect/Engineer 24 hours in advance that forms and reinforcing are in place and are ready for inspection. Keep Architect/Engineer informed of the basic schedule so that he can anticipate inspection times in advance of the required 24-hour notice. Canceled pours are subject to additional inspection charges by the Architect/Engineer against the Contractor where the Architect/Engineer representative is already in route to the site at the time the concrete pour is canceled. Inspection costs shall be based upon the hourly rate of the Architect/Engineer representative plus travel expenses.
2. Do not cast concrete until the Architect/Engineer has observed and accepted the installation.
3. Premature notification of the Architect/Engineer to inspect the reinforcement of forms shall be subject to additional inspection charges by the Architect/Engineer as described above.

END OF SECTION 03 20 00

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cast-in-place concrete as shown or implied by the Contract Documents.
2. Coordinate installation of vapor retarder, specified in Division 07.
3. Concrete fill in metal stair pans.
4. Concrete requirements for housekeeping pads and inertial isolation slabs.

B. Related Sections:

1. Division 03 Section: Concrete Formwork
2. Division 03 Section: Concrete Reinforcement
3. Division 03 Section: Grouting

1.2 REFERENCES

A. American Concrete Institute (ACI):

1. 116R – Cement and Concrete Terminology
2. 117 – Standard Specifications for Tolerances for Concrete Construction and Materials
3. 211.1 – Standard Practice For Selecting Proportions For Normal, Heavy Weight, And Mass Concrete
4. 211.2 – Standard Practice For Selecting Proportions For Structural Lightweight Concrete
5. 214 – Recommended Practice For Evaluation Of Strength Test Results Of Concrete
6. 301 – Specifications for Structural Concrete
7. 304R – Guide for Measuring, Mixing, Transporting, and Placing Concrete
8. 305 R – Recommended Practice For Hot Weather Concreting
9. 306 R – Recommended Practice For Cold Weather Concreting
10. 318 – Building Code Requirements For Reinforced Concrete

B. ASTM International (ASTM):

1. C 33 – Standard Specification for Concrete Aggregates
2. C 94 – Standard Specification for Ready-Mixed Concrete
3. C 143 – Standard Test Method for Slump of Hydraulic Cement Concrete
4. C 150 – Standard Specification for Portland Cement
5. C 260 – Standard Specification for Air-Entraining Admixtures for Concrete
6. C 309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
7. C 330 – Standard Specification for Lightweight Aggregates for Structural Concrete
8. C 494 – Standard Specification for Chemical Admixtures for Concrete

9. C 618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
10. D 6 – Standard Test Method for Loss on Heating of Oil and Asphaltic Compounds
11. D 297 – Standard Test Methods for Rubber Products-Chemical Analysis
12. D 994 – Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)
13. D 1752 – Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
14. E 1155 – Standard Test Method for Determining F_F Floor Flatness and F_L Floor Levelness Numbers
15. F609 – Standard Test Methods for static slip resistance of Footwear sole, heel, or related materials by horizontal-pull slipmeter.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturers literature for each type of product furnished.
- B. Shop Drawings:
 1. Provide layout drawings for coordination of floor slab pours. Indicate locations of expansion joints, construction joints, and control joints.
- C. Quality Assurance Submittals:
 1. Concrete Mix: Submit proposed concrete mix designs for each strength, slump, and combination of admixtures required for the Project.
 2. Test Reports:
 - a. Submit chloride ion tests or total chloride tests (with generally accepted method to relate total chloride to chloride ion) to show compliance with maximum ion concentrations.
 - 1) Tests may be from another job, utilizing the same proportions of aggregates, cements, and admixtures.
 - b. Submit slump, air-entrainment, compressive strength, and flatness and levelness test reports to the Architect/Engineer.

1.4 QUALITY ASSURANCE

- A. Codes and Standards:
 1. In addition to complying with all pertinent codes and regulations, comply with all pertinent requirements of the following American Concrete Institute Publications:
 - a. ACI 117 – Standard Specifications for Tolerances for Concrete Construction and Materials

- b. ACI 211.1 – Standard Practice For Selecting Proportions For Normal, Heavy Weight, And Mass Concrete
 - c. ACI 211.2 – Standard Practice For Selecting Proportions For Structural Lightweight Concrete
 - d. ACI 214 – Recommended Practice For Evaluation Of Strength Test Results Of Concrete
 - e. ACI 305 R – Recommended Practice For Hot Weather Concreting
 - f. ACI 306 R – Recommended Practice For Cold Weather Concreting
 - g. ACI 318 – Building Code Requirements For Reinforced Concrete
2. Where provisions of pertinent codes and standards conflict with this section of the Project Manual, the more stringent provisions shall govern.

B. Qualification for Testing:

- 1. The following field-testing procedures shall be performed only by personnel holding current certificates issued by ACI for Concrete Field Testing Technician - Grade I as required by the local code.
 - a. Sampling of fresh concrete
 - b. Testing fresh concrete for slump
 - c. Testing fresh concrete for entrained air
 - d. Making concrete specimens for compression tests
- 2. Flatness and levelness testing: Floor flatness and levelness testing shall be performed by a technician trained in the use of the testing equipment and the procedures of ASTM E 1155.

C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section: Project Management and Coordination. Review methods and procedures related to concrete Work, including, but not limited to, the following:

- 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
- 2. Review requirements for concrete tolerances, finishing, and curing methods, prior to commencing concrete work
 - a. Include floor covering installers, to review specific tolerance and finish requirements.

1.5 PROJECT CONDITIONS

A. Environment Conditions:

- 1. Extreme temperature conditions:
 - a. When extreme hot or cold weather conditions occur, or are expected to occur, which might detrimentally affect concrete, employ handling and placing techniques to guard against such effects.

- 1) Comply with the ACI nomograph attached to the end of this Section.
 - b. Comply with the recommendations of American Concrete Institute publications ACI 305 R and ACI 306 R, for hot and cold weather concreting.
2. Inclement weather:
- a. Unless adequate protection is provided, do not place exterior concrete during rain, sleet, or snow.
 - b. Do not use calcium chloride or admixtures containing soluble chlorides.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cement: ASTM C 150, Type I or III
- B. Fine Aggregate: ASTM C 33 with fineness modules, 2.40 to 3.00. For pumped concrete, 15 to 30% passing number 50 sieve and 5 to 10% passing a number 100 sieve.
- C. Coarse Aggregate:
 1. ASTM C 33 with maximum size:
 - a. Three-fourths of minimum clear spacing between reinforcing bars or between bars and forms
 2. Provide crushed stone for sidewalks, curbs, and exterior slabs/stairs
 3. Pea gravel shall not be used as an aggregate for any part of the elevated structure or the foundation system. Pea gravel may be acceptable for miscellaneous structural items as approved by the Architect/Engineer.
- D. Lightweight Aggregate: ASTM C 330.
 1. Nominal maximum size: 3/4"
 2. Pre-soak aggregate prior to mixing in accordance with aggregate supplier recommendations
- E. Water: Clean, fresh, potable.
- F. Air-Entraining Admixture: ASTM C 260
- G. Concrete shall not exceed maximum chloride ion content for corrosion protection as defined in ACI 318 Table 4.4.1.
- H. Fly Ash: ASTM C 618, Class C or F.
 1. Fly ash shall not replace more than 20% of the cement.

I. Curing and Sealing Compounds:

1. Products: Furnish one of the following curing or curing and sealing compounds for each application listed:
 - a. Interior concrete slabs to receive floor coverings or other applied material: ASTM C 309, Type 1D, Class B; water based, all resin, dissipating, VOC compliant, clear with fugitive dye.
 - 1) Conspec Marketing & Manufacturing Co., Inc.; WB Resin Cure
 - 2) Dayton Superior Chemical Division; Day-Chem Rez Cure (J-11-W)
 - 3) L&M Construction Chemicals, Inc.; Cure R
 - 4) W.R. Meadows; 1100 (Clear)
 - b. Interior concrete slabs, finish scheduled as sealed concrete, or formed concrete requiring use of a curing compound: ASTM C 309, Type 1, Class B; water based, all resin, VOC compliant, clear.
 - 1) Dayton Superior Chemical Division; Safe Cure & Seal (J-18)
 - 2) Euclid Chemical Company; Aqua-Cure VOX
 - 3) L&M Construction Chemicals, Inc.; Dress & Seal WB
 - 4) W.R. Meadows; Vocomp
 - 5) BASF Construction Chemicals; Sonneborn; Kure-N-Seal W
 - c. Interior concrete slabs, finish scheduled as hardener/sealer or hardened sealed concrete: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces.
 - 1) Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Intraseal.
 - 2) Curecrete Distribution Inc.; Ashford Formula.
 - 3) Dayton Superior Corporation; Day-Chem Sure Hard.
 - 4) Euclid Chemical Company (The); Euco Diamond Hard.
 - 5) L&M Construction Chemicals, Inc.; Seal Hard.
 - 6) Meadows, W. R., Inc.; Liqui-Hard.
 - 7) Symons Corporation, a Dayton Superior Company; Buff Hard.
 - d. Product used shall be compatible with waterproofing if forms are stripped from concrete to receive waterproofing prior to 7 days curing above 50°F.
 - e. Refer to Part 3 Article "Curing" for removal of curing compounds.
2. If curing compound is not used, and the forms are stripped prior to 7 days curing, the following methods are approved:
 - a. Ponding or continuous sprinkling
 - b. Continuously wet mats
 - c. Sand kept continuously wet

J. Expansion Strips:

1. Self-expanding cork: ASTM D 1752, Type III, preformed, self-expanding strips formed of cork particles with a non-bitumen, isolable resin binder for all interior and exterior slabs at building vertical faces, or as noted.
2. Asphaltic board expansion joint: ASTM D 994, preformed joint material. Material shall not deform under normal handling, or become brittle. Use in exterior slabs, except at building vertical faces or as noted.
3. Closed-cell poly

K. Waterstops:

1. 20 OZ. Copper formed to shapes shown on the drawings.
2. PVC flat ribbed waterstops:
 - a. Manufacturers:
 - 1) Vinylex Corporation
 - 2) Greenstreak.
 - b. Shapes and sizes to be reviewed by the Architect/Engineer.
3. PVC dumbbell waterstops:
 - a. Manufacturers:
 - 1) Vinylex Corporation
 - 2) Greenstreak.
 - b. Shapes and sizes to be reviewed by the Architect/Engineer.
4. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch (19 by 25 mm).
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Carlisle Coatings & Waterproofing, Inc.; MiraSTOP.
 - 2) CETCO; Volclay Waterstop-RX.
 - 3) Concrete Sealants Inc.; Con Seal CS-231.
 - 4) Greenstreak; Swellstop.
 - 5) Henry Company, Sealants Division; Hydro-Flex.
 - 6) JP Specialties, Inc.; Earth Shield Type 20.
5. Additional types, shapes, and sizes to fit the job conditions, with review by Architect/Engineer.
 - a. Standard: Vinylex Corporation

L. Dovetail Anchor Slot and Reglets:

1. Standard:

- a. Dovetail anchor slot No. 100 as manufactured by Heckmann Building Products, Inc.; 22 gauge galvanized steel.
- b. Dayton Superior Corporation, Dur-O-Wall Division; D/A 100
- c. Stay-put reglets as manufactured by Heckmann Building Products, Inc., 26 gage galvanized steel.

M. Joint Sealant:

- 1. Flatwork: Two-part polysulfide compound
 - a. Standard: "Euco Polysulphide sealant" by the Euclid Chemical Company
- 2. Vertical joints: Two-part polysulfide compound
 - a. Standard: W.R. Meadows CM-60
- 3. Vertical joints: Two-part polyurethane, refer to Section 07920.

N. Water Reducing Admixtures:

- 1. Normal set: ASTM C 494, Type A
- 2. Retarders: ASTM C 494, Type D
- 3. Accelerators: ASTM C 494, Type C or E
- 4. High range water reducers: ASTM C 494, Type F

O. Crystalline Waterproofing Additive: Concrete waterproofing and protection system shall be of the crystalline type provided in a carrier of cement and sand.

- 1. Testing Requirements: Crystalline waterproofing system shall be tested in accordance with the following standards and conditions. Testing shall be performed by an independent laboratory.
- 2. Crystalline Formation: Crystallizing capability of waterproofing system shall be evidenced by independent SEM (Scanning Electron Microscope) photographs showing crystalline formations within the concrete matrix at a magnification no greater than 2000 times.
- 3. Permeability: Independent testing shall be performed according to U.S. Army Corps of Engineers CRD-C48 - Mod "Permeability of Concrete" on maximum 2" thick samples. **The treated samples shall exhibit no measurable leakage against control samples which shall exhibit full saturation and measurable leakage.** Treated samples shall have an over 95% reduction in permeability.
- 4. Crack Healing: Crack healing testing shall have been performed where cracks in the treated panels shall heal within several days and cracks in the non-treated panels shall be shown to continue to pass water at the completion of the 2.5 week test.
- 5. Acceptable products:

- a. Kryton international Inc.: Krystol Internal; Krystol Internal Membrane for Concrete.
 - b. Xypex Chemical Corporation;; Xypex Admixture
- 6. Doseage rate: Crystalline dosage as recommended by manufacturer; no less than 2%-3% by weight of cement content.

P. Evaporation Retardant:

- 1. Standard: Master Builders Confilm; Degussa Building Systems
- 2. Apply per manufacturer's directions.

Q. Vapor Retarders:

- 1. Refer to Division 07 Section: Vapor Retarders, or use the information within this section if there is no Specification section which pertains to vapor retarders.
- 2. Plastic Vapor Barrier: ASTM E 1745, Class A with a permeance of 0.01 as tested before and after mandatory conditioning (ASTM E 1745 Section 7.1 and sub paragraph 7.1.1-7.1.5) less than 0.01 perms (grains/(ft² hr in Hg). Include manufacturer's recommended adhesive or pressure sensitive tape.
 - a. Products:
 - 1) Fortifiber Corporation; Moistop Ultra 15.
 - 2) Reef Industries; Griffolyn G 15.
 - 3) Stego Industries, Stego Wrap 15.

R. Bond Break:

- 1. 15 pound per square (100 sq.ft.) building paper

S. Bonding Agent:

- 1. Select bonding agent to suite the job condition and application.
- 2. Products:
 - a. Conpro Primer by Conproco Corp.
 - b. SBR Latex by the Euclid Chemical Company.
 - c. Everweld by L&M Construction Chemicals Inc.
- 3. Apply per manufacturer recommendations.
- 4. Finished concrete surface shall be roughened and cleaned, prior to application of the bonding agent.

2.2 MIX DESIGNS

A. Normal Weight Concrete:

- 1. Compressive strength: 4000 PSI.
- 2. Minimum cement content: 517 pounds per cubic yard (adjust for air entrainment).

3. Water/cement ratio: 0.45 maximum (Typical) 0.40 for concrete exposed to deicing salts, blackish water or salt spray, no water to be added to concrete after plant batching.
4. Slump: 4" + 1", adjust with addition of the admixture for pumping.
5. Typical for slabs unless walls, beams, columns and footing noted otherwise.

B. Air-Entrainment:

1. Provide air entrainment at:
 - a. All concrete that is to be exposed to the elements (weather) in the completed structure.
 - b. All concrete in contact with salts.
2. All other concrete may be air-entrained or non-air-entrained, at the Contractor's option.
 - a. Hard-troweled finishes shall not have air-entrainment.
3. Percentage of air content shall be determined in accordance with the admixture manufacturer's recommendations, to meet ASTM C173 or ASTM C231, based on aggregate size and a moderate level of exposure.

C. Selection of Concrete Proportions:

1. Proportions of materials for concrete shall be established in accordance with Section 5.2 of ACI 318.
2. Follow ACI 211 and ACI 301 to determine the water-cement ratio for lightweight concrete.
3. Concrete Mixing:
 - a. Plant mix concrete materials in same proportions as approved concrete mix design in accordance with ACI 304.
 - 1) Incorporate admixtures in quantities and using methods recommended by admixture manufacturers.
 - 2) Incorporate only admixtures included in the approved mix design, or with approval by Architect/Engineer.
 - b. Do not add water to batched concrete without approval by Architect/Engineer.

D. High Slump Concrete:

1. Slumps greater than those specified may be used (up to 10") under the following conditions:
 - a. Prior approval has been obtained from the Architect/Engineer, including location of pours and proposed mixes.
 - b. Admixture systems or high range water reducers are used to achieve the high slumps.
 - c. Water-cement ratios are compatible with normal mixes.
 - d. Compressive strength of the concrete exceeds normal mixes at specified slumps.

- e. If high range water reducers are used, the admixture is added by a concrete technician employed by the concrete supplier.
 - 2. Submit mix designs to Architect/Engineer for review.
 - 3. This review is made to ensure that portions of the mix meet the specifications. All performance related criteria must still be met.
- E. Crystalline Waterproofing:
- 1. Add crystalline waterproofing admixture at a rate of 2-3 percent by weight of portland cement content.
 - 2. Provide in concrete where “integral crystalline waterproofing” or “integral waterproofing” is indicated.

PART 3 - EXECUTION

3.1 SITE VERIFICATION OF CONDITIONS

- A. Inspection:
- 1. Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
 - 2. Verify that all items to be embedded in concrete are in place.
 - 3. Verify that concrete may be placed to the lines and elevations indicated on the Drawings, with all required clearance from reinforcement.
- B. Discrepancies:
- 1. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 PREPARATION

- A. Remove all wood scraps, ice, snow, frost, standing water, and debris from the area in which concrete will be placed.
- B. Thoroughly wet the surface of excavations (except in freezing weather), coat forms with release agent, and remove all standing water.
- C. Thoroughly clean all transporting and handling equipment.
- D. All concrete slabs on grade to be placed on a granular fill. Depth of fill to equal the slab thickness unless otherwise noted.
- E. Substrate over which the vapor barrier will be placed shall be compacted, smooth, and free of glass, large stones, and other objects that might puncture the barrier.

3.3 CONCRETE MIXING

- A. Plant mix concrete materials in same proportions as approved concrete mix design and in accordance with ACI 304.
 - 1. Incorporate admixtures in quantities and using methods recommended by admixture manufacturers.
 - 2. Incorporate only admixtures included in the approved mix design, or with approval by Architect/Engineer.
- B. Do not add water to batched concrete without approval by Architect/Engineer.

3.4 PLACING CONCRETE

- A. Method:
 - 1. Convey concrete from mixer to place of final deposit by methods that will prevent separation and loss of materials.
 - 2. For chuting, pumping, and pneumatically conveying concrete, use only equipment of such size and design as to ensure a practically continuous flow of concrete at the delivery end without loss or separation of materials.
 - 3. Deposit concrete as nearly as possible in its final position to avoid segregation due to re-handling and flowing.
 - 4. Contractor shall use screed poles or similar devices to ensure that all slabs are cast at the proper elevations and that specified tolerances are maintained.
 - 5. Deflections of supporting structure are to be anticipated to produce a level slab.
- B. Rate of Placement:
 - 1. Place concrete at such a rate that concrete is at all times plastic and flows readily between reinforcement.
 - 2. When placing is once started, carry it on as a continuous operation until placement of the panel or section is complete.
 - 3. Do not pour a greater area at one time than can be properly finished; this is particularly important during hot or dry weather.
- C. Compaction:
 - 1. Thoroughly consolidate all concrete by suitable means during placement, working it around all embedded fixtures and into corners of forms.
 - 2. During placement, thoroughly compact the concrete by hand tamping and by mechanical vibration.
- D. Acceptability:
 - 1. Do not use retempered concrete or concrete that has been contaminated by foreign materials.
- E. Limits of Pour:

1. No concrete pour of normal weight concrete shall exceed the following limits in any direction without prior approval of the Architect/Engineer:
 - a. Normal weight concrete: 80 feet
 - b. Lightweight concrete: 60 feet
 - c. Length to width ratio: 2
2. Minimum time period between adjacent pours shall be 24 hours.

3.5 LEVELING AND FINISHING

A. General: Finish concrete in accordance with ACI 301.

B. Finishing Exposed Walls:

1. Remove fins and fill tie holes, honeycombs and air holes (bug holes).
2. Provide a rubbed finish on all interior exposed concrete walls.
3. Provide a smooth rubbed finish on all exposed exterior concrete walls, including site walls.
4. Finishing methods:
 - a. Rubbed finish:
 - 1) Not later than one day after form removal, rub with carborundum brick or another abrasive to remove fins, ridges and other surface irregularities.
 - b. Smooth rubbed finish:
 - 1) Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

C. Finishing Slabs, Flatwork, Walk, Stairs:

1. Trowel all interior slabs to a smooth, hard finish unless otherwise indicated.
 - a. Provide a non-slip finish in all areas subject to public traffic.
2. Surfaces to receive a light broom finish:
 - a. Exterior slabs, walks, stairs
 - b. Interior floors to receive a dry set mortar installation of ceramic tile, tile, or pavers.
 - c. Interior stair treads not scheduled to receive floor covering
3. Where floor drains or floor slopes are indicated, slope slabs uniformly to provide even fall for drainage.

D. Tolerances:

1. Place concrete so members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
 - a. Level Alignment: Variance in elevation of top of slab in any typical structural bay shall not exceed 1/2 inch.
 - b. Structural Steel and composite metal deck structures: Concrete shall be placed in a manner that produces a slab that will meet the specified flatness and levelness tolerances prior to application of any superimposed loads.
2. Floor slabs: Finish floor slabs to meet the following flatness and levelness test requirements.
3. Definitions:
 - a. Test surface: The entire floor area on any one building level.
 - b. Test Section: Any subdivision of the test surface measuring no less than 8 feet on a side and no less than 320 square feet.
4. Test Sections less than 8 feet on a side or less than 320 square feet or at slab boundaries, block-outs or other discontinuities excluded by ASTM E 1155: Finish and measure surface so gap at any point between concrete surface and an unlevleed freestanding 10-foot- (3.05-m-) long straightedge, resting on two high spots and placed anywhere on the surface, does not exceed 1/4 inch.
 - a. Finish interior slab surfaces to the following tolerances, measured with a Type II apparatus within 24 hours according to ASTM E 1155/E 1155M for a randomly trafficked floor surface. Submit report to the Architect/Engineer within 72 hours of concrete placement.
 - 1) Specified overall values of flatness, F_F 30; and levelness, F_L 20; with minimum local values of flatness, F_F 24; and levelness, F_L 15.

3.6 JOINTS

A. Expansion Joints:

1. Provide where indicated on the Contract Documents.
2. Install expansion strips full depth of joints.
3. Where caulking of joints is indicated on Drawings, install fillers to 1/2 inch of top and pour full with sealant.
 - a. Standard: See "Joint Sealant for Flatwork," this section.
4. Provide self-expanding cork at all intersections of exterior concrete and vertical surfaces. Caulk top 1/2 inch of joint.
5. Where asphalt expansion joints are not sealed hold top of asphalt 1/4 inch below abutting concrete. Tool joints on both sides of expansion joint.

B. Tooled Joints:

1. Provide standard tooled joints where indicated on the Contract Documents.
2. Make joints straight, clean, and unragged.
3. Tool concrete on both sides of asphalt pavement.

C. Construction Joints:

1. Joints shall be made with properly constructed bulkheads and include formed keyways.
2. Reinforcing shall extend through all construction joints unless otherwise noted on the Contract Documents.
3. The Contractor shall consult with the Architect/Engineer before starting concrete work to establish a satisfactory placing schedule and to determine the location of construction joints so as to minimize the effects on the floor systems.
4. Horizontal construction joints, other than where shown on the Contract Documents, will not be permitted.
5. Vertical construction joints shall be located between quarter and third points of the spans. Submit construction joint layout for A/E review and approval.
6. If diamond blockouts are used around columns at the slab on grade level, the diamond must be poured to within plus or minus 1/16th of an inch in elevation with respect to the surrounding slab on grade. Floor prep as required to assure the blockout joint does not show through the flooring material.

D. Control Joints:

1. Control joints shall be provided in all slabs on grade unless waived by the Architect/Engineer. Elevated slabs shall not have control joints unless specifically detailed. Joints may not be required under carpet and sheet vinyl floor finishes.
2. Locate as shown on drawings or along column lines and at intervals not exceeding 20 feet in each direction. Review location with A/E prior to pouring slabs.
3. Control joints shall be 1/4 of the slab thickness and shall be sealed in accordance with "Joint Sealant" this section. Saw cut joints within 12 hours of placing the slab.

E. Bond Break:

1. Install where indicated. Lap seams a minimum of 4 inches.

F. Waterstops:

1. Install where indicated.
2. Vinyl waterstop joints shall be chemically or heat welded per manufacturer's recommendations.
 - a. Install waterstop near center of concrete pour, unless otherwise indicated on Drawings.
3. Bentonite waterstops shall be installed in accordance with manufacturer's instructions.
 - a. Provide 3 inches minimum concrete cover.

3.7 CURING

A. Formed Surfaces:

1. Cure formed surfaces by either of the following methods:
 - a. Refer to Division 03 Section "Formwork" for minimum time periods that formwork must remain in place even when curing compound is used.
 - b. Leave forms in place until the cumulative number of days or fractions thereof, not necessarily consecutive, has totaled seven days during which the temperature of the air in contact with the concrete is 50°F or above.
 - c. Remove forms at an earlier time but apply curing compound to concrete surfaces.
 - d. Apply compound in accordance with manufacturer's recommendations.
 - e. Do not add curing/sealing compound to walls that receive waterproofing unless a letter has been submitted to the Architect/Engineer, prior to the compound's use, that the specific compounds are compatible with their system.

B. Troweled Finish:

1. As soon as surface has dried sufficiently to not be marred by the application, apply sealer/curing compound in accordance with manufacturer's recommendations.
2. Do not add curing/sealing compound to walls that receive waterproofing unless a letter has been submitted to Architect/Engineer, prior to the compound's use, that the specific compounds are compatible with their system.
3. After application, keep all traffic, tools, materials, and equipment off such treated areas for at least twenty-four hours.
4. For floors scheduled as sealed concrete, after all other work in the area has been completed, apply a second coat of sealer/curing compound.

C. Wet Cure:

1. Concrete not covered with curing compound should be kept wet for at least 7 days.
2. Keep forms continuously wet to prevent the moisture loss until forms are removed.

D. Curing Compound Removal:

1. Remove residual curing compound from floor slabs to receive applied finishes using methods recommended by the manufacturer of the curing compound.
2. Remove curing compound no earlier than 28 days after application or after structure is enclosed and protected from exterior water sources.
3. Wet mop or rinse and wet vacuum slab to remove traces of cleaning products.

E. Hardener/Sealer:

1. Apply to wet-cured concrete in accordance with manufacturer's instructions.

3.8 PATCHING AND REPAIR

A. Inspection/Remedial Work:

1. Immediately after forms and curing membranes have been removed, inspect all concrete surfaces and patch all pour joints, voids, rock pockets, form tie holds, and other imperfections before the concrete is thoroughly dry.

B. Patching and Minor Repairs:

1. At all permanently exposed portion of interior concrete formed surfaces, repair surface defects including color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface.
 - a. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete but not less than 1 inch in depth.
 - 1) Make edges of cuts perpendicular to concrete surface.
 - b. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
 - c. Fill and compact with patching mortar before bonding agent has dried.
 - d. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color.
 - a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
 - b. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete durability and structural performance as determined by Architect/Engineer.
4. Remove all fins, offsets and projections by dry-stoning surfaces which will be exposed in the finished structure or will receive waterproofing or other barrier coating or membrane.
 - a. Provide additional patching of foundation wall for application of waterproofing membrane, in accordance with the manufacturer's recommendations.
5. Remove or fill all ridges, trowel marks, protrusions or pits more than 1/8-inch diameter on floor slabs by dry-stoning, grinding, or filling with trowelable cementitious underlayment.

C. Patching of Existing Concrete:

1. Patch in manner to receive new finishes so that existing and patched surfaces are smooth and continuous and have a uniform appearance, using methods specified for patching and repair.

D. Major Defective Areas:

1. If the defects are serious or affect the strength of the structure, or if patching does not satisfactorily restore the quality and appearance of the surface, the Architect/Engineer may require the concrete to be removed and replaced complete in accordance with the provisions of this Section, all at no additional cost to the Owner.
2. Floor slabs that do not meet tolerances specified shall be remediated by the Contractor to the elevation, flatness, or levelness specified at no additional cost to the Owner.
 - a. Contractor shall use floor-leveling materials acceptable to the manufacturer of floor finishes scheduled for the area to be remediated.

3.9 TESTS

A. Testing Laboratory:

1. The owner shall engage the testing agency to conduct the testing for compliance with the requirements of the Project Manual.

B. Compression Tests:

1. Secure minimum five standard cylinders from each pour of concrete, additional five sets of cylinders for every 50 cubic yards of concrete placement of the day, in accordance with ASTM C31, and cure under standard moisture and temperature conditions.
2. From each batch test in accordance with ASTM C39.
3. Test two cylinders at 7 days and two cylinders at 28 days, and save one for additional test, if needed.
4. Submit duplicate tests reports of results from testing to Architect/Engineer.
5. Take steps immediately to evaluate unsatisfactory test results. Test the fifth cylinder.
6. In the event of unsatisfactory test results, an investigation as outlined in Section 5.6.4 of ACI 318-Latest Edition shall be employed.

C. Slump/Air-Entrainment:

1. Perform slump tests in accordance with ASTM C 143.
2. Determine the air content of air-entrained concrete in accordance with ASTM standards.
3. Report results of slump tests on each compression test report, and report whether the concrete represented by the compression tests is air-entrained or nonair-entrained.

D. Floor Profile:

1. Test floor profile in accordance with ASTM E 1155 within 24 hours of floor placement, before shoring is removed.
2. Submit test results to Architect/Engineer within 72 hours of concrete placement.

E. Retesting:

1. Should additional testing be required because of unsatisfactory tests results, the Contractor shall reimburse the owner for the costs incurred for correcting any deficiencies and the costs of any tests.

END OF SECTION 03 30 00

SECTION 03 60 00
EPOXY GROUT

PART I - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Furnish labor and materials to install epoxy grout as shown or implied by the Contract Documents.
2. Furnish labor and materials necessary to grout anchor bolts and reinforcing bars into existing concrete and to patch existing concrete at equipment anchorages.
3. Furnish labor and materials to patch and repair existing concrete.
4. Furnish labor and materials to repair new construction as required by field errors or omissions.

B. Related Sections:

1. Division 03 Section: Concrete Formwork
2. Division 03 Section: Concrete Reinforcement
3. Division 03 Section: Grouting
4. Division 05 Section: Structural Steel Framing

1.2 QUALITY ASSURANCE

A. Codes and Standards:

1. Repairing concrete with epoxy grout and epoxy mortars shall conform to all requirements of Standard Specification for Repairing Concrete with Epoxy Mortars (ACI 503.4-Latest Edition), publishing by the American Concrete Institute, Detroit Michigan, except as modified by the requirements of this project specification.

1.3 SUBMITTALS

- A. Before any of the materials of this Section are delivered to the job site, submit product literature to the Architect/ Engineer in accordance with Division 01 Section: Submittal Procedures of these Specifications.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Reference Standard: Provide products manufactured by the following:

1. Sika Corporation

2.2 PRODUCTS

- A. Epoxy Grout for Grouting Anchor Bolts or Concrete Patching Mortar (when mixed with recommended aggregate):

1. For overhead installations:

- a. Sika Corporation; Sikadur 35, Hi-Mod LV
- b. Simpson Strong-Tie Company, Inc.; FX-763
- c. BASF Corporation Building Systems; MasterEmaco ADH 327RS

2. For non-overhead installations:

- a. Laticrete International, Inc.; Spectralock Pro
- b. Laticrete International, Inc.; Spectralock 2000 IG
- c. Sika Corporation; Sikadur 31 Hi-Mod Gel

3. Adhesive anchors:

- 1) HIT-RE 500 V3; Hilti Inc.
- 2) HIT-HY 200; Hilti, Inc.
- 3) HIT-HY 70; Hilti, Inc.
- 4) Epcon System; ITW Red Head
- 5) Pure 110+; Powers Fasteners, Inc.

4. Due to the large number of different applications and field conditions, additional products may be required by the Architect/Engineer.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Surface Preparation:

1. Surfaces of existing concrete shall be dry and structurally sound prior to grouting.
2. The surfaces of concrete at the perimeter of openings, which will be in contact with the grout fill, shall be cleaned. Remove dirt, oil, grease, and other foreign matter.
3. Apply cleaning agent, lacquer thinner by means which will not allow spillage and dripping on existing facilities below.
4. Existing steel reinforcing shall be cleaned by wire brush or by sand blasting, or needle gun, with all loose or damaged material removed.

3.2 INSTALLATION

A. Preparation:

1. Form to lines and elevations indicated or required such that adequate anchorage and bearing is provided.

B. Application:

1. Apply grout in accordance with the manufacturer's recommendations. Thoroughly pack forms to minimize shrinkage.
2. Rodding may be required to eliminate voids, honeycombing, and similar defects. Consult manufacturer.
3. Finished installation shall be tight, neat, smooth, and flush with adjoining surfaces and shall be thoroughly bonded thereto.
4. Loose, spalled, cracked, or otherwise defective material will be rejected.
5. Application by trowel is acceptable when forming is impractical or impossible.
6. Notify engineer of proposed method of installation prior to commencement of work.
7. When repairing existing concrete, restore original concrete size and shape with new material.
8. Avoid feathered edges by undercutting edges at sides of patches.
9. Notify engineer of any crack suspected of being a "working joint" prior to patching.

C. Curing:

1. Protect and cure grout in accordance with the manufacturer's recommendations.

END OF SECTION 03 60 00

SECTION 03 60 01
GROUTING

PART I - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Furnish and install all grout as indicated or implied by the Contract Documents.

B. Related Sections:

1. Division 03 Section: Cast-in-Place Concrete
2. Division 05 Section: Structural Steel Framing

1.2 DELIVERY AND STORAGE

- A. Prevent damage to or contamination of non-shrink grouting materials during delivery, handling, and storage.
- B. Store all non-shrink grouting materials in undamaged condition with package labels and seals intact.

1.3 SUBMITTALS

A. Product Literature:

1. Submit sufficient data regarding installation methods and compression strength.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Metallic Non-Shrink Non-Catalyzed Mortar: ASTM C1107

1. Reference Standard: BASF Corporation Building Systems; MasterFlow 885
2. General use: precision grouting of equipment.
3. All grout subject to fatigue

B. Non-Metallic Non-Shrink Cementitious Grout: ASTM C1107

1. Reference Standard: BASF Corporation Building Systems; MasterFlow 713
2. General use: Precision grouting of structure or building systems.

3. If grout is subject to fatigue, use metallic grout.

C. Latex Modified Concrete: ASTM C1059

1. Standard: Latex.
 - a. Acrylic Additive: BASF Construction Chemicals, LLC: Thoro Acryl 60
 - b. Standard: Concrete.
 - c. Per Cast-in-Place Concrete section of this Specification
2. General use: Patching large holes and areas
3. Submit mix design.

D. Pre-Mixed Repair Mortar or Gel:

1. Vertical and horizontal surfaces:
 - a. Sika Corporation; Sikatop 122 Plus
2. Overhead surfaces:
 - a. Sika Corporation; Sikatop 123 Plus
3. General use: Fill large cracks and reform lines of beams, columns, or walls in areas too small to form.

E. Portland Cement:

1. ASTM C150, Type I or III

F. Sand:

1. ASTM C33, fine aggregate

G. Water:

1. Potable

2.2 MIXES

- A. Follow manufacturer's recommendations for grout mixing.
- B. Use minimum amount of water necessary to produce a flowable grout without causing either segregation or bleeding.

2.3 MIXING

- A. Mix non-shrink grout materials in water in a mechanical mixer for no less than 5 minutes.
- B. Do not retemper grout or add more water for any reason.

PART 3 - EXECUTION

3.1 INSTALLATIONS

- A. Thoroughly clean all surfaces with which grout will be in contact free from dirt, grease, rust, and other deleterious substances. Form to lines and elevations indicated or required such that adequate bearing for structural elements is provided.
- B. Apply non-shrink grout immediately after mixing. Thoroughly pack forms to minimize shrinkage. Rodding is required to eliminate all voids, honeycombing and similar defects. Cure grout as recommended by manufacturer. Finished installation shall be tight, neat, smooth, and flush with adjoining surfaces and shall be thoroughly bonded thereto. Loose, spalled, cracked, or otherwise defective material will be rejected.

3.2 SURFACE PREPARATION

- A. Remove all defective concrete, laitance, dirt, oil, grease, and other foreign material from concrete surfaces. Clean all steel surfaces.
- B. Lightly roughen concrete surfaces.
- C. Align, level, and maintain final positioning of all components.
- D. Saturate all concrete surfaces with clean water, remove excess water. Leave no standing water.
- E. Take special precautions during extreme weather conditions according to manufacturer's written instructions.

3.3 PLACING GROUT

- A. Select material in accordance with manufacturer's recommendation.
- B. Place non-shrink grouting material quickly and continuously.
- C. Apply grout from one side only to avoid air pockets.
- D. If shims are used, do not remove for at least 48 hours after grout has been placed. After removal of shims, fill voids with plain cement-sand grout.

3.4 PLACEMENT OF LATEX MODIFIED CONCRETE

- A. Chip substrate as required to expose fresh clean material.
- B. Chip edges of voids so as not to produce feathered edges.
- C. Mix per submitted mix design with clean uncontaminated containers and tools. Thoroughly mix material. Place and vibrate as required to produce uniform void-free mix.
- D. Protect uncured material from detrimental environmental conditions.

3.5 PLACEMENT OF PREMIXED REPAIR MORTAR OR GEL

- A. Mix per manufacturer's instructions.
- B. Chip substrate as required to expose fresh clean material.
- C. Chip edges of voids so as to not produce feathered edges.
- D. Install per manufacturer's instructions.

3.6 CURING

- A. Cure grout for 3 days after placing by keeping work wet and covered.

END OF SECTION 03 60 01

SECTION 04 03 00
CONSERVATION TREATMENT FOR PERIOD MASONRY

PART 1 GENERAL

1.1 Section Includes

- A. Repair of damaged existing masonry.

1.2 Definitions

- A. Aggregates: Sand component of mortar.
- B. Biocide: Chemical treatment that inhibits, deters, or controls organic growth typically removed by cleaning following biocide treatment.
- C. Binder: Component of mortar that binds aggregate particles into a cohesive material.
- D. Dispersed Lime Crack Injection: Repair method in which dispersed lime material is injected using a needle or syringe into small cracks ranging in width from hairline to 1/8 inch (3.2 mm).
- E. Consolidant: Chemical product to strengthen loose or deteriorated stone.
- F. In situ: Masonry units and mortar remain in place and are restored without removal.
- G. New Elements: New, nonhistoric materials added to masonry structures to aid in resistance to structural loads or water infiltration.
- H. Patching: Use of substitute repair materials to treat damaged or deteriorated masonry units in situ.
- I. Repointing: Removal of existing mortar joints to specified depth and replacement with mortar matching color, texture, and performance of original mortar, and with water vapor transmission, bond, hardness, and flexibility compatible with original mortar, tested in accordance with ASTM C1713.
- J. Surface Treatment: Application of traditional materials or contemporary chemical products to surface of masonry to provide protection to the masonry and mortar or reduce water infiltration.
- K. Wall System: Masonry structures comprised of different materials but functioning holistically; restoration and cleaning processes should take into account effects on the adjacent materials and the building as a whole.
- L. Saturated Surface Dry (SSD): Condition of masonry after application of water to soak into the capillary pores of the masonry, saturating an area of the masonry, reducing further suction, and allowing surface water to evaporate, leaving the substrate damp but without a surface film of water.

1.3 Reference Standards

- A. ASTM C1713 - Standard Specification for Mortars for the Repair of Historic Masonry; 2023.

1.4 Administrative Requirements

- A. Preinstallation Meeting: Convene one week prior to commencing work of this section.
 - 1. Require attendance of parties directly affecting work of this section.

1.5 Submittals

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on cleaning compounds.
- C. Repointing Schedule: Detailed schedule of areas to be repointed, including assessment of the problem areas and detailed description of repointing procedures. Include the following:
- D. Samples: Submit four samples of decorative block and face brick units to show matching color, texture, and extremes of color range.

PART 2 PRODUCTS

END OF SECTION

SECTION 04 05 11
MASONRY MORTARING AND GROUTING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Mortar for masonry.
- B. Grout for masonry.

1.2 REFERENCE STANDARDS

- A. ASTM C5 - Standard Specification for Quicklime for Structural Purposes; 2018.
- B. ASTM C91/C91M - Standard Specification for Masonry Cement; 2023.
- C. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2023.
- D. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.
- E. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.
- F. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2018.
- G. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.
- H. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2018.
- I. ASTM C476 - Standard Specification for Grout for Masonry; 2023.
- J. ASTM C780 - Standard Test Methods for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2023.
- K. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.
- L. ASTM C1019 - Standard Test Method for Sampling and Testing Grout for Masonry; 2020.
- M. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata.

1.3 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used. Also include required environmental conditions and admixture limitations.
- C. Samples: Submit two samples of mortar, illustrating mortar color and color range.

1.4 QUALITY ASSURANCE

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.
 - 1. Maintain one copy of each document on project site.

1.5 PRECONSTRUCTION TESTING

- A. Testing will be conducted by an independent test agency, in accordance with provisions of Section 01 40 00 - Quality Requirements.
- B. Mortar Mixes: Test mortars prebatched by weight in accordance with ASTM C780 recommendations for preconstruction testing.
 - 1. Test results will be used to establish optimum mortar proportions and establish quality control values for construction testing.
- C. Grout Mixes: Test grout batches in accordance with ASTM C1019 procedures.
 - 1. Test results will be used to establish optimum grout proportions and establish quality control values for construction testing.

1.6 MOCK-UP

- A. Provide mock-up submittal of mortar to be used for new parging on the existing building.
 - 1. Provide a minimum 6" x 6" sized sample to compare color to existing parging.
 - 2. Mock-up shall not be constructed in-place

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.8 FIELD CONDITIONS

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

PART 2 PRODUCTS

2.1 MORTAR AND GROUT APPLICATIONS

- A. Field-mix all mortar and grout.
- B. Mortar Color: Natural gray unless otherwise indicated.
- C. Mortar Mix Designs: ASTM C270, Property Specification.
 - 1. Masonry below grade and in contact with earth: Type S.
 - 2. Exterior Masonry Veneer: Type S.
 - 3. Interior, Loadbearing Masonry: Type S.
- D. Grout Mix Designs:

1. Bond Beams and Lintels: 3,000 psi (21 MPa) strength at 28 days; 8-10 inches (200-250 mm) slump; provide premixed type in accordance with ASTM C 94/C 94M.
 - a. Fine grout for spaces with smallest horizontal dimension of 2 inches (50 mm) or less.

2.2 MATERIALS

- A. Portland Cement: ASTM C150/C150M.
 1. Type: Type I - Normal; ASTM C150/C150M.
 2. Color: Color as required to produce approved color sample.
 3. Color Match: Lehigh Flamingo Color: Buff Tan
 4. Manufacturers:
 - a. Solomon Colors; Solomon Colors Concentrated A, H, and X Series: www.solomoncolors.com/#sle.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Masonry Cement: ASTM C91/C91M.
 1. Type: Type N; ASTM C91/C91M.
- C. Hydrated Lime: ASTM C207, Type S.
- D. Quicklime: ASTM C5, non-hydraulic type.
- E. Mortar Aggregate: ASTM C144.
- F. Grout Aggregate: ASTM C404.
- G. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
 1. Color(s): As selected by Architect from manufacturer's full range.
 2. Manufacturers:
 - a. Davis Colors: www.daviscolors.com/#sle.
 - b. Lambert Corporation: www.lambertusa.com/#sle.
 - c. Solomon Colors; Solomon Colors Concentrated A, H, and X Series: www.solomoncolors.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- H. Water: Clean and potable.
- I. Bonding Agent: Latex type.

2.3 MORTAR MIXING

- A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.
- B. Maintain sand uniformly damp immediately before the mixing process.
- C. Do not use anti-freeze compounds to lower the freezing point of mortar.
- D. If water is lost by evaporation, re-temper only within two hours of mixing.

2.4 GROUT MIXING

- A. Mix grout in accordance with ASTM C94/C94M.
- B. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 for fine and coarse grout.

PART 3 EXECUTION

3.1 PREPARATION

- A. Apply bonding agent to existing concrete surfaces.
- B. Plug clean-out holes for grouted masonry with brick masonry units. Brace masonry to resist wet grout pressure.

3.2 INSTALLATION

- A. Install mortar and grout to requirements of section(s) in which masonry is specified.

3.3 GROUTING

- A. Use either high-lift or low-lift grouting techniques, at Contractor's option, subject to other limitations of Contract Documents.
- B. Low-Lift Grouting:
 - 1. Limit height of pours to 12 inches (300 mm).
 - 2. Limit height of masonry to 16 inches (400 mm) above each pour.
 - 3. Pour grout only after vertical reinforcing is in place; place horizontal reinforcing as grout is poured. Prevent displacement of bars as grout is poured.
 - 4. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1-1/2 hours.
- C. High-Lift Grouting:
 - 1. Verify that horizontal and vertical reinforcement is in proper position and adequately secured before beginning pours.
 - 2. Hollow Masonry: Limit lifts to maximum 4 feet (1.2 m) and pours to maximum height of 24 feet (7.3 m).
 - 3. Place grout for spanning elements in single, continuous pour.

3.4 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field tests, in accordance with provisions of Section 01 40 00 - Quality Requirements.
- B. Test and evaluate mortar in accordance with ASTM C780 procedures.
 - 1. Test with same frequency as specified for masonry units.
- C. Test and evaluate grout in accordance with ASTM C1019 procedures.

1. Test with same frequency as specified for masonry units.

END OF SECTION

SECTION 04 20 00
UNIT MASONRY

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Concrete block.
- B. Concrete facing brick.
- C. Mortar and grout.
- D. Reinforcement and anchorage.
- E. Flashings.
- F. Accessories.

1.2 RELATED REQUIREMENTS

- A. Section 03 20 00 - Concrete Reinforcing: Reinforcing steel for grouted masonry.
- B. Section 04 05 11 - Masonry Mortaring and Grouting.
- C. Section 07 92 00 - Joint Sealants: Sealing control and expansion joints.

1.3 REFERENCE STANDARDS

- A. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2023a.
- B. ASTM A580/A580M - Standard Specification for Stainless Steel Wire; 2023.
- C. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2019.
- D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.
- E. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement; 2022.
- F. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2022.
- G. ASTM C55 - Standard Specification for Concrete Building Brick; 2023.
- H. ASTM C67/C67M - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile; 2023.
- I. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2023.

- J. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units; 2023.
- K. ASTM C780 - Standard Test Methods for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2023.
- L. ASTM C1634 - Standard Specification for Concrete Facing Brick and Other Concrete Masonry Facing Units; 2023a.
- M. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2017 (Reapproved 2023).
- N. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing; 2017.
- O. BIA Technical Notes No. 13 - Ceramic Glazed Brick Exterior Walls; 2017.
- P. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls; 2005.
- Q. BIA Technical Notes No. 46 - Maintenance of Brick Masonry; 2017.
- R. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata.
- S. UL (FRD) - Fire Resistance Directory; Current Edition.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all relevant installers.

1.5 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.
- C. Shop Drawings: Indicate pertinent dimensions, materials, anchorage, size and type of fasteners, and accessories for brickwork support system.
- D. Samples: Submit four samples of decorative block units to illustrate color, texture, and extremes of color range.
- E. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.
- F. Installer's Qualification Statement.

1.6 QUALITY ASSURANCE

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.
- B. Fire Rated Assemblies: Comply with applicable code for UL requirements for fire rated masonry construction.

- C. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum three years of documented experience.
- D. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.7 MOCK-UPS

- A. Build mock-ups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockup as shown on drawings.
 - a. Include a sealant-filled joint at least 16 inches long.
 - b. Include cast stone masonry work as shown in mock up scope on drawings.
 - c. Include corner of window opening.
 - d. Include through-wall flashing.
 - e. Include metal studs, sheathing, veneer anchors, flashing, and weep holes in exterior masonry-veneer wall mockup.
 - 2. Clean exposed faces of mockups with masonry cleaner as per approved Product Data and per Contractor's approved masonry cleaning plan.
 - a. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with future cleaning of Project masonry work.
 - 3. Protect accepted mock up from the elements with weather resistant membrane.
 - 4. Approval of mock up will be for the following:
 - a. Color.
 - b. Texture.
 - c. Blending of masonry units (brick and case stone)
 - d. Mortar and sealant colors.
 - e. Joint tooling.
 - f. Aesthetic qualities of workmanship as judged by the Owner and Architect.
 - g. Any and all other material and construction qualities as the Architect indicates requiring correction, adjustment, removal and reinstallation.
 - h. Approval of mockup will not constitute approval of deviations from the Contract Documents contained in mockups, unless such deviations are specifically approved by Architect in writing.
- B. Locate as indicated on drawings..

1.8 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

2.1 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 (400 by 200 mm) 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. Nonloadbearing Units: ASTM C129.
 - a. Hollow block, as indicated.
- B. Concrete Brick:
1. Size: As indicated on drawings.
 2. Concrete Facing Brick: ASTM C1634; solid, lightweight; for architectural and below grade use.
 - a. Basis of Design: Echelon Masonry, Trenwyth Industries; Trendstone & Trendstone Plus
 - b. Exposed Faces, Color and Texture Blend of:
 - 1) 40% Brick Red; Trendstone Plus
 - 2) 40% Baton Rouge; Trendstone
 - 3) 20% Goldstone; Trendstone Plus
 - c. Manufacturers:
 - 1) BASIS OF DESIGN: Echelon Masonry, Trenwyth Industries; Trendstone
 - 2) Hanover Architectural Products, Inc; Reconstructed Stone Masonry: www.hanoverpavers.com/#sle.
 - 3) Substitutions: See Section 01 60 00 - Product Requirements.

2.2 MORTAR AND GROUT MATERIALS

- A. Mortar and Grout: As specified in Section 04 05 11.

2.3 REINFORCEMENT AND ANCHORAGE

- A. Manufacturers:
1. Blok-Lok Limited; _____: www.blok-lok.com/#sle.
 2. Hohmann & Barnard, Inc; X-Seal Anchor: www.h-b.com/#sle.
 3. WIRE-BOND; _____: www.wirebond.com/#sle.
 4. Heckmann Building Products; <https://www.heckmannbuildingprods.com/>.
 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Reinforcing Steel: Type specified in Section 03 20 00; size as indicated on drawings; galvanized finish.
- C. Single Wythe Joint Reinforcement: ASTM A951/A951M.
1. Type: Truss or ladder.
 2. Material: ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M Class 3.
 3. Size: 0.1483 inch (3.8 mm) side rods with 0.1483 inch (3.8 mm) cross rods; width as required to provide not less than 5/8 inch (16 mm) of mortar coverage on each exposure.
- D. Adjustable Multiple Wythe Joint Reinforcement: ASTM A951/A951M.
1. Type: Ladder, with adjustable loop and pintle ties spaced at 16 in (406 mm) on center.
 2. Material: stainless steel complying with ASTM A580/A580M Type 304.
 3. Size: 0.1875 inch (4.8 mm) side rods with 0.1483 inch (3.8 mm) cross rods and adjustable components of 0.1875 inch (4.8 mm) wire, width of components as required to provide not less than 5/8 inch (16 mm) of mortar coverage from each masonry face.

4. Vertical adjustment: Not more than 1 1/4 inches (32 mm).
 5. Seismic Feature: Provide lip, hook, or clip on extended leg of wall ties to engage or enclose not less than one continuous horizontal joint reinforcement wire of 0.1483 inch (3.8 mm) diameter.
 6. Insulation Clips: Provide clips at tabs or ties designed to secure insulation against outer face of inner wythe of masonry.
 7. Veneer masonry anchor size to be designed by the contractor.
- E. Two-Piece Wall Ties: Formed steel wire, 0.1875 inch (4.8 mm) thick, adjustable, eye and pintle type, stainless steel, sized to provide not less than 5/8 inch (16 mm) of mortar coverage from masonry face and to allow vertical adjustment of up to 1-1/4 in (32 mm).
- F. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, stainless steel.
1. Anchor plates: Not less than 0.075 inch (1.91 mm) thick, designed for fastening to structural backup through sheathing by two fasteners; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.
 2. Wire ties: Manufacturer's standard shape, 0.1875 inch (4.75 mm) thick.
 3. Vertical adjustment: Not less than 3-1/2 inches (89 mm).

2.4 FLASHINGS

- A. Metal Flashing Materials:
1. Stainless Steel Flashing: ASTM A666, Type 304, soft temper; 26 gauge, 0.0187 inch (0.48 mm) thick; finish 2B to 2D.
 2. Prefabricated Metal Flashing: Smooth fabricated 12 oz/sq ft (3.66 kg/sq m) stainless steel (type 304) flashing for thru-wall conditions.
 - a. Manufacturers:
 - 1) Cheney Flashing Company; ____: www.cheneyflashing.com/#sle.
 - 2) Hohmann & Barnard, Inc; ____: www.h-b.com/#sle.
 - 3) Substitutions: See Section 01 60 00 - Product Requirements.
- B. Combination Non-Asphaltic Flashing Materials - Stainless Steel:
1. Stainless Steel Flashing - Self-adhering: ASTM A240/A240M; 2 mil (0.05 mm) type 304 stainless steel sheet with 8 mil (0.20 mm) of butyl adhesive and a removable release liner.
 - a. Manufacturers:
 - 1) STS Coatings, Inc: www.stscoatings.com/#sle.
 - 2) VaproShield, LLC: www.vaproshield.com/#sle.
 - 3) WIRE-BOND: www.wirebond.com/#sle.
 - 4) York Manufacturing, Inc; York 304: www.yorkmfg.com/#sle.
 - 5) Substitutions: See Section 01 60 00 - Product Requirements.
- C. Factory-Fabricated Flashing Corners and End Dams: Stainless steel.
1. Manufacturers:
 - a. Hohmann & Barnard, Inc: www.h-b.com/#sle.
 - b. Mortar Net Solutions; CompleteFlash: www.mortarnet.com/#sle.
 - c. York Manufacturing, Inc: www.yorkmfg.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Flashing Sealant/Adhesives: Silicone, polyurethane, or silyl-terminated polyether/polyurethane or other type required or recommended by flashing manufacturer; type capable of adhering to type of flashing used.

1. Manufacturers, Synthetic Rubber Products:
 - a. Mortar Net Solutions; BTL-1 Butyl Sealant: www.mortarnet.com/#sle.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
 2. Manufacturers, Modified Polyether Products:
 - a. Mortar Net Solutions: www.mortarnet.com/#sle.
 - b. York Manufacturing, Inc; UniverSeal US-100 Liquid Tape: www.yorkmfg.com/#sle.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Termination Bars: Stainless steel; compatible with membrane and adhesives.
1. Manufacturers:
 - a. Hohmann & Barnard, Inc: www.h-b.com/#sle.
 - b. Mortar Net Solutions; Termination Bars: www.mortarnet.com/#sle.
 - c. York Manufacturing, Inc; Termination Bar: www.yorkmfg.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Drip Edge: Stainless steel; angled drip with hemmed edge; compatible with membrane and adhesives.
1. Manufacturers:
 - a. Hohmann & Barnard, Inc: www.h-b.com/#sle.
 - b. Mortar Net Solutions; Metal Drip Edges: www.mortarnet.com/#sle.
 - c. York Manufacturing, Inc: www.yorkmfg.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

2.5 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.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self expanding; in maximum lengths available.
1. Manufacturers:
 - a. Hohmann & Barnard, Inc: www.h-b.com/#sle.
 - b. WIRE-BOND: www.wirebond.com/#sle.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
1. Mortar Diverter: Semi-rigid mesh designed for installation at flashing locations.
 - a. Manufacturers:
 - 1) Advanced Building Products, Inc; Mortar Break DT: www.advancedbuildingproducts.com/#sle.
 - 2) Mortar Net Solutions; MortarNet: www.mortarnet.com/#sle.
 - 3) York Manufacturing, Inc: www.yorkmfg.com/#sle.
 - 4) Substitutions: See Section 01 60 00 - Product Requirements.

- D. Building Paper: ASTM D226/D226M, Type I ("No.15") asphalt felt.
- E. Nailing Strips: Softwood lumber, preservative treated for moisture resistance, dovetail shape, sized to masonry joints.
- F. Weeps:
 - 1. Type: Polyester mesh.
 - 2. Color(s): As selected by Architect from manufacturer's full range.
 - 3. Manufacturers:
 - a. Advanced Building Products, Inc: www.advancedbuildingproducts.com/#sle.
 - b. Blok-Lok Limited: www.blok-lok.com/#sle.
 - c. CavClear, a Division of Archovations Inc: www.cavclear.com/#sle.
 - d. Masonry Technology, Inc; Cavity Weep: www.mtidry.com/#sle.
 - e. Mortar Net Solutions; WeepVent: www.mortarnet.com/#sle.
 - f. Substitutions: See Section 01 60 00 - Product Requirements.
- G. Cavity Vents:
 - 1. Color(s): As selected by Architect from manufacturer's full range.
 - 2. Manufacturers:
 - a. Blok-Lok Limited: www.blok-lok.com/#sle.
 - b. CavClear, a Division of Archovations Inc: www.cavclear.com/#sle.
 - c. Hohmann & Barnard, Inc: www.h-b.com/#sle.
 - d. Mortar Net Solutions; CellVent: www.mortarnet.com/#sle.
 - e. WIRE-BOND: www.wirebond.com/#sle.
- H. Drainage Fabric: Polyester or polypropylene mesh bonded to a water and vapor-permeable fabric.
- I. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

PART 3 EXECUTION

3.1 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.

3.2 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.

3.3 COLD AND HOT WEATHER REQUIREMENTS

- A. Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

3.4 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 (200 mm).
 - 3. Mortar Joints: Concave.
- D. Concrete Brick
 - 1. Bond: Running
 - 2. Coursing: One unit and one mortar joint to equal 8 inches (200 mm).
 - 3. Mortar Joints: Concave

3.5 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- D. Remove excess mortar and mortar smears as work progresses.
- E. Interlock intersections and external corners, except for units laid in stack bond.
- F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- H. Isolate masonry partitions from vertical structural framing members with a control joint.
- I. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.6 WEEPS/CAVITY VENTS

- A. Install weeps in veneer and cavity walls at 24 inches (600 mm) on center horizontally on top of through-wall flashing above shelf angles and lintels and at bottom of walls.
- B. Install cavity vents in veneer and cavity walls at 32 inches (800 mm) on center horizontally below shelf angles and lintels and near top of walls.

3.7 CAVITY MORTAR CONTROL

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.

- B. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

3.8 REINFORCEMENT AND ANCHORAGE - GENERAL, SINGLE WYTHE MASONRY, and CAVITY WALL MASONRY

- A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches (400 mm) on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches (400 mm) each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Embed longitudinal wires of joint reinforcement in mortar joint with at least 5/8 inch (16 mm) mortar cover on each side.
- E. Lap joint reinforcement ends minimum 6 inches (150 mm).
- F. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 36 inches (900 mm) horizontally and 24 inches (600 mm) vertically.

3.9 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

- A. Masonry Back-Up: Embed anchors in masonry back-up to bond veneer at maximum 1.77 sq ft (0.16 sq m) of wall surface per anchor. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches (200 mm) on center.

3.10 MASONRY FLASHINGS

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
 - 1. Extend flashings full width at such interruptions and at least 6 inches (152 mm), minimum, into adjacent masonry or turn up flashing ends at least 1 inch (25.4 mm), minimum, to form watertight pan at nonmasonry construction.
 - 2. Remove or cover protrusions or sharp edges that could puncture flashings.
 - 3. Seal lapped ends and penetrations of flashing before covering with mortar.
- B. Terminate flashing up 8 inches (203 mm) minimum on vertical surface of backing:
 - 1. Install vertical leg of flashing behind water-resistive barrier sheet over backing.
 - 2. Install vertical leg of flashing over fluid-applied or self-adhered air/vapor barriers over backing or per manufacturer's directions.
 - 3. Anchor vertical leg of flashing into backing with a termination bar and sealant.
 - 4. Apply cap bead of sealant on top edge of self-adhered flashing.
- C. Install flashing in accordance with manufacturer's instructions and BIA Technical Notes No. 7.
- D. Extend metal flashings through exterior face of masonry and terminate in an angled drip with hemmed edge. Install joint sealer below drip edge to prevent moisture migration under flashing.
- E. Support flexible flashings across gaps and openings.

- F. Extend plastic, laminated, and EPDM flashings to within 1/2 inch (12 mm) of exterior face of masonry and adhere to top of stainless steel angled drip with hemmed edge.
- G. Lap end joints of flashings at least 6 inches (152 mm), minimum, and seal watertight with flashing sealant/adhesive.

3.11 LINTELS

- A. Install loose steel lintels over openings.
- B. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled.
 1. Openings to 42 inches (1070 mm): Place two, No. 3 (M9) reinforcing bars 1 inch (25 mm) from bottom web.
 2. Openings from 42 inches (1070 mm) to 78 inches (1980 mm): Place two, No. 5 (M16) reinforcing bars 1 inch (25 mm) from bottom web.
 3. Openings over 78 inches (1980 mm): Reinforce openings as detailed.
 4. Do not splice reinforcing bars.
 5. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch (13 mm) of dimensioned position.
 6. Place and consolidate grout fill without displacing reinforcing.
 7. Allow masonry lintels to attain specified strength before removing temporary supports.
- C. Maintain minimum 4 inch (101.6 mm) bearing on each side of opening.

3.12 GROUTED COMPONENTS

- A. Lap splices minimum 24 bar diameters.
- B. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch (13 mm) of dimensioned position.
- C. Place and consolidate grout fill without displacing reinforcing.
- D. At bearing locations, fill masonry cores with grout for a minimum 12 inches (300 mm) either side of opening.

3.13 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control or expansion joints.
- B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- C. Form expansion joint as detailed on drawings.

3.14 BUILT-IN WORK

- A. As work progresses, install built-in metal door frames and glazed 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.
 - 1. Fill adjacent masonry cores with grout minimum 12 inches (300 mm) from framed openings.
- D. Do not build into masonry construction organic materials that are subject to deterioration.

3.15 TOLERANCES

- A. Install masonry within the site tolerances found in TMS 402/602.
- B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch (1.6 mm).
- C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft (6 mm/3 m) and 1/2 inch in 20 ft (13 mm/6 m) or more.
- D. Maximum Variation from Plumb: 1/4 inch (6 mm) per story non-cumulative; 1/2 inch (13 mm) in two stories or more.
- E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft (3 mm/m) and 1/4 inch in 10 ft (6 mm/3 m); 1/2 inch in 30 ft (13 mm/9 m).

3.16 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.

3.17 PARGING

- A. Dampen masonry walls prior to parging.
- B. Scarify each parging coat to ensure full bond to subsequent coat.
- C. Parge masonry walls in two uniform coats of mortar to a total thickness of 3/4 inch (19 mm).
- D. Strike top edge of parging at 45 degrees.
- E. Color and finish texture of new parging to match existing adjacent.

3.18 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.
- B. Clay Masonry Unit Tests: Test each variety of clay masonry in accordance with ASTM C67/C67M requirements, sampling 5 randomly chosen units for each 50,000 installed.
- C. Mortar Tests: Test each type of mortar in accordance with ASTM C780, testing with same frequency as masonry samples.

3.19 CLEANING

- A. Remove excess mortar and mortar droppings.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.
- D. Use non-metallic tools in cleaning operations.

3.20 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 04 21 29
TERRA COTTA MASONRY

PART I GENERAL

1.1 SECTION INCLUDES

- A. Terra cotta units.
- B. Reinforcement and anchorage.

1.2 Related Requirements

- A. Section 04 05 11 - Masonry Mortaring and Grouting.

1.3 Reference Standards

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.
- C. ASTM C67/C67M - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile; 2023.
- D. ASTM C126 - Standard Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units; 2022.
- E. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale); 2023.

PART 2 PRODUCTS

2.1 Manufacturers

- A. Boston Valley Terra Cotta; _____: www.bostonvalley.com/#sle.
- B. Gladding, McBean; _____: www.gladdingmcbean.com/#sle.

2.2 Terra Cotta Units

- A. Terra Cotta Unit Profiles and Appearance: As indicated on drawings.
 - 1. Manufacture units to comply with design intent and installation conditions and to minimize field cutting of units. Adjust design of individual units to accommodate setting requirements without affecting aesthetic effect.
 - 2. Adjust configurations of terra cotta units to accommodate relieving angles, vents, weeps, expansion joints, and accessories.

- a. Coordinate with expansion joints, shelf supports, and similar items to prevent deflection, wind pressure, temperature changes, settlement, and similar stresses.
 - b. Coordinate with wall flashing installation.
 - B. Physical Requirements:
 - 1. Compressive Strength:
 - a. Vertical Direction of Coring: 3,000 psi (20.68 MPa), minimum, tested in accordance with ASTM C67/C67M.
 - b. Horizontal Direction of Coring: 2,000 psi (13.79 MPa), minimum, tested in accordance with ASTM C67/C67M.
 - 2. Absorption, 5-Hour Boil: 11.9 percent, maximum, tested in accordance with ASTM C67/C67M.
 - 3. Absorption, 24-Hour Soak: 7.9 percent, maximum, tested in accordance with ASTM C67/C67M.
 - 4. Saturation Coefficient: 0.69, maximum, tested in accordance with ASTM C67/C67M.
 - 5. Resistance to Crazeing: Meet requirements of ASTM C126.
 - 6. Glaze Absorption: 0.15 percent, maximum, tested in accordance with ASTM C67/C67M.
 - 7. Freeze-Thaw Resistance: Minimum 300 cycles without degradation tested in accordance with ASTM C67/C67M.
 - 8. Face Dimension Tolerances: In accordance with approved shop drawings and maximum 1.05 percent of unit dimension.
 - 9. Warpage Tolerances of New Units: Do not exceed variance from a true plane of machine extruded ceramic veneer units 0.5 percent of unit length, maximum.
 - C. Unit Fabrication:
 - 1. Fabricate units with minimum shell and web thicknesses complying with ASTM C216 unless greater thicknesses are required for form and structural design. Provide anchor holes and hand-holds in accordance with approved shop drawings.
 - 2. Allow for setting anchors and steel reinforcing without cutting of units, unless otherwise required and approved.
 - 3. Take field measurements and fabricate units to avoid cutting and fitting finished units.
 - 4. Fabricate finished faces that will be exposed to view when installed free from chips, crazes, blisters, crawling, or other imperfections detracting from the appearance of the finished wall when viewed from distance of 5 feet (1.5 m), minimum.
- 2.3 Reinforcement and Anchorage
- A. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi) (280 MPa), deformed billet bars; galvanized.
 - B. Two-Piece Wall Ties: Formed steel wire, 0.1875 inch (4.8 mm) thick, adjustable, eye and pintle type, hot dip galvanized to ASTM A153/A153M Class B, sized to provide not less than 5/8 inch (16 mm) of mortar coverage from masonry face and to allow vertical adjustment of up to 1-1/4 inches (32 mm).
- 2.4 Mortar Materials
- A. Mortar and Grout: See Section 04 05 11.

PART 3 EXECUTION

3.1 Installation - General

- A. Supports: Provide miscellaneous steel fabricated members for support of terra cotta with anchorage, whether or not indicated on drawings.
- B. Furnish loose anchors such as clamps, hangers, clips, straps, and pins installed as part of terra cotta masonry work.

3.2 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.

3.3 Placing and Bonding

- A. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- B. Remove excess mortar and mortar smears as work progresses.
- C. Interlock intersections and external corners, except for units laid in stack bond.
- D. Do not shift or tap terra cotta units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace with new mortar.
- E. Perform job site cutting of terra cotta units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

3.4 Drainage

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weeps or cavity vents.

3.5 Reinforcement and Anchorage - Terra Cotta Veneer

END OF SECTION

SECTION 04 72 00
CAST STONE MASONRY

PART 1 GENERAL

1.1 Section Includes

- A. Architectural cast stone.
- B. Exterior wall units include:
 - 1. Exterior wall units, including lintels, sills, and water tables.

1.2 Related Requirements

- A. Section 04 05 11 - Masonry Mortaring and Grouting: Mortar for setting cast stone.
- B. Section 04 20 00 - Unit Masonry: Installation of cast stone in conjunction with masonry.
- C. Section 07 92 00 - Joint Sealants: Sealing joints indicated to be left open for sealant.

1.3 Reference Standards

- A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).
- B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.
- C. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2019.
- D. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars; 2022.
- E. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement; 2019, with Editorial Revision (2020).
- F. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2022.
- G. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2023.
- H. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.
- I. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.
- J. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2019, with Editorial Revision (2022).
- K. ASTM C642 - Standard Test Method for Density, Absorption, and Voids in Hardened Concrete; 2021.

- L. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.
- M. ASTM C1364 - Standard Specification for Architectural Cast Stone; 2023.

1.4 Submittals

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Test results of cast stone components made previously by the manufacturer.
 - 1. Include one copy of ASTM C1364 for Architect's use.
- C. Shop Drawings: Include elevations, dimensions, layouts, profiles, cross sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, and piece numbers.
- D. Mortar Color Selection Samples.
- E. Verification Samples: Pieces of actual cast stone components not less than 6 inches (152 mm) square, illustrating range of color and texture to be anticipated in components furnished for the project.
- F. Full-Size Samples, For Review:
 - 1. Basic Shapes: One of each.
 - 2. Accent, Trim and Specialty Shapes: One of each.
- G. Source Quality Control Test Reports.
- H. Manufacturer's Qualification Data: Documentation showing compliance with specified requirements.

1.5 Quality Assurance

- A. Manufacturer Qualifications:
 - 1. A firm with a minimum of 5 years experience producing cast stone of types required for project.
 - 2. Current producer member of the Cast Stone Institute or the Architectural Precast Association.
 - 3. Manufacturer's production facility currently holds a Plant Certification from the Cast Stone Institute or the Architectural Precast Association.
 - 4. Adequate plant capacity to furnish quality, sizes, and quantity of cast stone required without delaying progress of the work.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.6 Delivery, Storage, and Handling

- A. Deliver cast stone components secured to shipping pallets and protected from damage and discoloration. Protect corners from damage.
- B. Number each piece individually to match shop drawings and schedule.

- C. Store cast stone components and installation materials in accordance with manufacturer's instructions.
- D. Store cast stone components on pallets with nonstaining, waterproof covers. Ventilate under covers to prevent condensation. Prevent contact with dirt.
- E. Protect cast stone components during handling and installation to prevent chipping, cracking, or other damage.
- F. Store mortar materials where contamination can be avoided.
- G. Schedule and coordinate production and delivery of cast stone components with unit masonry work to optimize on-site inventory and to avoid delaying the work.

PART 2 PRODUCTS

2.1 Manufacturers

- A. Architectural Cast Stone:
 - 1. Any current producer member of the Cast Stone Institute.
 - 2. Basis of Design Manufacturer: Custom Cast Stone, Inc. 734 E. 169th St., Westfield, IN 46074 Ph 317.896.1700 Toll Free 888.776.9960 Website: www.customcaststone.com Email: customcaststone@yahoo.com
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 Architectural Cast Stone

- A. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural granite, complying with ASTM C1364.
 - 1. Casting Method: Vibrant Dry Tamp; Machine Produced.
 - 2. Compressive Strength: As specified in ASTM C1364; 6,500 psi minimum for products at 28 days. Calculate strength of pieces to be field cut at 80 percent of uncut piece.
 - 3. Freeze-Thaw Resistance: Demonstrated by laboratory testing in accordance with ASTM C1364. The CPWL shall be less than 5% after 300 cycles of freezing and thawing
 - 4. Absorption: ASTM C 1195: 6 percent maximum by the cold water method for products at 28 days.
 - 5. Current Linear Shrinkage test data available for submittal.
 - 6. Job Site Testing: One sample from production units may be selected at random from the field for each 500 cubic feet delivered to the job site.
 - a. Three field cut cube specimens from each of these samples shall have an average compressive strength of not less than 85% with no single specimen testing less than 75% of design strength as allowed by ACI 318.
 - b. Three field cut cube specimens from each of these samples shall have an average maximum cold-water absorption of 6%.
 - c. Field specimens shall be tested in accordance with ASTM C 1194 and C 1195.
 - 7. Surface Texture: Fine grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 20 feet (6 meters).
 - 8. Color: Match sample on file at Architect's office.
 - a. Color to be Ginger 101, per Custom Cast Stone's standard coloring catalog.
 - 1) Remove cement film from exposed surfaces before packaging for shipment.
 - 2) Shapes: Provide shapes indicated on drawings.

- a) Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch (3 mm) or length divided by 360, whichever is greater, but not more than 1/4 inch (6 mm).
- 3) Unless otherwise indicated on drawings, provide:
 - 1 Wash or slope of 1:12 on exterior horizontal surfaces.
 - 2 Drips on projecting components, wherever possible.
 - 3 Raised fillets at back of sills and at ends to be built in.
- 4) Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI 318.
 - a) Minimum reinforcing shall be 0.25 percent of the cross section area.
 - b) Reinforcement shall be noncorrosive where faces exposed to weather are covered with less than 1.56 in. of concrete material. All reinforcement shall have minimum coverage of twice the diameter of the bars.
 - c) Panels, soffits and similar stones greater than 24 in. in one direction shall be reinforced in that direction. Units less than 24 in. both their length and width dimension shall be non-reinforced unless otherwise specified.
 - d) Welded wire fabric reinforcing shall not be used.
- 5) Curing
 - a) Cure cast stone components with a direct fired vapor generator at a minimum temperature of 105 degrees F (41 degrees C) for a minimum of 6 hours, within 12 hours of fabrication.
 - b) Cure casat stone components in presence of carbon monoxide and carbon dioxide to promote carbonation at surface, to minimize efflorescence.
- 9. Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI 318.

2.3 Materials

- A. Portland Cement: ASTM C150/C150M.
 - 1. For Units: Type I, white or gray as required to match Architect 's sample.
 - 2. For Mortar: Type I or II, except Type III may be used in cold weather.
 - 3. Basis of Design: Custom Cast Stone Color- Maize
- B. Coarse Aggregate: ASTM C33/C33M, except for gradation; granite, quartz, or limestone.
- C. Fine Aggregate: ASTM C33/C33M, except for gradation; natural or manufactured sands.
- D. Pigments: ASTM C979, inorganic iron oxides; do not use carbon black.
- E. Admixtures: ASTM C494/C494M.
- F. Water: Potable.
- G. Reinforcing Bars: ASTM A615/A615M, Grade 40 (40,000 psi) (280 MPa), deformed bars, galvanized or epoxy coated.
 - 1. Galvanized in accordance with ASTM A767/A767M, Class I.
 - 2. Epoxy coated in accordance with ASTM A775/A775M.
- H. Steel Welded Wire Reinforcement: ASTM A1064/A1064M, galvanized or ASTM A884/A884M, epoxy coated.

- I. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of type and size as required for conditions.
- J. Mortar: Portland cement-lime, as specified in Section 04 05 11 ; do not use masonry cement.
- K. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.

2.4 Source Quality Control

- A. Test compressive strength and absorption of specimens selected at random from plant production.
 - 1. Test in accordance with ASTM C642.
 - 2. Select specimens at rate of 3 per 500 cubic feet (3 per 14 cubic m), with a minimum of 3 per production week.
 - 3. Submit reports of tests by independent testing agency, showing compliance with requirements.
 - 4. Retain copies of all test reports for a minimum of two years

PART 3 EXECUTION

3.1 Examination

- A. Examine construction to receive cast stone components. Notify Architect if construction is not acceptable.
- B. Do not begin installation until unacceptable conditions have been corrected.

3.2 Installation

- A. Install in accordance with manufacturer's instructions.
- B. Install cast stone components in conjunction with masonry, complying with requirements of Section 04 20 00.
- C. Mechanically anchor cast stone units indicated; set remainder in mortar.
- D. Setting:
 - 1. Drench cast stone components with clear, running water immediately before installation.
 - 2. Set units in a full bed of mortar unless otherwise indicated.
 - 3. Fill vertical joints with mortar.
 - 4. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.

3.3 Tolerances

- A. Joints: Make all joints 3/8 inch (9.5 mm), except as otherwise detailed.
 - 1. Rake mortar joints 3/4 inch (19 mm) for pointing.
 - 2. Remove excess mortar from face of stone before pointing joints.

3. Point joints with mortar in layers 3/8 inch (9.5 mm) thick and tool to a slight concave profile.
4. Leave the following joints open for sealant:
 - a. Head joints in top courses, including copings, parapets, cornices, sills, and steps.
 - b. Joints in projecting units.
 - c. Joints between rigidly anchored units, including soffits, panels, and column covers.
 - d. Joints below lugged sills and stair treads.
 - e. Joints below ledge and relieving angles.
 - f. Joints labeled "expansion joint".

B. Installation Tolerances:

1. Variation from Plumb: Not more than 1/8 inch in 10 feet (3 mm in 3 m) or 1/4 inch in 20 feet (6 mm in 6 m) or more.
2. Variation from Level: Not more than 1/8 inch in 10 feet (3 mm in 3 m) or 1/4 inch in 20 feet (6 mm in 6 m), or 3/8 inch (9 mm) maximum.
3. Variation in Joint Width: Not more than 1/8 inch in 36 inches (3 mm in 900 mm) or 1/4 of nominal joint width, whichever is less.
4. Variation in Plane Between Adjacent Surfaces (Lipping): Not more than 1/16 inch (1.5 mm) difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

3.4 Repair

- A. Repair chips and other surface damage noticeable when viewed in direct daylight at 20 feet (6 m).
- B. Repair with matching touch-up material provided by the manufacturer and in accordance with manufacturer's instructions.
- C. Repair methods and results subject to Architect 's approval.

3.5 Cleaning

- A. Clean completed exposed cast stone after mortar is thoroughly set and cured.
 1. Wet surfaces with water before applying cleaner.
 2. Test clean a small area of stone (approx. 4 ft by 4 ft) on each color of stone on the project. Let test area dry for 4 or more days and have approved by Architect or Owner before cleaning the entire stone area.
 3. Apply manufacturer approved cleaner to cast stone in accordance with manufacturer's instructions.
 4. Remove cleaner promptly by rinsing thoroughly with clear water.
 5. Do not use a power washer, muratic acidic, sandblasting to clean units. Harsh cleaners or methods could damage or discolor units..
- B. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.

3.6 Protection

- A. Protect completed work from damage.

B. Clean, repair, or restore damaged or mortar-splashed work to condition of new work.

END OF SECTION

SECTION 05 12 00
STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. All structural steel framing, including connections and accessories, as shown or implied by the Contract Documents.

B. Related Sections:

1. Division 03 Section: Grouting

1.2 QUALITY ASSURANCE

A. Qualifications of Suppliers and Personnel:

1. The steel fabricator and erector shall have successfully completed work of this type and scope.
2. All welding shall be performed by operators who have been recently qualified as prescribed in "Structural Welding Code" of the American Welding Society (except for welds which do not carry calculated stress).

B. Codes and Standards:

1. In addition to complying with all pertinent codes and regulations, comply with:
2. "Specifications for Design, Fabrication, and Erection of Structural Steel for Buildings" of the American Institute of Steel Construction
3. "Structural Welding Code" of the American Welding Society
4. "Code of Standard Practice for Steel Buildings and Bridges" of the American Institute of Steel Construction.

C. Conflicting Requirements:

1. In the event of conflict between pertinent codes and regulations and the requirements of the referenced standards or this Section of the Project Manual, the provisions of the more stringent shall govern.

D. Fabricators Shop Testing, Inspection and Quality Control:

1. Structural Steel Fabrication Shop Quality Control Program: As a minimum, perform at least the following shop tests and inspections and submit daily reports of the results of all tests. State in each report whether the tested specimens conform to all requirements of the Contract Documents, and specifically note any discrepancies. If the inspections indicate

defects in the Work, increase the degree of testing to ensure that the full extent of defects in the joint are found and that similar defects are not present in similar joints.

- a. Provide evidence that all welders to be employed in the Work hold current AWS certification for the welding procedures that each will perform. If recertification of welders is required, the retesting is the Contractor's responsibility.
- b. Visually inspect all fabrication operations, including dimensional and fit-up/alignment and control.
- c. Visually inspect all plate edges and rolled shape edges for material defects.
- d. High strength bolted connections:
 - 1) Check all bolted connections in accordance with the procedures outlined in the RCSC "Specification for Structural Joints Using ASTM A325 or A490 Bolts", latest edition.
- e. Welding visual inspection:
 - 1) Inspect all welding operations and welds, including edge preparation, fit-up, preheat, and adherence to welding procedures.
 - a) Inspect welds prior to shop painting of steel.
 - b) Measure the weld profiles for 15 percent of the length of each weld, at random.
- f. Welding magnetic particle testing: Test in accordance with ASTM E109 for a minimum of:
 - 1) 20 percent of all shear plate fillet welds at random, final pass only.
 - 2) 20 percent of all continuity plate and bracing gusset plate fillet welds, at random, final pass only.
 - 3) 100 percent of tension member fillet welds (i.e., hanger connection plates and other similar connections) for root and final passes.
- g. Welding ultrasonic testing: Test in accordance with ASTM E164 and AWS D1.1 for 100 percent of all full penetration welds
- h. Schedule all work to allow the testing requirements listed above to be completed.

1.3 SUBMITTALS

A. Shop Drawings:

1. Prior to the bulk of shop drawing preparation, submit to the Architect/Engineer shop drawings of "typical conditions" and connections to assure that the fabricators assumptions are correct as to type of connection and other pertinent details.
2. Before any structural steel is fabricated, submit shop drawings to the Architect/Engineer for review and receive approval of same in accordance with Division 01 of this Project Manual.
3. Show all shop and erection details including cuts, copes, connections, holes, threaded fasteners, and welds.

4. Show all welds, both shop and field by the currently recommended symbols of the American Welding Society.

B. Proof of Qualification:

1. Submit to the Architect/Engineer evidence satisfactory to him that the steel fabricator and steel erector are qualified for the Work in accordance with the requirements of this Section of the Project Manual.

C. Certification:

1. Submit to the Architect/Engineer a certification that the materials supplied are in accordance with the requirements of this Section of the Project Manual.

1.4 PROJECT CONDITIONS

A. Field Verification:

1. Confirm all dimensions necessary to make the framing assembly fit accurately.
2. Do not fabricate materials until field dimensions have been confirmed.

PART 2 - PRODUCTS

2.1 STRUCTURAL STEEL

A. Steel Shapes and Plates:

1. All steel w-shapes shall meet the requirements of ASTM A992 or ASTM A572, Grade 50 except plates, angles and channels shall meet the requirements of ASTM A36.
2. All structural steel exposed to the elements shall be hot dipped galvanized unless noted otherwise on the drawings. All welds and scratches on this steel shall be touched up with a galvanic paint.

B. Hollow Structural Section (HSS):

1. Round, square and rectangular HSS sections shall meet the requirements of ASTM A500, Grade B.

C. Pipes:

1. Steel pipes shall meet the requirements of ASTM A501 or ASTM A53, Grade B, Type E or S.

2.2 CONNECTIONS

A. Materials:

1. High-strength bolts for shop and field connections: ASTM A325, 3/4 inch minimum diameter.
2. Anchor bolts, nuts and washers: ASTM F1554, Class [36] [55], Grade 2A
3. Machine bolts for minor connections: ASTM A307
4. Shear studs: ASTM A108, Grades 1015 through 1020, Headed-stud type, cold finished carbon steel; AWS D1.1, Type B.
5. Welding electrodes: ASTM A233, Series E70XX

- B. All shop connections shall be accomplished using high strength bolts or by welding at the Contractor's option.
- C. Use high strength bolts for field connections.
- D. Bolted connections shall be bearing type connections with threads in the shear plane.
- E. Moment connections as detailed in the Contract Documents are designed as welded connections.
- F. All connections shall be consistent with the design assumptions associated with Type "2" or Type "3" construction defined by the American Institute of Steel Construction.
- G. Minimum thickness of connection material shall be 5/16" unless noted otherwise.
- H. All connections both gravity and lateral are to be designed by a connection design engineer employed by the fabricator. The connection design drawings and calculations shall be signed and sealed by a professional engineer in the state where the project is located.

2.3 PRIMER PAINT

A. General:

1. All primer paint for structural steel shall be compatible with the finish coatings described in Division 09 of this Project Manual.
2. Omit paint from structural steel encased in concrete or designated to receive fireproofing, and from all faying surfaces.
3. Omit paint on all non-corrodible finished angles.

2.4 OTHER MATERIALS

- A. All other materials not specifically described but required for a complete and proper installation of structural steel, shall be new, free from rust, first quality of their respective kinds, and subject to the acceptance of the Architect/Engineer.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection:

1. Prior to installation of the Work of this Section, carefully inspect the installed Work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
2. Verify that existing conditions will permit the structural steel to be fabricated and erected in strict accordance with the original design, the shop drawings, and the referenced standards.

B. Discrepancies:

1. Do not proceed with fabrication or installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 FABRICATION

A. General:

1. Fabricate all structural steel in strict accordance with the shop drawings and the referenced standards.

B. Shop Cleaning and Priming:

1. Shop cleaning shall meet recommendations of the final finish manufacturer.
2. Shop paint all structural steel one coat where priming is required.
3. Thoroughly clean all steel that is not to be painted.

C. Leveling Nuts:

1. All column base plates shall be supported on leveling nuts unless noted otherwise. The area between the base plate and concrete shall be grouted in accordance with Division 03 Section: Grouting.

3.3 WELDING

A. General:

1. For details of joints, comply with requirements for AWS joints accepted with qualification tests.
2. Use ASTM A233, E-70 series electrodes.
3. Follow applicable sections of AWS specifications.

B. Types of Welds:

1. Unless otherwise noted:
 - a. Make all fillet welds 3/16" minimum.
 - b. Make all butt welds full penetration welds, using back-up or chip and back-weld.

3.4 ERECTION

A. General:

1. Erect all structural steel in strict accordance with the drawings, the shop drawings, and all pertinent regulations and standards.

B. Bolted Connections:

1. Accomplish high-strength bolted connections in accordance with the American Institute of Steel Construction's publication, "Specifications for Structural Joints Using ASTM A325 or A490 Bolts."
2. All bolts in bolted connections shall be tightened to the "snug tight condition" unless noted otherwise on the drawings.

C. Touch-Up:

1. After erection is complete:
 - a. Touch-up all shop priming coats damaged during transportation and erection.
 - b. Prime all field welds on members that have been welded and paint all field bolts using the priming paint specified for shop priming.

D. Bracing:

1. Furnish, design, and install all temporary erection bracing.
2. Leave such bracing in place until the structure is stabilized by walls, slabs, decks and permanent bracing.

3.5 INSPECTION AND QUALITY ASSURANCE

- A. The Testing Laboratory will conduct a program of testing and inspection for both shop fabrication and field erection. During shop fabrication, the program will consist of monitoring the structural steel Contractor's quality control and testing program. If the fabrication facility does not qualify as a certified AISC Category I facility, the Testing Laboratory will perform all shop testing and inspection work. During field erection, the program will consist of all field testing and inspection as specified.

- B. Shop Quality Control by Testing Laboratory: Provide periodic monitoring of the Contractor's quality control testing and inspection program. Include the following as a minimum degree of monitoring:

1. Verify all welder qualification and monitor welding procedures and welding processes.

2. Monitor all fabrication operations.
 3. Verify and monitor all shop testing and inspection, including review of the Contractor's testing and inspection records.
 4. Perform inspection as necessary on those portions of the structural steel not in evidence of complying with the Contract Documents.
- C. Field Quality Control by Testing Laboratory: Perform the following quality control tests and inspections. Interpret test results, submit daily reports and monthly summary reports.
1. Examine the Manufacturer's test certificates for all materials provided. Verify that the lot numbers of the tested material coincide with the lot numbers of the material used on-site.
 2. Visually inspect all anchor-bolt nut installation and tightening.
 3. High strength bolted connections:
 - a. Observe the job site calibration of each size bolted fastener assembly and installation technique in the calibrated tension measuring device. Verify that the proper bolt pretension listed in Table 4 of the RCSC "Specification" is achieved and that installation equipment is of sufficient capacity.
 - b. Routinely monitor field bolting procedures during bolt installation. Verify that all bolts in all connections are brought to a "snug tight" condition with all plies of the connection in firm contact. Verify that bolts in connections identified as either slip-critical or direct tension connections are being additionally tightened by the proper technique(s) determined in the tension testing device described above.
 - c. Check that all bolted connections are being installed in accordance with the procedures outlined in the RCSC "Specification."
 4. Welded connections:
 - a. Obtain qualifications of all welders and verify all welding procedures, including the Contractor's compliance with preheat, weather-protection, electrodes, and welding surface preparation requirements.
 - b. Visually inspect all field welding operations and welds.
 5. Magnetic particle testing: Test in accordance with ASTM E109 for a minimum of:
 - a. 20 percent of the length of all field fillet welds, at random, final pass only.
 - b. 25 percent of the length of all field partial penetration welds except column splices, at random, root and final passes.
 6. Ultrasonic testing: Test in accordance with ASTM E164 and AWS D1.1 for a minimum of:
 - a. 100 percent of all field full penetration welds.
 7. Schedule all work to allow the testing requirements listed above to be completed.
 8. Testing and inspection do not relieve the Contractor of the responsibility for providing materials and fabrication procedures in compliance with the specified requirements.

END OF SECTION 05 12 00

SECTION 06 03 00
CONSERVATION TREATMENT FOR PERIOD WOOD

PART 1 GENERAL

1.1 Section Includes

- A. Repair of damaged wood components.

1.2 Related Requirements

- A. Section 01 35 91 - Period Treatment Procedures for general historic preservation project requirements.
- B. Section 09 91 13 - Exterior Painting.
- C. Section 09 93 00 - Staining and Transparent Finishing.

1.3 DEFINITIONS

- A. In situ: Repair procedure in which wood elements and components remain in place and are repaired without removal from the system they are a part of.
- B. Patch: Use of substitute repair materials to treat damaged or deteriorated components in situ.
- C. Surface Treatment: Application of traditional materials or contemporary chemical products to the surface of wood components to provide protection and reduce water infiltration.

1.4 Reference Standards

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.

1.5 Submittals

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on cleaning compounds.
- C. Manufacturer's Instructions: For cleaning materials, indicate special procedures and conditions requiring special attention.
- D. Restorer's qualification statement.

1.6 Quality Assurance

- A. Restorer Qualifications: Company specializing in period wood restoration with minimum five years of documented experience.
 - 1. Use experienced carpenters and furniture craftspersons who have demonstrated proficiency in properly operating tools on historic elements.

1.7 MOCK-UPS

- A. See Section 01 40 00 - Quality Requirements for additional requirements.
- B. Restore existing wood framed wall in location indicated including siding, trim, accessories, wall openings, and flashings.
 - 1. Repair Material:
 - 2. Paint Removal: Test products and procedures for each type of removal on inconspicuous areas of existing coatings. Allow test areas to dry thoroughly after treatment. Obtain Architect's approval prior to retaining test areas for acceptable work results standards.
- C. Locate mock-up areas where directed.
- D. Approved restoration mock-up areas, including results of procedures employed, will remain and become the quality standard for work of this section.

PART 2 PRODUCTS

2.1 Replacement Finish Carpentry Materials

- A. Exterior Finish Carpentry Items: Matching existing elements.
 - 1. Window Casings and Moldings: Prepare for opaque finish.
 - 2. Soffits and Fascias: Prepare for opaque finish.
 - 3. Brackets, Finials, and Pediments: Prepare for opaque finish.
- B. Interior Finish Carpentry Items: Matching existing elements.
 - 1. Moldings, Bases, Casings, and Miscellaneous Trim: Prepare for transparent finish.

2.2 Cleaning Materials

- A. Cleaning Agent: Detergent type.

2.3 PAINT REMOVERS

- A. Manufacturers:
 - 1. American Building Restoration Products, Inc; _____: www.abrp.com/#sle.
 - 2. Dumond Chemicals, Inc; _____: www.dumondchemicals.com/#sle.
 - 3. PROSOCO, Inc; _____: www.prosoco.com/#sle.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.4 Wood Repair Materials

- A. Source Limitations: Obtain compatible consolidants and patching and filling compounds from single manufacturer.
- B. Manufacturers:
 - 1. Abatron; _____: www.abatron.com/#sle.
 - 2. Protective Coatings Company; _____: www.pcepoxy.com/#sle.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Patching and Filling Compounds:
 - 1. Epoxy Based: Two-part, adhesive system designed to fill voids in wood and be painted, stained, sawed, nailed, planed, sanded carved, and machined like wood.

PART 3 EXECUTION

3.1 Period Treatment, General

- A. See Section 013591 for special procedure requirements related to elements and features of historical significance and value.

3.2 Examination

- A. Verify that surfaces to be cleaned and restored are ready for work of this section.

3.3 Preparation

- A. Protect surrounding elements from damage that may result due to performance of restoration procedures.
- B. Remove and store removable items located in areas to be restored including, but not limited to, fixtures, fittings, finish hardware, and accessories; reinstall upon completion.
- C. Separate areas to be protected from restoration areas to prevent damage.
- D. Mask or cover adjacent surfaces and permanent equipment. Secure coverings without nails or tapes that leave residue. Do not use impervious sheeting which produces condensation.
 - 1. Use materials that withstand cleaning and restoration procedures.
- E. When using liquid cleaning methods, install drainage devices to prevent runoff over adjacent surfaces unless those surfaces are impervious to damage from runoff.
- F. Do not allow cleaning runoff to drain into sanitary or storm sewers.

3.4 In Situ Restoration

- A. Do not mix or apply materials or products when the ambient temperature or humidity are outside range recommended by their manufacturers.
- B. Schedule conservation treatments to avoid weather-related failures.

3.5 PAINT REMOVAL

- A. Remove existing coatings to bare substrate or first sound paint layer as indicated.
- B. Removal with Hand Tools: Use tools to remove flaking, cracking, blistering, peeling, or otherwise deteriorated coatings without marring or otherwise damaging substrates.
 - 1. Flat Areas: Use hand scrapers.
 - 2. Do not use open-flame heat devices.
- C. Leave surfaces in a clean, residue-free condition, ready for subsequent restoration procedures.
- D. Dispose of waste products and residue in accordance with applicable laws and regulations.

3.6 Replacement Element Installation

- A. Install work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) Section 12, Historic Restoration Work, and other applicable requirements.
- B. Match existing elements unless otherwise required for protection of wood materials from the weather and approved by Architect.
- C. Maintain continuity of historic architectural fabric.
- D. Finish Carpentry:
 - 1. Exterior Elements: Coordinate sequence of reinstallation with period treatment sequences of other exterior elements.
 - a. General: Use corrosion-resistant fasteners.
 - b. Set and secure materials and components in place, plumb, and level.
 - c. Scribe to abutting components, with gaps of 1/32 inch (0.79 mm), maximum. Do not use overlay trim to conceal larger gaps.
 - d. Soffits and Fascia: Fit replacement pieces to remaining elements, with gap widths between pieces matching adjacent, original construction.
 - e. Brackets, Finials, and Pediments: Fit replacement pieces to remaining elements, with gap widths between pieces matching adjacent, original construction.
 - 2. Interior Elements:
 - a. Do not begin installation until wood materials have been acclimated to interior conditions.
 - b. Standing and Running Trim: Attach using finishing nails. Set finish nail heads just below the surface of trim.
 - 1) Carefully scribe work abutting other components, with maximum gaps of 1/32 inch (0.79 mm). Do not use overlay trim to conceal larger gaps.
 - 2) Attach using finishing nails. Set finish nail heads just below the surface of trim.

3.7 Repair

- A. Patching: For wood elements indicated on drawings.
 - 1. Mix patching compound components and colorants as recommended by manufacturer.
 - 2. Mask off areas to be kept free of compound.
 - 3. Apply with putty knife or similar implement into and over areas to be repaired.

4. Sand, plane, and shape repair area after patch has set for time period recommended by manufacturer.

END OF SECTION

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Nonstructural dimension lumber framing.
- B. Rough opening framing for doors, windows, and roof openings.
- C. Communications and electrical room mounting boards.
- D. Concealed wood blocking, nailers, and supports.
- E. Miscellaneous wood nailers, furring, and grounds.

1.2 RELATED REQUIREMENTS

- A. Section 07 62 00 - Sheet Metal Flashing and Trim: Sill flashings.
- B. Section 09 21 16 - Gypsum Board Assemblies: Gypsum-based sheathing.

1.3 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- B. AWC (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings; 2018, with Errata (2019).
- C. PS 20 - American Softwood Lumber Standard; 2021.

1.4 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

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

1.6 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

- B. Correct defective work within a two-year period commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. Species: Southern Pine, unless otherwise indicated.
 - 2. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
 - 3. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at www.alsc.org, and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
 - 4. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.

2.2 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

3.1 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.

3.2 FRAMING INSTALLATION

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

- F. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

3.3 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- C. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- D. Provide the following specific nonstructural framing and blocking:
 - 1. Cabinets and shelf supports.
 - 2. Wall brackets.
 - 3. Handrails.
 - 4. Grab bars.
 - 5. Restroom accessories.
 - 6. Wall-mounted door stops.
 - 7. Wall paneling and trim.
 - 8. Joints of rigid wall coverings that occur between studs.

3.4 TOLERANCES

- A. Framing Members: 1/4 inch (6 mm) from true position, maximum.
- B. Variation from Plane, Other than Floors: 1/4 inch in 10 feet (2 mm/m) maximum, and 1/4 inch in 30 feet (7 mm in 10 m) maximum.

3.5 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements for additional requirements.

3.6 CLEANING

- A. Waste Disposal: See Section 01 74 19 - Construction Waste Management and Disposal.
 - 1. Comply with applicable regulations.
 - 2. Do not burn scrap on project site.
 - 3. Do not burn scraps that have been pressure treated.
 - 4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.
- B. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.
- C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 41 00
ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Specially fabricated cabinet units.
- B. Hardware.

1.2 RELATED REQUIREMENTS

- A. Section 12 36 00 - Countertops.

1.3 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.
- C. BHMA A156.9 - Cabinet Hardware; 2020.
- D. UL (DIR) - Online Certifications Directory; Current Edition.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting not less than one week before starting work of this section; require attendance by all affected installers.

1.5 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Scale of Drawings: 1-1/2 inch to 1 foot (125 mm to 1 m), minimum.
 - 2. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
 - 3. Include certification program label.
- C. Product Data: Provide data for hardware accessories.

1.6 QUALITY ASSURANCE

- A. Quality Certification:
 - 1. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades

- specified.
- 2. Provide designated labels on shop drawings as required by certification program.
- 3. Provide designated labels on installed products as required by certification program.
- 4. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.
- 5. Replace, repair, or rework all work for which certification is refused.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect units from moisture damage.

1.8 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

2.1 CABINETS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Plastic Laminate Faced Cabinets: Custom grade.

2.2 WOOD-BASED COMPONENTS

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

2.3 LAMINATE MATERIALS

- A. Manufacturers:
 - 1. Arborite; ColorEdge: www.arborite.com/#sle.
 - 2. Formica Corporation: www.formica.com/#sle.
 - 3. Wilsonart LLC: www.wilsonart.com/#sle.

2.4 COUNTERTOPS

- A. Countertops: See Section 12 36 00.

2.5 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Plastic Edge Banding: Extruded PVC, convex shaped; smooth finish; self locking serrated tongue; of width to match component thickness.
- 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 stainless steel or chrome-plated finish in

exposed locations.

- E. Grommets: Standard plastic or rubber grommets for cut-outs, in color to match adjacent surface.

2.6 HARDWARE

- A. Hardware: BHMA A156.9, types as recommended by fabricator for quality grade specified.
- B. Drawer and Door Pulls: "U" shaped wire pull, steel with chrome finish, 4 inch centers ("U" shaped wire pull, steel with chrome finish, 100 mm centers).
- C. Drawer Slides:
 - 1. Type: Extension types as indicated.
 - 2. Static Load Capacity: Commercial grade.
 - 3. Mounting: Side mounted.
 - 4. Stops: Integral type.
 - 5. Features: Provide self closing/stay closed type.
 - 6. Manufacturers:
 - a. Accuride International, Inc; Light-Duty Drawer Slides: www.accuride.com/#sle.
- D. Hinges: European style concealed self-closing type, steel with nickel-plated finish.
 - 1. Manufacturers:
 - a. Blum, Inc; CLIP top BLUMOTION: www.blum.com/#sle.
 - b. Grass America Inc: www.grassusa.com/#sle.
 - c. Hardware Resources: www.hardwareresources.com/#sle.
 - d. Hettich America, LP: www.hettich.com/#sle.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.

2.7 SHOP TREATMENT OF WOOD MATERIALS

- A. Provide UL (DIR) listed and approved identification on fire retardant treated material.
- B. Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.

2.8 FABRICATION

- A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs. (Locate counter butt joints minimum 600 mm from sink cut-outs.)
 - 1. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.

- E. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions.
Prime paint cut edges.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.

3.2 INSTALLATION

- A. Install work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.
- B. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- C. Use concealed joint fasteners to align and secure adjoining cabinet units.
- D. Secure cabinets to floor using appropriate angles and anchorages.

3.3 ADJUSTING

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

3.4 CLEANING

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

END OF SECTION

SECTION 07 11 13
BITUMINOUS DAMPPROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Cold applied asphalt bituminous dampproofing

1.2 REFERENCE STANDARDS

- A. ASTM D41/D41M - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing; 2011 (Reapproved 2023).
- B. ASTM D1227/D1227M - Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing; 2013, with Editorial Revision (2019).
- C. NRCA (WM) - The NRCA Waterproofing Manual; 2021.

1.3 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide properties of primer, bitumen, and mastics.
- C. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.4 FIELD CONDITIONS

- A. Section 01 60 00 - Product Requirements
- B. Maintain ambient temperatures above 40 degrees F (5 degrees C) for 24 hours before and during application until dampproofing has cured.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Bituminous Dampproofing Manufacturers:
 - 1. Karnak Corporation: www.karnakcorp.com/#sle.
 - 2. Mar-flex Waterproofing & Building Products: www.mar-flex.com/#sle.
 - 3. Euclid Chemical Co: <https://www.euclidchemical.com/>
 - 4. W. R. Meadows, Inc: www.wrmeadows.com/#sle.
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 BITUMINOUS DAMPPROOFING

2.3 BITUMEN MATERIALS

- A. Cold Asphaltic Type:
 - 1. Emulsified Asphalt: ASTM D1227/D1227M, unreinforced, Type III, Class 1 or 2.
 - 2. Asphalt Primer: ASTM D41/D41M, compatible with substrate.

2.4 ACCESSORIES

- A. Flexible Flashings: Butyl Type

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions are acceptable prior to starting this work.
- B. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of dampproofing system.
- C. Verify that items penetrating surfaces to receive dampproofing are securely installed.

3.2 PREPARATION

- A. Protect adjacent surfaces not designated to receive dampproofing.
- B. Clean and prepare surfaces to receive dampproofing in accordance with manufacturer's instructions.
- C. Do not apply dampproofing to surfaces unacceptable to manufacturer or applicator.
- D. Apply mastic to seal penetrations, small cracks, or minor honeycombs in substrate.

3.3 INSTALLATION

- A. Location: Foundations, from grade to bottom of footer.
- B. Prime surfaces in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.
- C. Apply cold bitumen by brush or spray application..
- D. Apply bitumen in two coats, continuous and uniform, at a rate of 1.5 gal/100 sq ft per coat.
- E. Seal items watertight with mastic, that project through dampproofing surface.
- F. Place protection board directly over dampproofing, butt joints, and adhere to tacky dampproofing.

G. Scribe and cut boards around projections, penetrations, and interruptions.

END OF SECTION

SECTION 07 21 00
THERMAL INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Rigid board insulation.
- B. Thermoplastic trim extrusion at cavity insulation termination at window and door openings.
- C. Formaldehyde-free sound attenuation batt insulation.
 - 1. For non-rated stud wall conditions.
- D. Sill seals.
- E. Expanding foam insulation.

1.2 RELATED REQUIREMENTS

1.3 REFERENCE STANDARDS

- A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2023.
- B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2023.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023c.
- D. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 °C; 2022.
- E. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2023.

1.4 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Unified Insulation Schedule:
 - 1. Provide schedule indicating insulation designation, insulation description, manufacturers, product name, thickness and locations where insulation is used.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of building insulation through one source from a single manufacturer.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
- C. Surface burning characteristics: ASTM E 84.
- D. Fire-resistance ratings: ASTM E 119
- E. Combustion characteristics: ASTM E 136

1.6 FIELD CONDITIONS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.
- B. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing and protecting during installation.

PART 2 PRODUCTS

2.1 APPLICATIONS

- A. Insulation Under Concrete Slabs: Extruded polystyrene (XPS) board.
- B. Insulation at Perimeter of Foundation: Extruded polystyrene (XPS) board.
- C. Insulation Inside Masonry Cavity Walls: Expanded polystyrene (EPS) board.
- D. Insulation in Wood Framed Walls: Batt insulation with separate vapor retarder.
- E. Insulation in Wood Framed Ceiling Structure: Batt insulation with integral vapor retarder.

2.2 FOAM BOARD INSULATION MATERIALS

- A. Extruded Polystyrene (XPS) Board Insulation: Comply with ASTM C578 with either natural skin or cut cell surfaces.
 - 1. Type and Compressive Resistance: Type IV, 25 psi (173 kPa), minimum.
 - 2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 - 3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 - 4. Type and Thermal Resistance, R-value (RSI-value): Type IV, 5.0 (0.88), minimum, per 1 inch (25.4 mm) thickness at 75 degrees F (24 degrees C) mean temperature.
 - 5. Complies with fire resistance requirements indicated on drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.

6. Type and Water Absorption: Type XII, 0.3 percent by volume, maximum, by total immersion.
7. Products:
 - a. Basis of Design: DuPont de Nemours, Inc; Styrofoam Brand Ultra SL: and Weathermate Straight Flashing Tape, 4" wide, for masonry cavity wall. building.dupont.com/#sle. Cavity wall insulation termination extrusions: Extruded plastic angle similar to SeaGates Plastics, SG 1737 - 2" x 3" x 1/4"
 - b. Kingspan Insulation LLC; GreenGuard GG25-LG XPS Insulation Board: www.kingspan.com/#sle.
 - c. Owens Corning Corporation; FOAMULAR Type ____ Extruded Polystyrene (XPS) Insulation: www.ocbuildingspec.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Extruded Polystyrene (XPS) Board, Drainage Panels for perimeter and under slab installation: Comply with ASTM C578, and manufactured using carbon black technology.
 1. Type and Compressive Resistance: Type IV, 25 psi (173 kPa), minimum.
 2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 4. Type and Thermal Resistance, R-value (RSI-value): Type IV, 5.6 (0.98), minimum, per 1 inch (25.4 mm) thickness at 75 degrees F (24 degrees C) mean temperature.
 5. Complies with fire resistance requirements indicated on drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
 6. Board Size: 48 inch by 96 inch (1220 mm by 2440 mm).
 7. Board Thickness: 1-3/4 inch (44.5 mm).
 8. Board Edges: Shiplap, at long edges.
 9. Type and Water Absorption: Type IV, 0.3 percent by volume, maximum, by total immersion.
 10. Products:
 - a. Basis of Design: Dow Styrofoam Scoreboard Insulation for below floor slabs
 - b. DiversiFoam Products..
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Extruded Polystyrene (XPS) Cavity Wall Insulation Board: Comply with ASTM C578, and manufactured using carbon black technology.
 1. Type and Compressive Resistance: Type IV, 25 psi (173 kPa), minimum.
 2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 4. Type and Thermal Resistance, R-value (RSI-value): Type IV, 5.6 (0.98), minimum, per 1 inch (25.4 mm) thickness at 75 degrees F (24 degrees C) mean temperature.
 5. Complies with fire resistance requirements indicated on drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
 6. Board Size: 15-3/4 inch by 96 inch (400 mm by 2440 mm).
 7. Board Thickness: 1-3/4 inch (44.5 mm).
 8. Board Edges: Square.
 9. Type and Water Absorption: Type IV, 0.3 percent by volume, maximum, by total immersion.
 10. Products:
 - a. DuPont de Nemours, Inc; Styrofoam Brand Cavitymate Ultra: building.dupont.com/#sle.

- b. Owens Corning.
- c. Substitutions: See Section 01 60 00 - Product Requirements.

2.3 MINERAL FIBER BLANKET INSULATION MATERIALS

- A. Flexible Glass Fiber Blanket Thermal Insulation: Preformed insulation, complying with ASTM C665; friction fit.
 - 1. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
 - 2. Thickness: 16" or 24", to match stud spacing.
 - 3. Facing: Unfaced.
 - 4. Location: Interior stud wall cavities
 - 5. Products:
 - a. CertainTeed Corporation; _____: www.certainteed.com/#sle.
 - b. Johns Manville; _____: www.jm.com/#sle.
 - c. Owens Corning Corporation; EcoTouch PINK FIBERGLAS Insulation: www.ocbuildingspec.com/#sle.
 - d. Knauf Fiber Glass: <https://www.knaufnorthamerica.com/en-us>.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Flexible Glass Fiber Blanket Thermal Insulation: Preformed insulation, complying with ASTM C665; Type II (non-reflective faced), Class C (faced surface not rated for flame propagation); Category I (membrane is a Class II vapor retarder); friction fit.
 - 1. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
 - 2. Thermal Resistance: R-value (RSI-value) of 38 (_____).
 - 3. Thickness: 24", to match joist spacing.
 - 4. Facing: Aluminum foil, flame spread 25 rated; one side.
 - 5. Location: Attic space
 - 6. Products:
 - a. CertainTeed Corporation; _____: www.certainteed.com/#sle.
 - b. Johns Manville; _____: www.jm.com/#sle.
 - c. Owens Corning Corporation; EcoTouch PINK FIBERGLAS Insulation: www.ocbuildingspec.com/#sle.
 - d. Knauf Fiber Glass: <https://www.knaufnorthamerica.com/en-us>.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.

2.4 ACCESSORIES

- A. Gap Closure Strips for acoustical partitions: 4.5 PCF minimum density to 6 PFC density closure material of packed insulation, drywall scab or closed-cell foam, acting as a barrier.
 - 1. Products:
 - a. Closure Strips manufactured by Carrington Specialty Products
 - b. Mineral wood speed plugs as manufactured by Hilti CP777 sealed on both sides with a spray seal product:
 - 1) Hilti CP572 (3mm thickness, at non fire rated acoustical partitions)
 - 2) Hilti CFS-SP WB (fire-rated acoustical partitions)
- B. Insulation for Miscellaneous Voids:
 - 1. Glass-Fiber Insulation: ASTM C 764, Type II, loose fill; with maximum flame spread and smoke-developed indexes of 5, per ASTM E 84.

2. Spray Polyurethane Foam Insulation: ASTM C 1029, Type II, closed cell, with maximum flamespread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
- C. Tape: Reinforced polyethylene film with acrylic pressure sensitive adhesive.
 1. Application: Sealing of interior circular penetrations, such as pipes or cables.
 2. Width: Are required for application.
- D. Flashing Tape: Special reinforced film with high performance adhesive.
 1. Application: Window and door opening flashing tape.
 2. Width: As required for application.
 3. Primer: Tape manufacturer's recommended product.
- E. Sill Plate Sealer: Closed-cell foam tape with rubberized adhesive membrane; bridges gap between foundation structure and sill plate or skirt board.
 1. Width: 3-1/2 inches (89 mm).
 2. Ultraviolet (UV) and Weathering Resistance: Approved in writing by manufacturer for up to 30 days of weather exposure.
 3. Products:
 - a. Protecto Wrap Company; Triple Guard Energy Sill Sealer:
www.protectowrap.com/#sle.
- F. Insulation Fasteners: Appropriate for purpose intended. Fasteners for wall insulation panels: Self tapping fasteners as recommended by the manufacturer.
- G. Adhesive: Type recommended by insulation manufacturer for application.
 1. Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.2 BOARD INSTALLATION AT FOUNDATION PERIMETER

- A. Install boards horizontally on foundation perimeter.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.3 BOARD INSTALLATION AT CAVITY WALLS

- A. Secure impale fasteners to substrate at following frequency:
 1. 24 inches o.c. both ways on inside face as recommended by the manufacturer.
- B. Apply adhesive to back of boards:
- C. Install boards to fit snugly between wall ties.

1. Place membrane surface against adhesive.
 2. Place membrane surface facing out, and tape seal board joints.
- D. Install boards horizontally on walls.
1. Place boards to maximize adhesive contact.
 2. Install in running bond pattern.
 3. Butt edges and ends tightly to adjacent boards and protrusions.
 4. Place impale fastener locking discs.
- E. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.4 BOARD INSTALLATION UNDER CONCRETE SLABS

- A. Place insulation under slabs on grade after base for slab has been compacted.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.

3.5 DRAINAGE PANEL AT FOUNDATION WALL

- A. Refer to Waterproofing specification section for installation over waterproofing.

3.6 BATT INSTALLATION

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
- B. Install in exterior roof spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
- E. At wood framing, place vapor retarder on warm side of insulation by stapling at 6 inches (152 mm) on center. Lap and seal sheet retarder joints over face of member.
- F. Tape seal tears or cuts in vapor retarder.
- G. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane; tape seal in place.

3.7 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements for additional requirements.

3.8 PROTECTION

- A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07 27 00
AIR BARRIERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Air barriers.

1.2 DEFINITIONS

- A. Air Barrier: Airtight barrier made of material that is virtually air impermeable but water vapor permeable, both to amount as specified, with sealed seams and sealed joints to adjacent surfaces.

1.3 REFERENCE STANDARDS

- A. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2021.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023c.
- C. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a, with Editorial Revision (2023).
- D. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.

1.4 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on material characteristics, performance criteria, and limitations.
- C. Shop Drawings: Provide drawings of special joint conditions.
- D. Manufacturer's Installation Instructions: Indicate preparation, installation methods, and storage and handling criteria.
- E. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.
- F. Manufacturer's qualification statement.
- G. Installer's qualification statement.
- H. Testing agency qualification statement.

1.5 QUALITY ASSURANCE

- A. Air Barrier Association of America (ABAA) Evaluated Air Barrier Assemblies; www.airbarrier.org/#sle: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture, and use secondary materials approved in writing by primary material manufacturer.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.
- C. Manufacturer Qualification: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture, and use secondary materials approved in writing by primary material manufacturer.
- D. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

1.6 MOCK-UPS

- A. Construct air barrier mock-up as part of the exterior wall mock up.
- B. Locate as indicated on drawings.
- C. Mock-up may remain as part of work.

1.7 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by materials manufacturers before, during, and after installation.
 - 1. Protect substrates from environmental conditions that affect air-barrier performance.
 - 2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog or mist.

PART 2 PRODUCTS

2.1 AIR BARRIER MATERIALS (AIR IMPERMEABLE AND WATER VAPOR PERMEABLE)

2.2 AIR BARRIER MATERIALS (AIR IMPERMEABLE AND WATER VAPOR IMPERMEABLE)

- A. Air and Vapor Barrier, Fluid-Applied:
 - 1. Air Permeance: 0.004 cfm/sq ft (0.02 L/(s sq m)), maximum, when tested in accordance with ASTM E2178.
 - 2. Water Vapor Permeance: 0.1 perm (5.72 ng/(Pa s sq m)), maximum, when tested in accordance with ASTM E96/E96M using Procedure A - Desiccant Method, at 73.4 degrees F (23 degrees C).
 - 3. Water Penetration Resistance Around Nails: Pass, when tested in accordance with ASTM D1970/D1970M.
 - 4. Pull Adhesion: Minimum 16 psi (110 kPa) pull-off strength when tested in accordance with ASTM D4541-09e1
 - 5. Crack Bridging: Pass, when tested in accordance with ASTM C1305-08.

6. Ultraviolet (UV) and Weathering Resistance: Approved in writing by manufacturer for up to 60 days of weather exposure.
7. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, Class A when tested in accordance with ASTM E84.
8. Seam and Perimeter Tape: As recommended by sheet manufacturer.
9. Products:
 - a. Carlisle Coatings and Waterproofing, Inc; Fire Resist Barritech NP: www.carlisleccw.com/#sle.
 - b. Tremco Commercial Sealants & Waterproofing; ExoAir 130: www.tremcosealants.com/#sle.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

2.3 ACCESSORIES

- A. Requirement: Provide primers, transition strips, termination strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces and conditions are ready for work of this section.
 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar or other contaminants.
 2. Verify that substrates have cured and aged for minimum time recommended in writing by air-barrier manufacturer.
 3. Verify that substrates are visibly dry and free of moisture. Test concrete substrates for capillary moisture by plastic sheet method according to ASTM D 4263.
 4. Verify that masonry joints are flush and completely filled with mortar.
- B. Where existing conditions are responsibility of another installer, notify Architect of unsatisfactory conditions.
- C. Do not proceed with this work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean, prepare, treat, fill and seal substrate and joints and cracks in substrate according to manufacturer's written instructions and details. Provide clean, dust-free and dry substrate for air-barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete..

- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes and other voids in concrete with substrate-patching membrane.
- E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.
- H. Bridge expansion joints discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer's written instructions and details.

3.3 INSTALLATION

- A. Install materials in accordance with manufacturer's installation instructions.
- B. Air Barriers: Install continuous airtight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
- C. Apply sealants and adhesives within recommended temperature range in accordance with manufacturer's installation instructions.
- D. Fluid-Applied Coatings or Membranes:
 - 1. Prepare substrate in accordance with manufacturer's installation instructions; treat joints in substrate and between dissimilar materials as indicated.
 - 2. Where exterior masonry veneer is being installed, install masonry anchors before installing air barrier over masonry; provide airtight seal around anchors.
 - 3. Apply bead or trowel coat of mastic sealant with minimum thickness of 1/4 inch (6 mm) along coating seams, rough cuts, and as recommended by manufacturer.
 - 4. Use flashing to seal to adjacent construction and to bridge joints in coating substrate.
- E. Openings and Penetrations in Exterior Air Barriers:
 - 1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches (125 mm) onto air barrier and at least 6 inches (150 mm) up jambs; mechanically fasten stretched edges.
 - 2. At openings with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with sealing tape at least 4 inches (100 mm) wide; do not seal sill flange.
 - 3. At openings with nonflanged frames, seal air barrier to each side of framing at opening using flashing at least 9 inches (230 mm) wide, and covering entire depth of framing.
 - 4. At head of openings, install flashing under air barrier extending at least 2 inches (50 mm) beyond face of jambs; seal air barrier to flashing.
 - 5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
 - 6. Service and Other Penetrations: Form flashing around penetrating item and seal to air barrier surface.

3.4 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements for additional requirements.
- B. Coordination of ABAA Tests and Inspections:
 - 1. Provide testing and inspection required by ABAA QAP.
 - 2. Notify ABAA in writing of schedule for air barrier work, and allow adequate time for testing and inspection.
 - 3. Cooperate with ABAA testing agency.
 - 4. Allow access to air barrier work areas and staging.
 - 5. Do not cover air barrier work until tested, inspected, and accepted.
- C. Do not cover installed air barriers until required inspections have been completed.
- D. Obtain approval of installation procedures from air barrier manufacturer based on a mock-up installed in place, prior to proceeding with remainder of installation.
- E. Take digital photographs of each portion of installation prior to covering up air barriers.

3.5 PROTECTION

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION

SECTION 07 31 13
ASPHALT SHINGLES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Asphalt shingle roofing.
- B. Flexible sheet membranes for eave protection, underlayment, and valley protection.
- C. Metal flashing.

1.2 REFERENCE STANDARDS

- A. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2021.
- B. ASTM D3462/D3462M - Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules; 2023.
- C. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2018).
- D. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings; 2020a.
- E. ASTM F1667/F1667M - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples; 2021a.
- F. NRCA (RM) - The NRCA Roofing Manual; 2024.

1.3 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data indicating material characteristics, performance criteria, and limitations.
- C. Shop Drawings: For metal flashings, indicate specially configured metal flashings, jointing methods and locations, fastening methods and locations, and installation details.
- D. Samples: Submit two samples of each shingle color indicating color range and finish texture/pattern ; for color selection.
- E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements for additional provisions.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacture of roofing systems similar to those required for this project, with not less than 5 years of documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.
- B. Deliver and store materials with labels intact in manufacturer's unopened packaging until ready for installation.
- C. Store materials under dry and waterproof cover, well ventilated, and elevated above grade on a flat surface.
- D. Protect materials from harmful environmental elements, construction dust, direct sunlight, and other potentially detrimental conditions.
- E. When storing roofing materials on roofing system ensure that no damage occurs to supporting members and other materials.

1.6 FIELD CONDITIONS

- A. Do not install shingles, eave protection membrane or underlayment when surface, ambient air, or wind chill temperatures are below 45 degrees F (7 degrees C).

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Asphalt Shingles:
 - 1. Atlas Roofing Corporation: www.atlasroofing.com/#sle.
 - 2. Certainteed Roofing; Landmark Premium Shingles: www.certainteed.com/#sle.
 - 3. GAF; Timberline HDZ RS Shingles: www.gaf.com/#sle.
 - 4. IKO Industries Inc: www.iko.com/#sle.
 - 5. Owens Corning Corp: www.owenscorning.com/#sle.
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 ASPHALT SHINGLES

- A. Asphalt Shingles: Asphalt-coated glass felt, mineral granule surfaced, complying with ASTM D3462/D3462M.
 - 1. Fire Resistance: Class A, complying with ASTM E108.
 - 2. Self-sealing type.
 - 3. Style: Square.
 - 4. Color: As selected by Architect.

2.3 SHEET MATERIALS

- A. Underlayment: Self-adhering butyl-rubber sheet complying with ASTM D1970/D1970M; strippable release film.
 - 1. Self Sealability: Passing nail sealability test specified in ASTM D1970/D1970M.
 - 2. Low Temperature Flexibility: Passing test specified in ASTM D1970/D1970M.

2.4 METAL FLASHING

- A. Metal Flashings: Provide sheet metal eave edge, gable edge, ridge, ridge vents, open valley flashing, chimney flashing, dormer flashing, and other flashing as indicated.
 - 1. Form flashings to profiles indicated on drawings.
 - 2. Form sections square and accurate to profile, in maximum possible lengths, free from distortion or defects detrimental to appearance or performance.
 - 3. Hem exposed edges of flashings minimum 1/4 inch (6 mm) on underside.

2.5 ACCESSORIES

- A. Roofing Nails: Standard round wire shingle type, galvanized steel, stainless steel, aluminum roofing nails, or copper roofing nails, minimum 3/8-inch (9.5 mm) head diameter, 12-gauge, 0.109-inch (2.77 mm) nail shank diameter, 1-1/2 inches (38 mm) long and complying with ASTM F1667/F1667M.
- B. Asphalt Roof Cement: ASTM D4586/D4586M, asbestos-free.
- C. Bituminous Paint: Acid and alkali resistant type; black color.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions prior to starting this work.
- B. Verify that roof deck is of sufficient thickness to accept fasteners.
- C. Verify that roof penetrations and plumbing stacks are in place and flashed to deck surface.
- D. Verify roof openings are correctly framed.
- E. Verify deck surfaces are dry, free of ridges, warps, or voids.

3.2 PREPARATION

- A. At areas where eave protection membrane is to be adhered to substrate, fill knot holes and surface cracks with latex filler.
- B. Broom clean deck surfaces before installing underlayment or eave protection.
- C. Protect surrounding areas and adjacent surfaces from damage during execution of this work.
- D. Install eave edge flashings tight with fascia boards, weather lap joints 2 inches (50 mm) and seal with roof cement, and secure flange with nails spaced a maximum of 12 inches (305 mm) on

center.

3.3 INSTALLATION

A. Eave Protection Membrane:

1. Install eave protection membrane from eave edge to minimum 48 inches (1,220 mm) up-slope beyond interior face of exterior wall.

B. Underlayment:

1. Roof Slopes Up to 8:12 : Install two layers of underlayment over area not protected by eave protection, with ends and edges weather lapped minimum 4 inches (100 mm); stagger end laps of each consecutive layer and nail in place.
2. Weather lap and seal watertight with plastic cement any items projecting through or mounted on roof.

C. Valley Protection:

1. Install one ply of smooth surfaced roll roofing, minimum 18 inches (450 mm) wide, centered over valleys.
2. Weather lap joints minimum 2 inches (50 mm).
3. Nail in place minimum 18 inches (450 mm) on center, 1 inch (25 mm) from edges.
4. At Exposed Valleys: Install one layer of sheet metal flashing, minimum 24 inches (600 mm) wide, centered over open valley and crimped to guide water flow. Weather lap joints minimum 2-inch (50 mm) wide band of lap cement along each edge of first layer, press roll roofing into cement, and nail in place minimum 18 inches (450 mm) on center and 1 inch (25 mm) from edges.

D. Metal Flashing:

1. Install flashings in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
2. Weather lap joints minimum 2 inches (50 mm) and seal weather tight with plastic cement.
3. Secure in place with nails at a maximum of 12 inches (305 mm) on center, and conceal fastenings.
4. Items Projecting Through or Mounted on Roofing: Flash and seal weather tight with plastic cement.

E. Shingles:

1. Install shingles in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
 - a. Fasten individual shingles using two nails per shingle, or as required by manufacturer and local building code, whichever is greater.
 - b. Fasten strip shingles using four nails per strip, or as required by manufacturer and local building code, whichever is greater.
2. Place shingles in straight coursing pattern with 5-inch (125 mm) weather exposure to produce double thickness over full roof area, and provide double course of shingles at eaves.
3. Project first course of shingles 3/4 inch (19 mm) beyond fascia boards.
4. Extend shingles 1/2 inch (13 mm) beyond face of gable edge fascia boards.
5. Complete installation to provide weathertight service.

3.4 CLEANING

- A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.
- B. Clean exposed work upon completion of installation; remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to finish.

3.5 PROTECTION

- A. Do not permit traffic over finished roof surface; protect roofing until completion of project.
- B. Touch-up, repair, or replace damaged asphalt shingles or accessories before Date of Substantial Completion.

END OF SECTION

SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings, counterflashings, sheet metal roofing, and exterior penetrations.
- B. Sealants for joints within sheet metal fabrications.

1.2 RELATED REQUIREMENTS

- A. Section 07 71 23 - Manufactured Gutters and Downspouts.

1.3 REFERENCE STANDARDS

- A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- C. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2017 (Reapproved 2023).
- D. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2018).
- E. CDA A4050 - Copper in Architecture - Handbook; current edition.
- F. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.4 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- C. Samples: Submit two samples, 4 by 6 inches (___ by ___ mm) in size, illustrating metal finish color.
- D. Product Data: Submit data on manufactured components metal types, finishes, and characteristics.

1.5 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

- B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with ____ years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.
- B. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- C. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Sheet Metal Flashing and Trim:
 - 1. ALUCOBOND by 3A Composites USA; ALUCOBOND AXCENT: www.alucobondusa.com/#sle.
 - 2. Fairview Architectural LLC; edgeline ____: www.fairview-na.com/#sle.
 - 3. Hickman Edge Systems: www.hickmanedgesystems.com/#sle.
 - 4. Petersen Aluminum Corporation: www.pac-clad.com/#sle.
 - 5. Tamlyn: www.tamlyn.com/#sle.
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Exterior Penetration Flashing Panel:
 - 1. Quickflash Weatherproofing Products, Inc: www.quickflashproducts.com/#sle.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 SHEET MATERIALS

- A. Stainless Steel: ASTM A666, Type 304 alloy, soft temper, 28 gauge, 0.0156 inch (0.40 mm) thick; smooth No. 4 - Brushed finish.

2.3 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch (13 mm); miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18-inch (450 mm) long legs; seam for rigidity, seal with sealant.
- F. Fabricate flashings to allow toe to extend 2 inches (50 mm) over roofing gravel. Return and brake edges.

2.4 EXTERIOR PENETRATION FLASHING PANELS

- A. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.

2.5 ACCESSORIES

- A. Fasteners: Galvanized steel, with soft neoprene washers.
- B. Underlayment: ASTM D226/D226M, organic roofing felt, Type II, No. 30.
- C. Slip Sheet: Rosin-sized sheathing paper.
- D. Primer Type: Zinc chromate.
- E. Concealed Sealants: Non-curing butyl sealant.
- F. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.
- G. Asphalt Roof Cement: ASTM D4586/D4586M, Type I, asbestos-free.
- H. Reglets: Surface-mounted type, galvanized steel; face and ends covered with plastic tape.
- I. Downspout Boots: Cast Iron

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.2 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Install surface mounted reglets true to lines and levels, and seal top of reglets with sealant.
- C. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch (0.38 mm).

3.3 INSTALLATION

- A. Comply with drawing details.
- B. Secure flashings in place using concealed fasteners.
- C. Apply plastic cement compound between metal flashings and felt flashings.

- D. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- E. Seal metal joints watertight.
- F. Secure gutters and downspouts in place with concealed fasteners.
- G. Slope gutters 1/4 inch per 10 feet (2.1 mm per m), minimum.
- H. Connect downspouts to downspout boots, and grout connection watertight.

3.4 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements for field inspection requirements.
- B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

END OF SECTION

SECTION 07 71 23
MANUFACTURED GUTTERS AND DOWNSPOUTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pre-finished aluminum gutters and downspouts.

1.2 RELATED REQUIREMENTS

- A. Section 07 62 00 - Sheet Metal Flashing and Trim.

1.3 REFERENCE STANDARDS

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.
- B. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2022.
- C. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
- D. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Comply with SMACNA (ASMM) for sizing components for rainfall intensity determined by a storm occurrence of 1 in 5 years.
- B. Comply with applicable code for size and method of rain water discharge.

1.5 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on prefabricated components.
- C. Shop Drawings: Indicate locations, configurations, jointing methods, fastening methods, locations, and installation details.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.
- B. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope to drain.
- C. Prevent contact with materials that could cause discoloration, staining, or damage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Gutters and Downspouts:
 - 1. ATAS International, Inc; ____: www.atas.com/#sle.
 - 2. Cheney Flashing Company; ____: www.cheneyflashing.com/#sle.
 - 3. Drexel Metals Inc; ____: www.drexmet.com/#sle.
 - 4. Hickman Edge Systems; ____: www.hickmanedgesystems.com/#sle.

2.2 MATERIALS

- A. Aluminum Sheet: ASTM B209/B209M; 0.032 inch (0.8 mm) thick.
 - 1. Finish: Mill.
 - 2. Finish: Mill.

2.3 COMPONENTS

- A. Gutters: CDA rectangular style profile.
- B. Downspouts: CDA rectangular profile.
- C. Anchors and Supports: Profiled to suit gutters and downspouts.
 - 1. Anchoring Devices: In accordance with CDA requirements.
 - 2. Gutter Supports: Brackets.
 - 3. Downspout Supports: Brackets.
- D. Fasteners: Galvanized steel, with soft neoprene washers.

2.4 FABRICATION

- A. Form gutters and downspouts of profiles and size indicated.
- B. Fabricate with required connection pieces.
- C. Form sections square, true, and accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.
- D. Hem exposed edges of metal.
- E. Fabricate gutter and downspout accessories; seal watertight.

2.5 FINISHES

- A. Class II Color Anodized Finish: AAMA 611 AA-M12C22A41, integrally colored anodic coating not less than 0.4 mil, 0.0004 inch (0.010 mm) thick.

2.6 ACCESSORIES

- A. Downspout Boots: Smooth interior without boxed corners or choke points; include integral lug slots and on-body cleanout and cover with neoprene gaskets.
 - 1. Configuration: Angular.
 - 2. Material: Cast iron; ASTM A48/A48M; casting thickness 3/8 inch (9.5 mm), minimum.
 - 3. Finish: Manufacturer's standard factory applied powder coat finish.
 - 4. Color: To be selected by Architect from manufacturer's standard range.
 - 5. Accessories: Manufacturer's standard stainless steel fasteners, stainless steel building wall anchors, and rubber coupling.
 - 6. Products:
 - a. Downspoutboots.com, a division of J. R. Hoe & Sons; ____:
www.downspoutboots.com/#sle.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that surfaces are ready to receive work.

3.2 PREPARATION

- A. Paint concealed sheet metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch (0.381 mm).

3.3 INSTALLATION

- A. Install gutters, downspouts, and accessories in accordance with manufacturer's instructions.
- B. Sheet Metal: Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts and accessories.
- C. Slope gutters 1/4 inch per 10 feet (203.2 mm/m) .
- D. Connect downspouts to downspout boots at 8 inches (____ mm) above grade. Grout connection watertight.
- E. Connect downspouts to storm sewer system. Grout connection watertight.

END OF SECTION

SECTION 07 92 00
JOINT SEALANTS

PART 1 GENERAL

1.1 SECTION INCLUDES

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

1.2 RELATED REQUIREMENTS

1.3 REFERENCE STANDARDS

- A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015 (Reapproved 2022).
- B. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants; 2018 (Reapproved 2022).
- C. ASTM C834 - Standard Specification for Latex Sealants; 2017 (Reapproved 2023).
- D. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2022.
- E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- F. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2023.
- G. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).
- H. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2022.
- I. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2023.
- J. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints; 2019 (Reapproved 2020).
- K. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2015 (Reapproved 2021).
- L. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2016 (Reapproved 2021).

1.4 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

- B. Product Data: Submit manufacturer's technical datasheets for each product to be used; include the following:
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates the product should not be used on.
 - 5. Substrates for which use of primer is required.
 - 6. Substrates for which laboratory adhesion and/or compatibility testing is required.
 - 7. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
 - 8. Sample product warranty.
 - 9. Certification by manufacturer indicating that product complies with specification requirements.
- C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
- D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- E. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.
- F. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.
- G. Installation Plan: Submit at least four weeks prior to start of installation.
- H. Preinstallation Field Adhesion Test Plan: Submit at least two weeks prior to start of installation.
- I. Field Quality Control Plan: Submit at least two weeks prior to start of installation.
- J. Preinstallation Field Adhesion Test Reports: Submit filled out Preinstallation Field Adhesion Test Reports log within 10 days after completion of tests; include bagged test samples and photographic records.
- K. Installation Log: Submit filled-out log for each length or instance of sealant installed.
- L. Field Quality Control Log: Submit filled-out log for each length or instance of sealant installed, within 10 days after completion of inspections/tests; include bagged test samples and photographic records, if any.
- M. Manufacturer's qualification statement.
- N. Installer's qualification statement.
- O. Executed warranty.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.
- C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.
- D. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
 - 1. Adhesion Testing: In accordance with ASTM C794.
 - 2. Compatibility Testing: In accordance with ASTM C1087.
 - 3. Allow sufficient time for testing to avoid delaying the work.
 - 4. Deliver sufficient samples to manufacturer for testing.
 - 5. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
 - 6. Testing is not required if sealant manufacturer provides data showing previous testing, not older than 24 months, that shows satisfactory adhesion, lack of staining, and compatibility.
- E. Installation Plan: Include schedule of sealed joints, including the following:
 - 1. Joint width indicated in Contract Documents.
 - 2. Joint depth indicated in Contract Documents; to face of backing material at centerline of joint.
 - 3. Method to be used to protect adjacent surfaces from sealant droppings and smears, with acknowledgment that some surfaces cannot be cleaned to like-new condition and therefore prevention is imperative.
 - 4. Installation Log Form: Include the following data fields, with known information filled out.
 - a. Location on project.
 - b. Substrates.
 - c. Sealant used.
 - d. Stated movement capability of sealant.
 - e. Primer to be used, or indicate no primer is used.
 - f. Size and actual backing material used.
 - g. Date of installation.
 - h. Name of installer.
 - i. Actual joint width; provide space to indicate maximum and minimum width.
 - j. Actual joint depth to face of backing material at centerline of joint.
 - k. Air temperature.
- F. Preinstallation Field Adhesion Test Plan: Include destructive field adhesion testing of one sample of each combination of sealant type and substrate, except interior acrylic latex sealants, and include the following for each tested sample.
 - 1. Identification of testing agency.
 - 2. Preinstallation Field Adhesion Test Log Form: Include the following data fields, with known information filled out.
 - a. Test date.

- b. Copy of test method documents.
 - c. Age of sealant upon date of testing.
 - d. Test results, modeled after the sample form in the test method document.
 - e. Indicate use of photographic record of test.
- G. Field Quality Control Plan:
 - 1. Visual inspection of entire length of sealant joints.
 - 2. Nondestructive field adhesion testing of sealant joints, except interior acrylic latex sealants.
 - a. For each different sealant and substrate combination, allow for one test every 12 inches (305 mm) in the first 10 linear feet (3 linear m) of joint and one test every 24 inches (610 mm) thereafter.
 - b. If any failures occur in the first 10 linear feet (3 linear m), continue testing at 12 inches (305 mm) intervals at no extra cost to Owner.
 - 3. Field testing agency's qualifications.
 - 4. Field Quality Control Log Form: Show same data fields as on Preinstallation Field Adhesion Test Log, with known information filled out and lines for multiple tests per sealant/substrate combinations; include visual inspection and specified field testing; allow for possibility that more tests than minimum specified may be necessary.
- H. Field Adhesion Test Procedures:
 - 1. Allow sealants to fully cure as recommended by manufacturer before testing.
 - 2. Have a copy of the test method document available during tests.
 - 3. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.
 - 4. When performing destructive tests, also inspect the opened joint for proper installation characteristics recommended by manufacturer, and report any deficiencies.
 - 5. Deliver the samples removed during destructive tests in separate sealed plastic bags, identified with project, location, test date, and test results, to Owner.
 - 6. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Architect.
- I. Nondestructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Nondestructive Spot Method.
- J. Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Destructive Tail Procedure.
 - 1. Sample: At least 18 inches (457 mm) long.
 - 2. Minimum Elongation Without Adhesive Failure: Consider the tail at rest, not under any elongation stress; multiply the stated movement capability of the sealant in percent by two; then multiply 1 inch (25.4 mm) by that percentage; if adhesion failure occurs before the 1-inch mark is that distance from the substrate, the test has failed.
 - 3. If either adhesive or cohesive failure occurs before minimum elongation, take necessary measures to correct conditions and retest; record each modification to products or installation procedures.
- K. Field Adhesion Tests of Joints: Test for adhesion using most appropriate method in accordance with ASTM C1521, or another applicable method as recommended by manufacturer.

1.6 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

- B. Manufacturer Warranty: Provide 2-year manufacturer warranty for installed sealants and accessories that fail to achieve a watertight seal, exhibit loss of adhesion or cohesion, or do not cure. Complete forms in Owner's name and register with manufacturer.
- C. Extended Correction Period: Correct defective work within five year period commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Nonsag Sealants:

1. Adfast USA Inc; ____: www.adfastcorp.com/#sle.
2. Adhesives Technology Corporation; ____: www.atcepoxy.com/#sle.
3. Bostik Inc; ____: www.bostik-us.com/#sle.
4. Dow; ____: www.dow.com/#sle.
5. Everkem Diversified Products, Inc; ____: www.everkemproducts.com/#sle.
6. Franklin International, Inc; ____: www.titebond.com/#sle.
7. Henry Company; ____: www.henry.com/#sle.
8. Hilti, Inc; ____: www.hilti.com/#sle.
9. Master Builders Solutions; ____: www.master-builders-solutions.com/en-us/#sle.
10. Momentive Performance Materials, Inc (formerly GE Silicones); ____: www.momentive.com/#sle.
11. Pecora Corporation; ____: www.pecora.com/#sle.
12. Sherwin-Williams Company; ____: www.sherwin-williams.com/#sle.
13. Sika Corporation; ____: www.usa.sika.com/#sle.
14. Specified Technologies Inc; ____: www.stifirestop.com/#sle.
15. Tremco Commercial Sealants & Waterproofing; ____: www.tremcosealants.com/#sle.
16. W.R. Meadows, Inc; ____: www.wrmeadows.com/#sle.
17. Substitutions: See Section 01 60 00 - Product Requirements.

B. Self-Leveling Sealants:

1. Adhesives Technology Corporation: www.atcepoxy.com/#sle.
2. Dayton Superior Corporation: www.daytonsuperior.com/#sle.
3. Dow: www.dow.com/#sle.
4. Master Builders Solutions: www.master-builders-solutions.com/en-us/#sle.
5. Pecora Corporation: www.pecora.com/#sle.
6. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
7. Sika Corporation: www.usa.sika.com/#sle.
8. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
9. W.R. Meadows, Inc: www.wrmeadows.com/#sle.
10. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 JOINT SEALANT APPLICATIONS

A. Scope:

1. Exterior Joints:
 - a. Seal open joints except open joints indicated on drawings as not sealed.
2. Interior Joints:

- a. Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
 - 1) Joints between door frames and window frames and adjacent construction.
 - 2) In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, and piping penetrations.
 - a) Exception: Such gaps and openings in gypsum board and plaster finished stud walls and suspended ceilings.
 - 3) In sound-rated wall and ceiling assemblies, seal joints between wall assemblies and ceiling assemblies; between wall assemblies and other construction; between ceiling assemblies and other construction.
 - a) Exception: Through-penetrations in sound-rated assemblies that are also fire-rated assemblies.
 - 3. Do Not Seal:
 - a. Intentional weep holes in masonry.
 - b. Joints indicated to be covered with expansion joint cover assemblies.
 - c. Joints where sealant is specified to be furnished and installed by manufacturer of product to be sealed.
 - d. Joints where sealant installation is specified in other sections.
 - e. Joints between suspended ceilings and walls.
- B. Exterior Joints: Use nonsag nonstaining silicone sealant, unless otherwise indicated.
 - 1. Lap Joints in Sheet Metal Fabrications: Butyl rubber, noncuring.
 - 2. Control and Expansion Joints in Concrete Paving: Self-leveling polyurethane traffic-grade sealant.
 - 3. Wiring Slots in Concrete Paving: Self-leveling epoxy sealant.
- C. Interior Joints: Use nonsag polyurethane sealant, unless otherwise indicated.
 - 1. Wall and Ceiling Joints in Nonwet Areas: Acrylic emulsion latex sealant.
 - 2. Wall and Ceiling Joints in Wet Areas: Nonsag polyurethane sealant for continuous liquid immersion.
 - 3. Floor Joints in Wet Areas: Nonsag polyurethane non-traffic-grade sealant suitable for continuous liquid immersion.
 - 4. Wall, Ceiling, and Floor Joints Where Tamper-Resistance is Required: Non-sag tamper-resistant silyl-terminated polyurethane sealant.
 - 5. Joints between Tile in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; clear.
 - 6. In Sound-Rated Assemblies: Acrylic emulsion latex sealant.
 - 7. Narrow Control Joints in Interior Concrete Slabs: Self-leveling epoxy sealant.
 - 8. Other Floor Joints: Self-leveling polyurethane traffic-grade sealant.
- D. Interior Wet Areas: Bathrooms, restrooms, kitchens, food service areas, food processing areas, and _____; fixtures in wet areas include plumbing fixtures, food service equipment, countertops, cabinets, other similar items, and _____.
- E. Sound-Rated Assemblies: Walls and ceilings identified as STC-rated, sound-rated, or acoustical.

2.3 JOINT SEALANTS - GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

- B. Colors: As indicated on drawings.

2.4 NONSAG JOINT SEALANTS

- A. Nonstaining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus and minus 50 percent, minimum.
 2. Nonstaining to Porous Stone: Nonstaining to light-colored natural stone when tested in accordance with ASTM C1248.
 3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
 4. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
 5. Color: Match adjacent finished surfaces.
 6. Cure Type: Single-component, neutral moisture curing.
 7. Service Temperature Range: Minus 20 to 180 degrees F (Minus 29 to 82 degrees C).
 8. Products:
 - a. Adfast USA Inc; Adseal DWS 4580 Series: www.adfastcorp.com/#sle.
 - b. Dow: www.dow.com/#sle.
 - c. Momentive Performance Materials, Inc/GE Silicones: www.siliconeforbuilding.com/#sle.
 - d. Pecora Corporation: www.pecora.com/#sle.
 - e. Sika Corporation: www.usa.sika.com/#sle.
 - f. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
- B. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
1. Color: Clear.
 2. Products:
 - a. Adfast USA Inc; ADSEAL KB 4800 Series: www.adfastcorp.com/#sle.
 - b. Everkem Diversified Products, Inc; TruSil 100: www.everkemproducts.com/#sle.
 - c. Pecora Corporation; Pecora 898 NST (Non-Staining Technology): www.pecora.com/#sle.
 - d. Sika Corporation; Sikasil GP: www.usa.sika.com/#sle.
- C. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single component; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus and minus 50 percent, minimum.
 2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
 3. Color: Match adjacent finished surfaces.
 4. Service Temperature Range: Minus 40 to 180 degrees F (Minus 40 to 82 degrees C).
 5. Products:
 - a. Master Builders Solutions; MasterSeal NP1: www.master-builders-solutions.com/en-us/#sle.
 - b. Pecora Corporation: www.pecora.com/#sle.
 - c. Polycoat Products: www.polycoatusa.com/#sle.
 - d. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
 - e. Sika Corporation: www.usa.sika.com/#sle.
 - f. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
 - g. W. R. Meadows, Inc: www.wrmeadows.com/#sle.

- D. Polyurethane Sealant for Continuous Water Immersion: ASTM C920, Grade NS, Uses M and A; single or multicomponent; explicitly approved by manufacturer for continuous water immersion; suitable for traffic exposure when recessed below traffic surface.
1. Movement Capability: Plus and minus 35 percent, minimum.
 2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
 3. Color: Match adjacent finished surfaces.
 4. Service Temperature Range: Minus 40 to 180 degrees F (Minus 40 to 82 degrees C).
 5. Products:
 - a. Sika Corporation: www.usa.sika.com/#sle.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, nonstaining, nonbleeding, nonsagging; not intended for exterior use.
1. Color: Standard colors matching finished surfaces, Type OP (opaque).
 2. Grade: ASTM C834; Grade 0 Degrees F (Minus 18 Degrees C).
 3. Products:
 - a. Everkem Diversified Products, Inc: www.everkemproducts.com/#sle.
 - b. Franklin International, Inc: www.titebond.com/#sle.
 - c. Hilti, Inc: www.us.hilti.com/#sle.
 - d. Master Builders Solutions: www.master-builders-solutions.com/en-us/#sle.
 - e. Pecora Corporation: www.pecora.com/#sle.
 - f. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
 - g. Specified Technologies Inc: www.stifirestop.com/#sle.
 - h. Top Gun, a brand of PPG Architectural Coatings: www.ppgpaints.com/#sle.
 - i. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
- F. Noncuring Butyl Sealant: Solvent-based, single component, nonsag, nonskinning, nonhardening, nonbleeding; nonvapor permeable; intended for fully concealed applications.
1. Products:
 - a. Pecora Corporation: www.pecora.com/#sle.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.

2.5 SELF-LEVELING JOINT SEALANTS

- A. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multicomponent; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
1. Movement Capability: Plus and minus 25 percent, minimum.
 2. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.
 3. Color: To be selected by Architect from manufacturer's standard range.
 4. Service Temperature Range: Minus 40 to 180 degrees F (Minus 40 to 82 degrees C).
 5. Products:
 - a. Pecora Corporation: www.pecora.com/#sle.
 - b. Polycoat Products: www.polycoatusa.com/#sle.
 - c. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
 - d. Sika Corporation: www.usa.sika.com/#sle.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Self-Leveling Polyurethane Sealant for Continuous Water Immersion: Polyurethane; ASTM C920, Grade P, Uses M and A; single component; explicitly approved by manufacturer for

traffic exposure and continuous water immersion.

1. Movement Capability: Plus and minus 25 percent, minimum.
 2. Color: To be selected by Architect from manufacturer's standard range.
 3. Service Temperature Range: Minus 40 to 180 degrees F (Minus 40 to 82 degrees C).
 4. Products:
 - a. Sika Corporation; Sikaflex-1c SL: www.usa.sika.com/#sle.
 - b. W. R. MEADOWS, Inc; POURTHANE SL: www.wrmeadows.com/#sle.
- C. Rigid Self-Leveling Polyurethane Joint Filler: Two part, low viscosity, fast setting; intended for cracks and control joints not subject to significant movement.
1. Hardness Range: Greater than 100, Shore A, and 50 to 80, Shore D, when tested in accordance with ASTM C661.
 2. Products:
 - a. ARDEX Engineered Cements; ARDEX ARDIFIX: www.ardexamericas.com/#sle.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Flexible Polyurethane Foam: Single component, gun grade, and low-expanding.
1. Products:
 - a. ADFAST Corporation: www.adfastcorp.com/#sle.
 - b. DAP Products Inc: www.dapspecline.com/#sle.
 - c. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- E. High Quality Latex-Based Sound Sealant: ASTM C834, Type OP an opaque sealant, and Grade 0, 32 degrees F (0 degrees C), meets requirements for low-temperature flexibility.
1. Color: White.
 2. Products:
 - a. Everkem Diversified Products, Inc; Sound Seal 90: www.everkemproducts.com/#sle.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Semi-Rigid Self-Leveling Epoxy Joint Filler: Epoxy or epoxy/polyurethane copolymer; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
1. Composition: Multicomponent, 100 percent solids by weight.
 2. Durometer Hardness: Minimum of 85 for Type A or 35 for Type D, after seven days when tested in accordance with ASTM D2240.
 3. Color: To be selected by Architect from manufacturer's standard colors.
 4. Joint Width, Minimum: 1/8 inch (3 mm).
 5. Joint Width, Maximum: 1/4 inch (6 mm).
 6. Joint Depth: Provide product suitable for joints from 1/8 inch (3 mm) to 2 inches (51 mm) in depth including space for backer rod.
 7. Products:
 - a. Dayton Superior Corporation; ____: www.daytonsuperior.com/#sle.
 - b. Euclid Chemical Company; EUCO 700: www.euclidchemical.com/#sle.
 - c. W.R. Meadows, Inc; Rezi-Weld Flex: www.wrmeadows.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- G. Semi-Rigid Self-Leveling Polyurea Joint Filler: Two-component, 100 percent solids; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.

1. Durometer Hardness, Type A: 75, minimum, after seven days when tested in accordance with ASTM D2240.
2. Color: To be selected by Architect from manufacturer's standard colors.
3. Joint Width, Minimum: 1/8 inch (3 mm).
4. Joint Width, Maximum: 3/4 inch (19 mm).
5. Joint Depth: Provide product suitable for joints from 1/8 inch (3 mm) to 1 inch (25.4 mm) in depth excluding space for backer rod.
6. Products:
 - a. Adhesives Technology Corporation: www.atcepoxy.com/#sle.
 - b. ARDEX Engineered Cements: www.ardexamericas.com/#sle.
 - c. Curecrete Distribution, Inc: www.curecrete.com/#sle.
 - d. Euclid Chemical Company: www.euclidchemical.com/#sle.
 - e. Nox-Crete Inc: www.nox-crete.com/#sle.
 - f. Polycoat Products: www.polycoatusa.com/#sle.
 - g. Rust-Oleum Corporation: www.rustoleum.com/#sle.
 - h. SpecChem, LLC: www.specchemllc.com/#sle.
 - i. Substitutions: See Section 01 60 00 - Product Requirements.

2.6 ACCESSORIES

- A. Sealant Backing Rod, Closed-Cell Type:
 1. Cylindrical flexible sealant backings complying with ASTM C1330 Type C.
 2. Size: 25 to 33 percent larger in diameter than joint width.
- B. Sealant Backing Rod, Open-Cell Type:
 1. Cylindrical flexible sealant backings complying with ASTM C1330 Type O.
 2. Size: 40 to 50 percent larger in diameter than joint width.
- C. Sealant Backing Rod, Bi-Cellular Type:
 1. Cylindrical flexible sealant backings complying with ASTM C1330 Type B.
 2. Size: 25 to 33 percent larger in diameter than joint width.
- D. Preformed Extruded Silicone Joint Seal: Pre-cured low-modulus silicone extrusion, in sizes to fit applications indicated on drawings, combined with a neutral-curing liquid silicone sealant for bonding joint seal to substrates.
 1. Size: 1 inch (25.4 mm) wide, in rolls 100 feet (30.5 m) long.
 2. Thickness: 0.78 inch (19.8 mm), with ridges along outside bottom edges for bonding area.
 3. Color: As selected by Architect..
 4. Durometer Hardness, Type A: 26 to 32, minimum, when tested in accordance with ASTM D2240.
 5. Tensile Strength: 218 psi (1.5 MPa), in accordance with ASTM D412.
 6. Elongation at Break: 554 percent, in accordance with ASTM D412.
- E. Preformed Extruded Polyurethane Joint Seal: Medium-modulus, preformed polyurethane extrusion used to bridge joints under elastomeric wall coatings, in sizes to fit applications indicated on drawings, combined with polyurethane sealant for bonding joint seal to substrates.
 1. Size: 1-1/2 inch (38 mm) wide, in rolls 100 feet (30.5 m) long.
 2. Thickness: 0.051 inch (1.3 mm), with ridges along outside bottom edges for bonding area.
 3. Color: As selected by Architect.

4. Durometer Hardness, Type A: 55, minimum, when tested in accordance with ASTM D2240.
 5. Tensile Strength: 532 psi (3.67 MPa), in accordance with ASTM D412.
 6. Elongation at Break: 690 percent, in accordance with ASTM D412.
- F. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- G. Masking Tape: Self-adhesive, nonabsorbent, nonstaining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- H. Joint Cleaner: Noncorrosive and nonstaining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- I. Primers: Type recommended by sealant manufacturer to suit application; nonstaining.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.
- D. Preinstallation Adhesion Testing: Install a sample for each test location indicated in the test plan.
 1. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.
 2. Notify Architect of date and time that tests will be performed, at least seven days in advance.
 3. Record each test on Preinstallation Adhesion Test Log as indicated.
 4. If any sample fails, review products and installation procedures, consult manufacturer, or take other measures that are necessary to ensure adhesion; retest in a different location; if unable to obtain satisfactory adhesion, report to Architect.
 5. After completion of tests, remove remaining sample material and prepare joints for new sealant installation.

3.2 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.
- E. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in an inconspicuous area to verify that it does not stain or discolor slab.

3.3 INSTALLATION

- A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Provide joint sealant installations complying with ASTM C1193.
- C. Install acoustical sealant application work in accordance with ASTM C919.
- D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- E. Install bond breaker backing tape where backer rod cannot be used.
- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- G. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- H. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
- I. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

3.4 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements for additional requirements.
- B. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.
- C. Non-Destructive Adhesion Testing: If there are any failures in first 100 linear feet (30 linear m), notify Architect immediately.
- D. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

END OF SECTION

SECTION 08 14 16
FLUSH WOOD DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

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

1.2 RELATED REQUIREMENTS

- A. Section 06 20 00 - Finish Carpentry: Wood door frames.
- B. Section 08 71 00 - Door Hardware.
- C. Section 08 80 00 - Glazing.

1.3 REFERENCE STANDARDS

- A. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.
- B. AWI (QCP) - Quality Certification Program; Current Edition.
- C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- D. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.
- E. WDMA I.S. 1A - Interior Architectural Wood Flush Doors; 2021, with Errata (2022).

1.4 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
 - 1. Indicate dimensions and locations of mortises and holes for hardware.
 - 2. Indicate dimensions and locations of cutouts.
 - 3. Indicate requirements for veneer matching.
 - 4. Indicate doors to be factory finished and finish requirements.
 - 5. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
- D. Samples: Factory finishes applied to actual door face materials, 8 by 10 inches, for each material and finish. For wood species and transparent finish, provide set of three samples of

door veneer illustrating range of wood grain, stain color, and sheen to be expected. Printed brochures are not acceptable.

- E. Frames for light openings, 6 inches long, for each material, type and finish required.
- F. Certificate: Submit labels and certificates required by quality assurance and quality control programs.
- G. Manufacturer's Installation Instructions: Indicate special installation instructions.
- H. Manufacturer's qualification statement.
- I. Installer's qualification statement.
- J. Warranty, executed in Owner's name.

1.5 QUALITY ASSURANCE

- A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.
- B. Woodwork Quality Assurance Program:
 - 1. Comply with AWI (QCP) woodwork association quality assurance service/program in accordance with requirements for work specified in this section; www.awiqcp.org/#sle.
 - 2. Provide labels indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
 - 3. Provide designated labels on shop drawings as required by quality assurance program.
 - 4. Provide designated labels on installed products as required by quality assurance program.
 - 5. Submit documentation upon completion of installation that verifies this work is in compliance with specified requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging, and inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and break seal on site to permit ventilation.

1.7 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide manufacturer's warranty on interior doors for the life of the installation. Complete forms in Owner's name and register with manufacturer.
 - 1. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Wood Veneer Faced Doors:
 - 1. Basis of Design Product: Masonite Architectural; Aspiro Select Wood Veneer Doors: www.architectural.masonite.com/#sle.
 - 2. VT Industries, Inc; ____: www.vtindustries.com/#sle.
 - 3. Graham; an Assa Abloy Group company..
 - 4. Oshkosh Door Company

2.2 DOORS AND PANELS

- A. Doors: See drawings for locations and additional requirements.
 - 1. Quality Standard: Custom Grade, Extra 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 (44 mm) thick unless otherwise indicated; flush construction.
 - 1. Provide solid core doors at each location.

2.3 DOOR AND PANEL CORES

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.

2.4 DOOR FACINGS

- A. Veneer Facing for Transparent Finish:
 - 1. Vertical Edges: Any option allowed by quality standard for grade.
 - 2. Grade: Premium, with Grade AA faces.
 - 3. Species: Select White Maple.
 - 4. Cut: Plain Sliced.
 - 5. Match between veneer leave: Slip match.
 - 6. Assembly of veneer leaves on door faces: Balance match.
 - 7. Pair and set match: Provide for doors hung in same opening or separated only by mullions.
 - 8. Exposed vertical edges: Applied wood-veneer edges of same species as faces and covering edges of facesls
 - 9. Core: Particleboard
 - 10. Construction: Five plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.
 - 11. WDMA 1-A Performance Grade: Heavy duty except at Courtroom Entrances, which shall be Extra Heavy Duty.

2.5 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.
- C. Where supplementary protective edge trim is required, install trim after veneer facing has been applied full-width.
- D. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
- E. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- F. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- G. Cut and configure exterior door edge to receive recessed weatherstripping devices.
- H. Provide edge clearances in accordance with the quality standard specified.

2.6 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:
- B. Finish work in accordance with WDMA I.S. 1A for grade specified and as follows:
 - 1. Grade: Premium.
 - 2. Effect: Open-grain finish.
 - 3. Sheen: Satin.
 - 4. Stain: Match architect's sample.
 - 5. Basis of Design: Aspiro Series | Harring #A101 by Masonite Architectural, Plain Sliced Select White Maple
 - a. System - TR-4, Conversion Varnish.
 - b. Sheen: Satin.
- C. Factory finish doors in accordance with approved sample.
- D. Seal door top edge with color sealer to match door facing.

2.7 ACCESSORIES

- A. Wood Door Frames: See Section 06 20 00.
- B. Glazed Openings:
 - 1. Heat-Strengthened and Fully Tempered Glass: ASTM C1048.
 - 2. Glazing: Single vision units, 1/4 inch (6.4 mm) thick glass.
 - 3. Tint: Clear.
- C. Door Window Frames: Door window frames with glazing securely fastened within door opening.
 - 1. Size: As indicated on drawings.
 - 2. Glazing: 1/4 inch (6.4 mm) thick, tempered glass, in compliance with requirements of authorities having jurisdiction.

- D. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws.
- E. Door Hardware: See Section 08 71 00.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.2 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Use machine tools to cut or drill for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.
- E. Coordinate installation of glazing.

3.3 TOLERANCES

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

3.4 ADJUSTING

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

END OF SECTION

SECTION 08 31 00
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Ceiling-mounted access units.

1.2 RELATED REQUIREMENTS

1.3 REFERENCE STANDARDS

1.4 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- C. Shop Drawings: Indicate exact position of each access door and/or panel unit.
- D. Project Record Documents: Record actual locations of each access unit.

PART 2 PRODUCTS

2.1 ACCESS DOORS AND PANELS ASSEMBLIES

2.2 Ceiling-MOUNTED ACCESS UNITS

- A. Manufacturers:
 - 1. Activar Construction Products Group, Inc. - JL Industries: www.activarcpg.com/#sle.
 - 2. Nystrom, Inc: www.nystrom.com/#sle.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Ceiling-Mounted Units: Factory-fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
 - 1. Material: 20 gauge steel.
 - 2. Style: Exposed frame with door surface flush with frame surface.
 - 3. Frames: 16-gauge, 0.0598-inch (1.52 mm) minimum thickness.
 - 4. Insulation: Non-combustible mineral wool or glass fiber, 2 inches.
 - 5. Primed and Factory Finish: Polyester powder coat; white .
 - 6. Door/Panel Size: As indicated on the drawings.
 - 7. Hardware:
 - a. Hinges: Continuous piano hinge.
 - b. Latch/Lock: Knurled Knob / Key Operated Latch Bolt

- c. Inside Latch Release: Mechanism that allows door/panel to be opened from inside.
- d. Gasketing: Extruded neoprene, around perimeter of door panel.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that rough openings are correctly sized and located.
- B. Begin installation only after substrates have been properly prepared, and if the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to proceeding with this work.
- B. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

3.3 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings, and secure units rigidly in place.
- C. Position units to provide convenient access to concealed equipment when necessary.

END OF SECTION

SECTION 08 43 13
ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.1 SECTION INCLUDES

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

1.2 RELATED REQUIREMENTS

- A. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.
- B. Section 08 44 13 - Glazed Aluminum Curtain Walls.
- C. Section 08 71 00 - Door Hardware: Hardware items other than specified in this section.
- D. Section 08 80 00 - Glazing: Glass and glazing accessories.

1.3 REFERENCE STANDARDS

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site; 2015.
- B. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems; 2015.
- C. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.
- D. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.
- E. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
- F. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- G. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.
- H. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.
- I. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014

(Reapproved 2021).

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of other components that comprise the exterior enclosure.
- B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.5 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, and internal drainage details.
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.
- D. Samples: Submit two samples 12" x 12" inches (304.8 x 304.8 mm) in size illustrating finished aluminum surface, glass, glazing materials.
- E. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.
- F. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.
- G. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.
- H. Manufacturer's qualification statement.
- I. Installer's qualification statement.
- J. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.
 - 1. Provide certified glass products through ANSI accredited certifications that include plant audits and independent laboratory performance testing.
 - a. Insulating Glass Certification Council (IGCC).
 - b. Safety Glazing Certification Council (SGCC).
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.

- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.8 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C). Maintain this minimum temperature during and 48 hours after installation.

1.9 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
- D. Provide ten year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Aluminum-Framed Storefronts:
 - 1. Basis of Design: Kawneer North America; Kawneer 451T: www.kawneer.com/#sle.
 - 2. Pittco Architectural Metals Inc; _____: www.pittcometals.com/#sle.
 - 3. Tubelite, Inc; _____: www.tubeliteinc.com/#sle.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 BASIS OF DESIGN -- FRAMING FOR INSULATING GLAZING

- A. Center-Set Style, Thermally-Broken:
 - 1. Basis of Design: Kawneer 451T.
- B. Substitutions: See Section 01 60 00 - Product Requirements.
 - 1. For any product not identified as "Basis of Design", submit information as specified for substitutions.

2.3 BASIS OF DESIGN -- FRAMING SYSTEM (DOOR FRAMES)

- A. Basis of Design Exterior Storefront: Kawneer 451T; Kawneer North America, www.kawneer.com/#sle
 - 1. Face Dimension: 2 inches
 - 2. Depth: 4 1/2 inches
- B. Basis of Design Interior Storefront: Kawneer 451; Kawneer North America, www.kawneer.com/#sle
 - 1. Face Dimension: 2 inches
 - 2. Depth: 4 1/2 inches

2.4 BASIS OF DESIGN -- SWINGING DOORS

- A. Wide Stile, Insulating Glazing, Thermally Broken:
 - 1. Basis of Design: Kawneer Wide Stile 500T Insulpour Thermal Door; Kawneer North America, www.kawneer.com#sle.
 - 2. Bottom Rail: 6 1/2" minimum height
 - 3. Hardware: Provided under Division 08 Section "Door Hardware".
 - 4. Automatic Operators: Refer to Division 08 Section "Door Hardware".
 - 5. Glazing: 1 inch insulated safety glazing; refer to Division 08 Section "Glazing".
 - 6. Thickness: 2 1/4 inches (____ mm).
 - 7. Miscellaneous: Coordinate electrical connections to automatic door operators and card readers where required.
- B. Substitutions: See Section 01 60 00 - Product Requirements.
 - 1. For any product not identified as "Basis of Design", submit information as specified for substitutions.

2.5 ALUMINUM-FRAMED STOREFRONT

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
 - 1. Unitized, shop assembly.
 - 2. Glazing Rabbet: For 1 inch (25 mm) insulating glazing.
 - 3. Finish: Class I color anodized.
 - a. Factory finish all surfaces that will be exposed in completed assemblies.
 - 4. Finish Color: Color match to Sherwin Williams 6608 Rave Red.
 - 5. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
 - 6. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
 - 7. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
 - 8. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F (95 degrees C) over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
 - 9. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
 - 10. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
- B. Performance Requirements
 - 1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
 - a. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.

2. Air Leakage: 0.06 cfm/sq ft (0.3 L/sec sq m) maximum leakage of storefront wall area when tested in accordance with ASTM E283/E283M at 1.57 psf (75 Pa) pressure difference.
3. Air Leakage: 0.06 cfm/sq ft (0.3 L/sec sq m) maximum leakage of storefront wall area when tested in accordance with ASTM E283/E283M at 1.57 psf (75 Pa) pressure difference.

2.6 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
 1. Glazing Stops: Flush.
- B. Glazing: See Section 08 80 00.
- C. Swing Doors: Glazed aluminum.
 1. Thickness: 2 1/4 inches (57.15 mm).
 2. Top Rail: 5 inches (127 mm) wide.
 3. Vertical Stiles: 5 inches (127 mm) wide.
 4. Bottom Rail: 6 1/2 inches (165.1 mm) wide.
 5. Glazing Stops: Square.
 6. Finish: Same as storefront.

2.7 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Sheet Aluminum: ASTM B209/B209M.
- C. Fasteners: Stainless steel.
- D. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

2.8 FINISHES

- A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A42 Integrally colored anodic coating not less than 0.7 mils (0.018 mm) thick.
- B. Color: Color match to Sherwin Williams 6608 Rave Red.

2.9 HARDWARE

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

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Install wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Set thresholds in bed of sealant and secure.
- J. Install hardware using templates provided.
- K. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.3 TOLERANCES

- A. Maximum Variation from Plumb: 0.06 inch per 3 feet (1.5 mm per m) non-cumulative or 0.06 inch per 10 feet (1.5 mm per 3 m), whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch (0.8 mm).

3.4 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements for general testing and inspection requirements.
- B. Water-Spray Test: Provide water spray quality test of installed storefront components in accordance with AAMA 501.2 during construction process and before installation of interior finishes.
 - 1. Perform a minimum of two tests in each designated area as indicated on drawings.

2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.
- C. Repair or replace storefront components that have failed designated field testing, and retest to verify performance complies with specified requirements.

3.5 ADJUSTING

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

3.6 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths, and take care to remove dirt from corners and to wipe surfaces clean.
- C. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

3.7 PROTECTION

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

END OF SECTION

SECTION 08 44 13
GLAZED ALUMINUM CURTAIN WALLS

PART 1 GENERAL

1.1 Section Includes

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

1.2 Related Requirements

- A. Section 05 12 00 - Structural Steel Framing: Steel attachment members.
- B. Section 08 80 00 - Glazing.
- C. Section 09 91 23 - Interior Painting: Field painting of interior surface of infill panels.

1.3 Reference Standards

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- C. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
- D. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- E. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.
- F. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.
- G. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).

1.4 Administrative Requirements

- A. Preinstallation Meeting: Conduct a preinstallation meeting at the project site one week before starting work of this section; require attendance by all affected installers.

1.5 Submittals

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: For each product indicated

- C. Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication and assembly of glazed aluminum curtain-wall systems.
 - 1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Samples: For each exposed finish.
- E. Test Reports: Submit results of full-size mock-up testing. Reports of tests previously performed on the same design are acceptable.
- F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.6 Quality Assurance

- A. Installer Qualifications: Acceptable to manufacturer and capable of preparing data for glazed aluminum curtain-wall systems including Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this project.

1.7 Warranty

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Special Warranty: manufacturer's standard form in which manufacturer agrees to repair or replace components of glazed aluminum curtain-wall systems that do not comply with requirements or that deteriorate as defined in this Section within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration caused by thermal movements.
 - c. Deterioration of metals and other materials beyond normal weathering.
 - d. Water leakage.
 - e. Failure of operating components to function normally.
 - 2. Warranty Period: 5 years from date of substantial completion.
- C. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 Manufacturers

- A. Glazed Aluminum Curtain Walls Manufacturers:
 - 1. Basis of Design: Kawneer North America; Kawnee 1600 UT System 2 Curtain Wall: www.kawneer.com/#sle.
 - 2. Pittco Architectural Metals Inc; ____: www.pittcometals.com/#sle.
 - 3. Tubelite, Inc; ____: www.tubeliteinc.com/#sle.
 - 4. Wausau Window and Wall Systems; ____: www.wausauwindow.com/#sle.
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 Curtain Wall

- A. Aluminum-Framed Curtain Wall: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
 - 1. Finish: Class I natural anodized.
 - a. Factory finish surfaces that will be exposed in completed assemblies.
 - b. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
 - 2. Provide flush joints and corners, weathersealed, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for imposed loads.
 - 3. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
 - 4. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
- B. Structural Performance Requirements: Design and size components to withstand the following load requirements without damage or permanent set.
 - 1. Design Wind Loads: Comply with the following:
 - a. Positive Design Wind Load: ____ lbf/sq ft (____ Pa).
 - b. Negative Design Wind Load: ____ lbf/sq ft (____ Pa).
 - c. Measure performance by testing in accordance with ASTM E330/E330M, using test loads equal to 1.5 times the design wind loads and 10 second duration of maximum pressure.
 - 2. Movement: Accommodate the following movement without damage to components or deterioration of seals:
 - a. Expansion and contraction caused by 180 degrees F (82 degrees C) surface temperature.
 - b. Expansion and contraction caused by cycling temperature range of 170 degrees F (77 degrees C) over a 12 hour period.
 - c. Movement of curtain wall relative to perimeter framing.
 - d. Deflection of structural support framing, under permanent and dynamic loads.
- C. Water Penetration Resistance on Manufactured Assembly: No uncontrolled water on indoor face when tested as follows:
- D. Water Penetration Resistance on Manufactured Assembly: No uncontrolled water on indoor face when tested as follows:
 - 1. Test Pressure Differential: 10 psf (480 Pa).
- E. Air Leakage: 0.06 cfm/sq ft (0.3 L/sec sq m) maximum leakage of wall area when tested in accordance with ASTM E283/E283M at 6.24 psf (300 Pa) pressure difference across assembly.
- F. Air Leakage: 0.06 cfm/sq ft (0.3 L/sec sq m) maximum leakage of wall area when tested in accordance with ASTM E283/E283M at 6.24 psf (300 Pa) pressure difference across assembly.

2.3 Components

- A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.

- B. Glazing: See Section 08 80 00.
- C. Insulated Spandrel Panels: Laminated, metal-faced flat panels with no deviations in plane exceeding 0.8 percent of panel dimension in width or length.
 - 1. Overall Panel Thickness: 1 inch (25.4 mm).
 - 2. Exterior Skin: Aluminum
 - a. Thickness: Manufacturer's standard for finish and texture indicated.
 - b. Finish: Matching framing system.
 - c. Texture: Smooth.
 - d. Backing Sheet: 0.125-inch (3.2mm) thick, corrugated, high-density polyethylene.
 - 3. Interior Skin: Aluminum.
 - a. Thickness: Manufacturer's standard for finish and texture indicated.
 - b. Finish: Matching curtain-wall framing.
 - c. Texture: Smooth.
 - d. Backing Sheet: 0.125-inch (3.2mm) thick, corrugated, high-density polyethylene.
 - 4. Thermal Insulation Core: Manufacturer's standard rigid, closed-cell, extruded-polystyrene.
 - 5. Surface-Burning Characteristics: For exposed interior surfaces of panels, when tested according to ASTM E 84 as follows:
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.

2.4 Materials

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
 - 1. Alloy and temper recommended by glazed aluminum curtain wall manufacturer for strength, corrosion resistance, and application of required finish.
 - 2. Sheet and Plate: ASTM B 209 (ASTM B 209 M).
 - 3. Extruded Structural Pipe and Tubes: ASTM B 429.
- B. Sheet Aluminum: ASTM B209/B209M.
- C. Steel Reinforcement: With manufacturer's standard corrosion-resistant primer.
 - 1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
 - 2. Cold-Rolled Sheet and Strip: ASTM A 611.
 - 3. Hot-Rolled Sheet and Strip: ASTM A 570/A 570M.
- D. Anchors: Three-way adjustable anchors that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
 - 1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A123 M or ASTM A 153/A153M requirements.
- E. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with non-staining, non-ferrous shims for aligning system components.
- F. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.
 - 1. Where fasteners are subject to loosening or turn out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
 - 2. Reinforce members as required to receive fastener threads.

3. Use exposed fasteners with countersunk Phillips screw heads.
 4. Finish exposed portions to match framing system.
 5. At movement joints, use slip-joint linings, spacers, and sleeves of material and type recommended by manufacturer.
- G. Concealed Flashings: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding flashing compatible with adjacent materials.
 - H. Framing Gaskets: As recommended by manufacturer for joint type.
 - I. Framing Sealants: As recommended by manufacturer for joint type.
 - J. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
 - K. Glazing Sealants: As recommended by manufacturer for joint type.
 - L. Glazing Accessories: See Section 08 80 00.

2.5 Fabrication

- A. Form Aluminum shapes before finishing.
- B. Fabricate components that, when assembled, have the following characteristics:
 1. Sharp profiles, straight and free of defects or deformations.
 2. Accurately fitted joints with ends coped or mitered.
 3. Internal guttering systems or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
 4. Physical and thermal isolation of glazing from framing members.
 5. Accommodations for thermal and mechanical movements of glazing and framing to prevent glazing-to-glazing contact and to maintain required glazing edge clearances.
- C. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

2.6 Finishes

- A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A42 Integrally colored anodic coating not less than 0.7 mils (0.018 mm) thick.
- B. Color: Color match to Sherwin Williams 6608 Rave Red.
- C. Source Quality: Provide aluminum curtain walls specified herein from a single source.
 1. Building Enclosure System: When aluminum curtain walls are part of a building enclosure system, including entrances, entrance hardware, windows, storefront framing and related products, provide building enclosure system products from a single source manufacturer.

PART 3 EXECUTION

3.1 Examination

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify dimensions, tolerances, and method of attachment with other related work.
- C. Verify that curtain wall openings and adjoining water-resistive and air barrier seal materials are ready to receive work of this section.
- D. Verify that anchorage devices have been properly installed and located.

3.2 Installation

- A. Install curtain wall system in accordance with AAMA MCWM-1 - Metal Curtain Wall, Window, Store Front and Entrance - Guide Specifications Manual
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Coordinate attachment and seal of perimeter air and vapor retarder materials.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Install integral flashings and integral joint sealers.
- J. Coordinate installation of glass with Section 08 80 00; separate glass from metal surfaces.
- K. Coordinate installation of perimeter sealants with Section 07 92 00
- L. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.3 Tolerances

- A. Maximum Variation from Plumb: 0.06 inch per 3 feet (1.5 mm/m) noncumulative or 1/16 inch per 10 ft, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch (0.8 mm).
- C. Sealant Space Between Curtain Wall Mullions and Adjacent Construction: Maximum of 3/4 inch (19 mm) and minimum of 1/4 inch (6 mm).

3.4 Field Quality Control

- A. Provide services of curtain wall manufacturer's field representative to observe for proper installation of system and submit report.
- B. See Section 01 40 00 - Quality Requirements for general testing and inspection requirements.
- C. Field Tests: Architect shall select curtain wall units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for air infiltration and water penetration with manufacturer's representative present. Tests not meeting specified performance requirements and units having deficiencies shall be corrected as part of the contract amount.
 - 1. Testing: Testing shall be performed per AAMA 503 by a qualified independent testing agency. Refer to Testing Section for payment of testing and testing requirements.
 - a. Air Infiltration Tests: Conduct tests in accordance with ASTM E 783. Allowable air infiltration shall not exceed 1.5 times the amount indicated in the performance requirements or 0.09 cfm/sq ft, whichever is greater.
 - b. Water Infiltration Tests: Conduct tests in accordance with ASTM E 1105. No uncontrolled water leakage is permitted when tested at a static test pressure of two-thirds the specified water penetration pressure but not less than 8 psf (383 Pa).
 - 2. Manufacturer's Field Services: Upon Owner's written request, provide periodic site visit by manufacturer's field service representative.
- D. Repair or replace curtain wall components that have failed designated field testing, and retest to verify performance complies with specified requirements.

3.5 Cleaning

- A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.
- B. Remove protective material from pre-finished aluminum surfaces.
- C. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths, take care to remove dirt from corners, and wipe surfaces clean.
- D. Remove excess sealant by method acceptable to sealant manufacturer.

3.6 Protection

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.
- B. Protect installed products from damage.

END OF SECTION

SECTION 08 52 00
WOOD WINDOWS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Factory-fabricated wood windows.
- B. Glazing.
- C. Wood trim for exterior finishing.

1.2 RELATED REQUIREMENTS

- A. Section 07 25 00 - Weather Barriers: Sealing frames to water-resistive barrier installed on adjacent construction.
- B. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.
- C. Section 08 80 00 - Glazing.
- D. Section 09 91 13 - Exterior Painting: Site finishing wood surfaces.
- E. Section 09 91 23 - Interior Painting: Site finishing wood surfaces.

1.3 REFERENCE STANDARDS

- A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for Windows, Doors, and Skylights; 2022.
- B. AAMA 502 - Voluntary Specification for Field Testing of Newly Installed Fenestration Products; 2021.
- C. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors; 2002 (Reapproved 2018).
- D. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2015 (Reapproved 2023).

1.4 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Show component dimensions, anchorage and fasteners, glass, and internal drainage details.
- C. Shop Drawings: Indicate opening dimensions, framed opening tolerances, affected related work, and installation requirements.

- D. Samples: Two samples 12 by 12 inch (___ by ___ mm) in size illustrating window frame section.
- E. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.

1.5 QUALITY ASSURANCE

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect factory finished surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.

1.7 FIELD CONDITIONS

1.8 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Wood Windows:
 - 1. Andersen Windows, Inc; ___ : www.andersenwindows.com/#sle.
 - 2. BASIS OF DESIGN: Pella Corp; Architect Series Reserve: www.pellacommercial.com/#sle.
 - 3. Marvin Signature Wood Windows.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 WOOD WINDOWS

- A. Wood Windows: Wood frame and sash, factory fabricated and assembled.
 - 1. Exterior Finish: Primed.
 - 2. Interior Finish: Unfinished, for transparent finish.
 - 3. Configuration: As indicated on drawings.
 - 4. Window Product Types: Simulated single-hung in a fixed position, in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.
 - 5. Wood Species: Clear pine, preservative treated using treatment type suitable for required finish.
 - 6. Transparent Finish: Scarf joints permitted if wood matches in color and grain texture.

2.3 COMPONENTS

- A. Glazing: Double glazed, clear, Low-E coated, argon filled, with glass thicknesses as recommended by manufacturer for specified wind conditions.
- B. Glass and Glazing Materials: See Section 08 80 00.

- C. Frames: ____ inch (____ mm) wide by ____ inch (____ mm) deep profile; flush solid wood glass stops of screw fastened type, sloped for positive drainage.
- D. Sills: Extruded aluminum, with ____ inch (____ mm) nominal thickness; sloped for positive drainage; fits under sash and projects at least 1/2 inch (12 mm) beyond exterior face of wall; single piece full width of opening.
- E. Muntins/Grilles: Grilles permanently installed on outside and inside faces of insulating glass.
 - 1. Pattern: Custom design, see drawings.
 - 2. Bar Width: 3/4 inch (19 mm).
 - 3. Color: Match interior and exterior of frame.
- F. Fasteners: Stainless steel.
- G. Sealant and Backing Materials: See Section 07 92 00 of types as indicated.
- H. Flashing: Provide related flashings, with necessary anchors and attachment devices.
- I. Sealant for Setting Sills, Stools, Aprons, and Sill Flashing: Non-curing butyl type.

2.4 PERFORMANCE REQUIREMENTS

- A. Comply with AAMA/WDMA/CSA 101/I.S.2/A440 requirements for the specific window type in accordance with the following:
 - 1. Performance Class (PC): R.
- B. Design Pressure (DP): In accordance with applicable codes.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify wall openings and adjoining water-resistive barrier materials are ready to receive wood windows; see Section 07 25 00.

3.2 INSTALLATION

- A. Install windows in accordance with manufacturer's instructions.
- B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
- C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
- D. Set sill members and sill flashing in continuous bead of sealant.
- E. Install glass; see Section 08 80 00.
- F. Finish exterior surfaces with opaque materials; see Section 09 91 13.

3.3 TOLERANCES

- A. Maximum Variation from Level or Plumb: 1/16 inch per 3 ft (1.6 mm per m) non-cumulative or 1/8 inch per 10 ft (3.2 mm per 3 m), whichever is less.

3.4 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements for independent field testing and inspection requirements, and requirements for monitoring quality of specified product installations.
- B. Provide field testing of installed wood windows by independent laboratory in accordance with AAMA 502 and AAMA/WDMA/CSA 101/I.S.2/A440 during construction process and before installation of interior finishes.
 - 1. Field test for water penetration in accordance with ASTM E1105 using Procedure B - cyclic static air pressure difference; test pressure shall not be less than 1.9 psf (91 Pa).
 - 2. Field test for air leakage in accordance with ASTM E783 with uniform static air pressure difference of 6.27 psf (300 Pa).
- C. Repair or replace fenestration components that have failed designated field testing, and retest to verify performance complies with specified requirements.

3.5 ADJUSTING

- A. Adjust hardware for smooth operation and secure weathertight closure.

3.6 CLEANING

- A. Remove protective material from factory finished surfaces.
- B. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.

END OF SECTION

SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Mechanical and electrified door hardware
2. Field verification, preparation and modification of existing doors and frames to receive new door hardware.

B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

C. Related Sections:

1. Division 01 "General Requirements" sections for Allowances, Alternates, Owner Furnished Contractor Installed, Project Management and Coordination.
2. Division 06 Section "Rough Carpentry"
3. Division 06 Section "Finish Carpentry"
4. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
5. Division 08 Sections:
 - a. "Metal Doors and Frames"
 - b. "Flush Wood Doors"
 - c. "Aluminum-Framed Entrances and Storefronts"
6. Division 09 sections for touchup, finishing or refinishing of existing openings modified by this section.
7. Division 26 "Electrical" sections for connections to electrical power system and for low-voltage wiring.
8. Division 28 "Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system.

1.02 REFERENCES

A. UL LLC

1. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Keying Systems and Nomenclature
4. Installation Guide for Doors and Hardware

C. NFPA – National Fire Protection Association

1. NFPA 70 – National Electric Code
2. NFPA 101 – Life Safety Code

D. ANSI - American National Standards Institute

1. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
2. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
3. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
4. ANSI/SDI A250.8 - Standard Steel Doors and Frames

1.03 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
 - a. Comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, "EXAMINATION" article, herein.
 - b. Review drawings and Sections from related trades to verify compatibility with specified hardware.
 - c. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
 - a. Wiring Diagrams: For power, signal, and control wiring and including:
 - 1) Details of interface of electrified door hardware and building safety and security systems.
 - 2) Schematic diagram of systems that interface with electrified door hardware.
 - 3) Point-to-point wiring.
 - 4) Risers.
3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
 - a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
4. Door Hardware Schedule:
 - a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.

- b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
 - c. Indicate complete designations of each item required for each opening, include:
 - 1) Door Index: door number, heading number, and Architect's hardware set number.
 - 2) Quantity, type, style, function, size, and finish of each hardware item.
 - 3) Name and manufacturer of each item.
 - 4) Fastenings and other pertinent information.
 - 5) Location of each hardware set cross-referenced to indications on Drawings.
 - 6) Explanation of all abbreviations, symbols, and codes contained in schedule.
 - 7) Mounting locations for hardware.
 - 8) Door and frame sizes and materials.
 - 9) Degree of door swing and handing.
 - 10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.
5. Key Schedule:
- a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
 - b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
 - c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
 - d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
 - e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
 - f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

C. Informational Submittals:

- 1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
- 2. Provide Product Data:
 - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
 - b. Include warranties for specified door hardware.

D. Closeout Submittals:

- 1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
 - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
 - b. Catalog pages for each product.
 - c. Final approved hardware schedule edited to reflect conditions as installed.
 - d. Final keying schedule
 - e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
 - f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

E. Inspection and Testing:

1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
 - a. Required egress door assemblies, in compliance with NFPA 101.

1.04 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
 - a. For door hardware: DHI certified AHC or DHC.
 - b. Can provide installation and technical data to Architect and other related subcontractors.
 - c. Can inspect and verify components are in working order upon completion of installation.
 - d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.
4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:

1. Electrified Door Hardware
 - a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
2. Accessibility Requirements:
 - a. Comply with governing accessibility regulations cited in "REFERENCES" article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.

C. Pre-Installation Meetings

1. Keying Conference
 - a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
 - 1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - 2) Preliminary key system schematic diagram.

- 3) Requirements for access control.
 - 4) Address for delivery of keys.
2. Pre-installation Conference
 - a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Inspect and discuss preparatory work performed by other trades.
 - c. Inspect and discuss electrical roughing-in for electrified door hardware.
 - d. Review sequence of operation for each type of electrified door hardware.
 - e. Review required testing, inspecting, and certifying procedures.
 - f. Review questions or concerns related to proper installation and adjustment of door hardware.
 3. Electrified Hardware Coordination Conference:
 - a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.
- C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
- D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

1.06 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

- E. Existing Openings: Where existing doors, frames and/or hardware are to remain, field verify existing functions, conditions and preparations and coordinate to suit opening conditions and to provide proper door operation.

1.07 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.
 - 1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
 - 2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.
 - a. Mechanical Warranty
 - 1) Locks: 3 years
 - 2) Exit Devices: 3 years
 - 3) Closers: 25 years
 - 4) Automatic Operators: 2 years

1.08 MAINTENANCE

- A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.
- B. Turn over unused materials to Owner for maintenance purposes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Approval of alternate manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category are only to be considered by official substitution request in accordance with section 01 25 00.
- B. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.
- C. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.02 MATERIALS

- A. Fabrication
 - 1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.

2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
 3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with "Metal Doors and Frames", "Flush Wood Doors", "Stile and Rail Wood Doors" to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.
- B. Modification and Preparation of Existing Doors: Where existing door hardware is indicated to be removed and reinstalled.
1. Provide necessary fillers, Dutchmen, reinforcements, and fasteners, compatible with existing materials, as required for mounting new opening hardware and to cover existing door and frame preparations.
 2. Use materials which match materials of adjacent modified areas.
 3. When modifying existing fire-rated openings, provide materials permitted by NFPA 80 as required to maintain fire-rating.
- C. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

2.03 HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Ives 5BB series
2. Acceptable Manufacturers and Products:
 - a. Hager BB1191/1279 series
 - b. McKinney TB series

B. Requirements:

1. Provide hinges conforming to ANSI/BHMA A156.1.
2. Provide five knuckle, ball bearing hinges.
3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
 - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
 - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
 - a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
5. 2 inches or thicker doors:
 - a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
7. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
8. Where new hinges are specified for existing doors or existing frames, provide new hinges of identical size to hinge preparation present in existing door or existing frame.

9. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - a. Steel Hinges: Steel pins
 - b. Non-Ferrous Hinges: Stainless steel pins
 - c. Out-Swinging Exterior Doors: Non-removable pins
 - d. Out-Swinging Interior Lockable Doors: Non-removable pins
 - e. Interior Non-lockable Doors: Non-rising pins
10. Provide hinges with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component. Provide mortar guard for each electrified hinge specified.

2.04 ELECTRIC POWER TRANSFER

A. Manufacturers:

1. Scheduled Manufacturer and Product:
 - a. Von Duprin EPT-10
2. Acceptable Manufacturers and Products:
 - a. ABH PT1000
 - b. Securitron CEPT-10

B. Requirements:

1. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
2. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.05 MORTISE LOCKS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Schlage L9000 series
2. Acceptable Manufacturers and Products:
 - a. Sargent 8200 series
 - b. Best 45H series

B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3-hour fire doors.
2. Indicators: Where specified, provide indicator window measuring a minimum 2-3/5-inch x 3/5 inch with 180-degree visibility. Provide messages color-coded using ANSI Z535 Safety Red with full text and/or symbols, as scheduled, for easy visibility. When applicable allows for lock status indication on both sides of the door.
3. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
4. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.

5. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch (25 mm) throw, constructed of stainless steel.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide switches and sensors integrated into the locks and latches.
7. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
 - a. Lever Design: 06N.

2.06 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Von Duprin 99/33A series
2. Acceptable Manufacturers and Products:
 - a. Precision APEX 2000 series
 - b. Sargent 19-43-GL-80 series

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to "KEYING" article, herein.
3. Provide grooved touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide exit devices with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
7. Provide flush end caps for exit devices.
8. Provide exit devices with manufacturer's approved strikes.
9. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
11. Provide cylinder dogging as specified at non fire-rated openings.
12. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
14. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
15. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

2.07 POWER SUPPLIES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Schlage/Von Duprin PS900 Series
2. Acceptable Manufacturers and Products:
 - a. Precision ELR series
 - b. Sargent 3500 series

B. Requirements:

1. Provide power supplies approved by manufacturer of supplied electrified hardware.
2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.
3. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.
4. Provide power supplies with the following features:
 - a. 12/24 VDC Output, field selectable.
 - b. Class 2 Rated power limited output.
 - c. Universal 120-240 VAC input.
 - d. Low voltage DC, regulated and filtered.
 - e. Polarized connector for distribution boards.
 - f. Fused primary input.
 - g. AC input and DC output monitoring circuit w/LED indicators.
 - h. Cover mounted AC Input indication.
 - i. Tested and certified to meet UL294.
 - j. NEMA 1 enclosure.
 - k. Hinged cover w/lock down screws.
 - l. High voltage protective cover.

2.08 CYLINDERS

A. Manufacturers:

1. Scheduled Manufacturer and Product:
 - a. Existing system
2. Acceptable Manufacturers and Products:

B. Requirements:

1. Provide cylinders/cores to match Owner's existing key system, compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.

2.09 KEYING

A. Scheduled System:

1. Existing factory registered system:

- a. Provide cylinders/cores keyed into Owner's existing factory registered keying system. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Requirements:

1. Permanent Keying:
 - a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
 - 1) Master Keying system as directed by the Owner.
 - b. Forward biting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
 - c. Provide keys with the following features:
 - 1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
 - d. Identification:
 - 1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
 - 2) Identification stamping provisions must be approved by the Architect and Owner.
 - 3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE".
 - 4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
 - 5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
 - e. Quantity: Furnish in the following quantities.
 - 1) Master Keys: 6.
 - 2) Change (Day) Keys: 3 per cylinder/core that is keyed differently
 - 3) Key Blanks: Quantity as determined in the keying meeting.

2.10 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. LCN 4050A series
2. Acceptable Manufacturers and Products:
 - a. Norton 7500 series
 - b. Sargent 351 series

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with cast aluminum cylinder.
3. Closer Body: 1-1/2-inch (38 mm) diameter with 11/16-inch (17 mm) diameter heat-treated pinion journal and full complement bearings.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and all weather requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.

5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and back check.
7. Pressure Relief Valve (PRV) Technology: Not permitted.
8. Provide stick on templates, special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.11 ELECTRO-HYDRAULIC AUTOMATIC OPERATORS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. LCN 4600 series
2. Acceptable Manufacturers and Products:
 - a. Norton 6000 series
 - b. Besam Power Swing

B. Requirements:

1. Provide low energy automatic operator units with hydraulic closer complying with ANSI/BHMA A156.19.
2. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
3. Provide units with conventional door closer opening and closing forces unless power operator motor is activated. Provide door closer assembly with adjustable spring size, back-check, and opening and closing speed adjustment valves to control door
4. Provide units with on/off switch for manual operation, motor start up delay, vestibule interface delay, electric lock delay, and door hold open delay.
5. Provide drop plates, brackets, and adapters for arms as required for details.
6. Provide actuator switches and receivers for operation as specified.
7. Provide weather-resistant actuators at exterior applications.
8. Provide key switches with LED's, recommended and approved by manufacturer of automatic operator as required for function described in operation description of hardware group below. Cylinders: Refer to "KEYING" article, herein.
9. Provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by manufacturer of automatic operator for each individual leaf. Actuators control both doors simultaneously at pairs. Sequence operation of exterior and vestibule doors with automatic operators to allow ingress or egress through both sets of openings as directed by Architect. Locate actuators, key switches, and other controls as directed by Architect.
10. Provide units with vestibule inputs that allow sequencing operation of two units, and SPDT relay for interfacing with latching or locking devices.

2.12 DOOR TRIM

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
2. Acceptable Manufacturers:

- a. Trimco
- b. Rockwood

B. Requirements:

- 1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

2.13 PROTECTION PLATES

A. Manufacturers:

- 1. Scheduled Manufacturer:
 - a. Ives
- 2. Acceptable Manufacturers:
 - a. Trimco
 - b. Rockwood

B. Requirements:

- 1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
- 2. Sizes plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
- 3. At fire rated doors, provide protection plates over 16 inches high with UL label.

2.14 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

- 1. Scheduled Manufacturers:
 - a. Glynn-Johnson
- 2. Acceptable Manufacturers:
 - a. Sargent
 - b. ABH

B. Requirements:

- 1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.

2.15 DOOR STOPS AND HOLDERS

A. Manufacturers:

- 1. Scheduled Manufacturer:
 - a. Ives
- 2. Acceptable Manufacturers:
 - a. Trimco

b. Rockwood

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button or thumbturn.
2. Where a wall stop cannot be used, provide universal floor stops.
3. Where wall or floor stop cannot be used, provide overhead stop.
4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

2.16 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Zero International
2. Acceptable Manufacturers:
 - a. National Guard
 - b. Pemko

B. Requirements:

1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
4. Size thresholds 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

2.17 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
2. Acceptable Manufacturers:
 - a. Rockwood
 - b. Trimco

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

2.18 FINISHES

A. FINISH: BHMA 643E/716 (US11); EXCEPT:

1. Door Closers: Powder Coat to Match.
2. Weatherstripping: Dark Bronze Anodized Aluminum.
3. Thresholds: Extruded Architectural Bronze, Oil-Rubbed

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.
- B. Field verify existing doors and frames receiving new hardware and existing conditions receiving new openings. Verify that new hardware is compatible with existing door and frame preparation and existing conditions.
- C. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- D. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Where on-site modification of doors and frames is required:
 1. Carefully remove existing door hardware and components being reused. Clean, protect, tag, and store in accordance with storage and handling requirements specified herein.
 2. Field modify and prepare existing doors and frames for new hardware being installed.
 3. When modifications are exposed to view, use concealed fasteners, when possible.
 4. Prepare hardware locations and reinstall in accordance with installation requirements for new door hardware and with:
 - a. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
 - b. Wood Doors: DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."
 - c. Doors in rated assemblies: NFPA 80 for restrictions on on-site door hardware preparation.

3.03 INSTALLATION

- A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 2. Custom Steel Doors and Frames: HMMA 831.

3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
 4. Installation Guide for Doors and Hardware: DHI TDH-007-20
- B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.
 - C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
 - D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
 - E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
 - F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
 - G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
 - H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.
 - I. Lock Cylinders:
 1. Install construction cores to secure building and areas during construction period.
 2. Replace construction cores with permanent cores as indicated in keying section.
 3. Furnish permanent cores to Owner for installation.
 - J. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:
 1. Conduit, junction boxes and wire pulls.
 2. Connections to and from power supplies to electrified hardware.
 3. Connections to fire/smoke alarm system and smoke evacuation system.
 4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
 5. Connections to panel interface modules, controllers, and gateways.
 6. Testing and labeling wires with Architect's opening number.
 - K. Door Closers & Auto Operators: Mount closers/operators on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers/operators so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.
 - L. Overhead Stops/Holders: Mount overhead stops/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
 - M. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

- N. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
- O. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.04 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.05 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items per manufacturer's instructions to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.06 DOOR HARDWARE SCHEDULE

- A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.
- B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.
- C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.
- D. Hardware Sets:

104131 OPT0353742 Version 2

Legend:

 Link to catalog cut sheet

 Electrified Opening

Hardware Group No. 01

For use on Door #(s):

103 104

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5		B643E/716	IVE
1	EA	PRIVACY W/DEADBOLT W/ OUTSIDE INDICATOR	L9440 06N OS-OCC		643e	SCH
1	EA	SURFACE CLOSER	4050A REG OR PA AS REQ		695	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		695	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS		695	IVE
1	EA	WALL STOP	WS406/407CVX		643E/716	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER

Hardware Group No. 02

For use on Door #(s):

105

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5		B643E/716	IVE
1	EA	PASSAGE SET	L9010 06N		643e	SCH
1	EA	SURFACE CLOSER	4050A CUSH		695	LCN
1	EA	CUSH SHOE SUPPORT	4050A-30 SRT		695	LCN
1	EA	BLADE STOP SPACER	4050A-61 SRT		695	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		695	IVE

Hardware Group No. 03

For use on Door #(s):

105X

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	PASSAGE SET	L9010 06N		643e	SCH
1	EA	MORTISE LOCK ADAPTER	504-CW		613	DON
1		NOTE	BALANCE OF EXISTING HARDWARE TO REMAIN			

GC TO VERIFY COMPATIBILITY OF NEW HARDWARE FOR EXISTING DOOR/FRAME.

Hardware Group No. 04

For use on Door #(s):

106

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		B643E/ 716	IVE
1	EA	OFFICE W/SIM RETRACT	L9056L 06N L583-363		643e	SCH
1	EA	MORTISE CYLINDER	KEYED TO/MATCH EXISITNG SYSTEM		643e	
1	EA	SURFACE CLOSER	4050A CUSH		695	LCN
1	EA	CUSH SHOE SUPPORT	4050A-30 SRT		695	LCN
1	EA	BLADE STOP SPACER	4050A-61 SRT		695	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		695	IVE

Hardware Group No. 05

For use on Door #(s):

106X

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	OFFICE W/SIM RETRACT	L9056L 06N L583-363		643e	SCH
1	EA	MORTISE CYLINDER	KEYED TO/MATCH EXISITNG SYSTEM		643e	
1		NOTE	BALANCE OF EXISTING HARDWARE TO REMAIN			

GC TO VERIFY COMPATIBILITY OF NEW HARDWARE FOR EXISTING DOOR/FRAME.

Hardware Group No. 06

For use on Door #(s):
107

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		B643E/ 716	IVE
1	EA	STOREROOM LOCK	L9080L 06N		643e	SCH
1	EA	MORTISE CYLINDER	KEYED TO/MATCH EXISITNG SYSTEM		643e	
1	EA	SURFACE CLOSER	4050A CUSH		695	LCN
1	EA	CUSH SHOE SUPPORT	4050A-30 SRT		695	LCN
1	EA	BLADE STOP SPACER	4050A-61 SRT		695	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		695	IVE

Hardware Group No. 07

For use on Door #(s):
108

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		B643E/ 716	IVE
1	EA	STOREROOM LOCK	L9080L 06N		643e	SCH
1	EA	MORTISE CYLINDER	KEYED TO/MATCH EXISITNG SYSTEM		643e	
1	EA	SURFACE CLOSER	4050A REG OR PA AS REQ		695	LCN
1	EA	BLADE STOP SPACER	4050A-61 SRT		695	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		695	IVE
1	EA	WALL STOP	WS406/407CVX		643E/7 16	IVE

Hardware Group No. 08

For use on Door #(s):

111A

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
8	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		B643E/ 716	IVE
2	EA	POWER TRANSFER	EPT10		✂ 695	VON
1	EA	REMOVABLE MULLION	5654		313	VON
1	EA	PANIC HARDWARE	CD-99-EO		643E	VON
1	EA	ELEC PANIC HARDWARE	QEL-99-NL-OP-110MD 24 VDC		✂ 643E	VON
1	EA	MORTISE CYLINDER	KEYED TO/MATCH EXISITNG SYSTEM		643e	
1	EA	RIM CYLINDER	KEYED TO/MATCH EXISITNG SYSTEM		643e	
2	EA	90 DEG OFFSET PULL	8190EZHD 8" STD		643E/7 16	IVE
2	EA	OH STOP	100S		613	GLY
1	EA	SURFACE CLOSER	4050A EDA		695	LCN
1	EA	SURF. AUTO OPERATOR	4642 WMS 120 VAC		✂ 695	LCN
1	EA	BLADE STOP SPACER	4050A-61 SRT		695	LCN
2	EA	ACTUATOR	8310-853T		✂ 630	LCN
1	EA	MULLION SEAL	8780NBK PSA		BK	ZER
2	EA	DOOR SWEEP	8198D		D	ZER
1	EA	THRESHOLD	655D		D	ZER
1	EA	CREDENTIAL READER	BY DIVISION 28		✂	B/O
1	EA	POWER SUPPLY	PS902 900-2RS 120/240 VAC (COORDINATE WITH ACCESS CONTROL)		✂ LGR	SCE
1	EA	NOTE	WEATHERSTRIP BY DOOR/FRAME MFG			B/O

BUSINESS HOURS - DOOR NORMALLY CLOSED AND UNLOCKED. WHEN THE ELECTRIC PANIC DEVICE LATCH IS HELD IN THE RETRACTED POSITION, VIA THE ACCESS CONTROL SYSTEM, THE EXTERIOR ACTUATOR IS ENABLED. THE INTERIOR ACTUATOR IS ENABLED AT ALL TIMES. ACTIVATING EITHER ENABLED ACTUATOR WILL CAUSE THE AUTOMATIC OPERATOR TO CYCLE THE DOOR. DOOR TO LOCK UPON LOSS OF POWER. FREE EGRESS AT ALL TIMES.

AFTER HOURS - DOOR NORMALLY CLOSED AND LOCKED. WHEN THE ELECTRIC PANIC DEVICE LATCH IS EXTENDED THE EXTERIOR ACTUATOR WILL BECOME DISABLED. PRESENTING A VALID CREDENTIAL TO THE READER WILL MOMENTARILY RETRACT THE PANIC DEVICE LATCH AND MOMENTARILY ENABLE THE EXTERIOR ACTUATOR. ACTIVATING THE ENABLED EXTERIOR ACTUATOR WILL CAUSE THE AUTOMATIC OPERATOR TO CYCLE THE DOOR. THE INTERIOR ACTUATOR WILL BE ENABLED AT ALL TIMES. ACTIVATING THE INTERIOR ACTUATOR WILL MOMENTARILY RETRACT THE PANIC DEVICE LATCH AND CAUSE THE AUTOMATIC OPERATOR TO CYCLE THE DOOR. DOOR TO REMAIN LOCKED UPON LOSS OF POWER. FREE EGRESS AT ALL TIMES.

Hardware Group No. 09

For use on Door #(s):

112A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		B643E/ 716	IVE
1	EA	POWER TRANSFER	EPT10		✂ 695	VON
1	EA	ELEC PANIC HARDWARE	QEL-99-NL-OP-110MD 24 VDC		✂ 643E	VON
1	EA	RIM CYLINDER	KEYED TO/MATCH EXISITNG SYSTEM		643e	
1	EA	90 DEG OFFSET PULL	8190EZHD 8" STD		643E/7 16	IVE
1	EA	SURFACE CLOSER	4050A CUSH		695	LCN
1	EA	CUSH SHOE SUPPORT	4050A-30 SRT		695	LCN
1	EA	BLADE STOP SPACER	4050A-61 SRT		695	LCN
1	EA	DOOR SWEEP	8198D		D	ZER
1	EA	THRESHOLD	655D		D	ZER
1	EA	CREDENTIAL READER	BY DIVISION 28		✂	B/O
1	EA	POWER SUPPLY	PS902 900-2RS 120/240 VAC (COORDINATE WITH ACCESS CONTROL)		✂ LGR	SCE
1	EA	NOTE	WEATHERSTRIP BY DOOR/FRAME MFG			B/O

OPERATION: WHEN THE DOOR IS IN THE LOCKED POSITION, PRESENTING A VALID CREDENTIAL TO THE READER WILL MOMENTARILY RETRACT THE PANIC DEVICE LATCH ALLOWING ACCESS. DOOR CAN BE SCHEDULED TO BE IN THE UNLOCKED POSITION DURING BUSINESS HOURS. DOOR TO LOCK UPON LOSS OF POWER. FREE EGRESS AT ALL TIMES.

Hardware Group No. 10

For use on Door #(s):

205

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5		B643E/ 716	IVE
1	EA	CLASSROOM LOCK	L9070L 06N		643e	SCH
1	EA	MORTISE CYLINDER	KEYED TO/MATCH EXISITNG SYSTEM		643e	
1	EA	FLOOR STOP	FS436/FS438		643E/7 16	IVE

Hardware Group No. 11

For use on Door #(s):
112B

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		B643E/ 716	IVE
1	EA	POWER TRANSFER	EPT10		⚡ 695	VON
1	EA	ELEC PANIC HARDWARE	QEL-99-NL-OP-110MD 24 VDC		⚡ 643E	VON
1	EA	RIM CYLINDER	KEYED TO/MATCH EXISTING SYSTEM		643e	
1	EA	90 DEG OFFSET PULL	8190EZHD 8" STD		643E/7 16	IVE
1	EA	SURFACE CLOSER	4050A CUSH		695	LCN
1	EA	CUSH SHOE SUPPORT	4050A-30 SRT		695	LCN
1	EA	BLADE STOP SPACER	4050A-61 SRT		695	LCN
1	EA	CREDENTIAL READER	BY DIVISION 28		⚡	B/O
1	EA	POWER SUPPLY	PS902 900-2RS 120/240 VAC (COORDINATE WITH ACCESS CONTROL)		⚡ LGR	SCE

OPERATION: WHEN THE DOOR IS IN THE LOCKED POSITION, PRESENTING A VALID CREDENTIAL TO THE READER WILL MOMENTARILY RETRACT THE PANIC DEVICE LATCH ALLOWING ACCESS. DOOR CAN BE SCHEDULED TO BE IN THE UNLOCKED POSITION DURING BUSINESS HOURS. DOOR TO LOCK UPON LOSS OF POWER. FREE EGRESS AT ALL TIMES.

END OF SECTION

SECTION 08 80 00
GLAZING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Insulating glass units.
- B. Glazing units.
- C. Plastic films.
- D. Glazing compounds.

1.2 RELATED REQUIREMENTS

- A. Section 08 43 13 - Aluminum-Framed Storefronts: Glazing provided as part of storefront assembly.
- B. Section 08 44 13 - Glazed Aluminum Curtain Walls: Glazing provided as part of wall assembly.
- C. Section 08 52 00 - Wood Windows: Glazing provided by window manufacturer.

1.3 REFERENCE STANDARDS

- A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2019).
- C. ASTM C1036 - Standard Specification for Flat Glass; 2021.
- D. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).
- E. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2021a.
- F. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.
- G. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2019.
- H. GANA (SM) - GANA Sealant Manual; 2008.
- I. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2023.
- J. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2023.

- K. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2023.

1.4 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data on Insulating Glass Unit, Glazing Unit, Plastic Film, and _____ 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, and identify available colors.
- D. Certificate: Certify that products of this section meet or exceed specified requirements.
- E. Manufacturer's qualification statement.
- F. Installer's qualification statement.
- G. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

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

1.6 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 40 degrees F (4 degrees C).
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.7 WARRANTY

- A. See Section 01 78 00 - 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 providing products to replace failed units.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Glass Fabricators:
 - 1. GGI - General Glass International: www.generalglass.com/#sle.
 - 2. Thompson I.G., LLC: www.thompsonig.com/#sle.
 - 3. Trulite Glass & Aluminum Solutions, LLC: www.trulite.com/#sle.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

- A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
 - 1. Design Pressure: Calculated in accordance with ASCE 7.
 - 2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
 - 3. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
 - 4. Glass thicknesses listed are minimum.
- B. Weather-Resistive Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure water-resistive barrier, vapor retarder, and/or air barrier.
 - 1. In conjunction with weather barrier related materials described in other sections, as follows:
- C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
 - 1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
 - 2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
 - 3. Solar Optical Properties: Comply with NFRC 300 test method.

2.3 GLASS MATERIALS

- A. Float Glass: Provide float glass based glazing unless otherwise indicated.
 - 1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.

2.4 INSULATING GLASS UNITS

- A. Manufacturers:
 - 1. Glass: Any of the manufacturers specified for float glass.
 - 2. Cardinal Glass Industries: www.cardinalcorp.com/#sle.
 - 3. Guardian Glass, LLC: www.guardianglass.com/#sle.
 - 4. Pilkington North America Inc: www.pilkington.com/na/#sle. Pilkington North America Inc: www.pilkington.com/na/#sle.
 - 5. Vitro Architectural Glass (formerly PPG Glass): www.vitroglazings.com/#sle.
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Insulating Glass Units: Types as indicated.
 - 1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
 - 2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
 - 3. Warm-Edge Spacers: Low-conductivity thermoplastic with desiccant warm-edge technology design.
 - a. Spacer Width: As required for specified insulating glass unit.

- b. Spacer Height: Manufacturer's standard.
 - 4. Spacer Color: Black.
 - 5. Edge Seal:
 - a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.
 - b. Color: Black.
 - 6. Purge interpane space with dry air, hermetically sealed.
- C. Type IG - Insulating Glass Units: Vision glass, double glazed.
 - 1. Applications: Exterior glazing unless otherwise indicated.
 - 2. Space between lites filled with argon.
 - 3. Outboard Lite: Annealed float glass, 1/4 inch (6.4 mm) thick, minimum.
 - a. Tint: Gray.
 - 4. Warm-edge spacer.
 - 5. Inboard Lite: Annealed float glass, 1/4 inch (6.4 mm) thick, minimum.
 - a. Tint: Clear.
 - 6. Total Thickness: 1 inch (25.4 mm).
 - 7. Thermal Transmittance (U-Value), Summer - Center of Glass: 1.20, maximum.
 - 8. Solar Heat Gain Coefficient (SHGC): 0.25, maximum.

2.5 PLASTIC FILMS

2.6 GLASS COATINGS

- A. Opacifying Coating: One component, water-based silicone elastomeric opaque color coating for roll coat and spray applications.
 - 1. Application: Exterior spandrel location as indicated on drawings.
 - a. Glass and Coating Orientation at Spandrels: On surface facing interior.
 - 2. Fabrication of Glass Unit with Coating: Solely by Approved Factory Fabricators trained and certified annually by coating manufacturer.
 - 3. Color: Selected from manufacturer's standard range and indicated on drawings.

2.7 ACCESSORIES

- A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot (25 mm for each square meter) of glazing or minimum 4 inch (100 mm) by width of glazing rabbet space minus 1/16 inch (1.5 mm) by height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch (75 mm) long by one half the height of the glazing stop by thickness to suit application, self adhesive on one face.
- C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.
 - 1. Width: As required for application.
 - 2. Thickness: As required for application.
 - 3. Manufacturers:
 - a. Pecora Corporation; _____: www.pecora.com/#sle.

- b. Tremco Global Sealants; _____: www.tremcosealants.com/#sle.
- c. Substitutions: See Section 01 60 00 - Product Requirements.

2.8 SOURCE QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements for additional requirements.
- B. Provide shop inspection and testing for Type IG glass.

PART 3 EXECUTION

3.1 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.

3.2 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.

3.3 INSTALLATION, GENERAL

- A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.
- B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.
- C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.
- D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.
- E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.
- F. 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, and paint.

3.4 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements for additional requirements.
- B. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.
- C. Monitor and report installation procedures and unacceptable conditions.

3.5 CLEANING

- A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.
- B. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- C. Remove nonpermanent labels immediately after glazing installation is complete.
- D. Clean glass and adjacent surfaces after sealants are fully cured.
- E. 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.

3.6 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 09 03 00
CONSERVATION TREATMENT OF PERIOD FINISHES

PART 1 GENERAL

1.1 Section Includes

- A. Gypsum plastering.
- B. Plaster repair.
- C. Painting.

1.2 Related Requirements

- A. Section 01 35 91 - Period Treatment Procedures for general historic preservation project requirements.
- B. Section 09 91 23 - Interior Painting.
- C. Section 09 25 23 - Lime Based Plastering

1.3 Submittals

- A. See Section 01 30 00 - Administrative Requirements for submittals procedures.
- B. Plaster Materials Product Data: Plaster materials, characteristics, and limitations of products.

1.4 Quality Assurance

- A. Conservation Treatment Quality Control Plan: Prior to commencing work of this section, receive written approval of plan of proposed restoration and cleaning work. Include the following:
 - 1. Methods of protecting surrounding construction and landscape features.
- B. Plasterwork Restorer Qualifications: Company specializing in period plaster restoration with minimum five years of experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original and unopened packaging, with brand names and manufacturer's labels intact and legible.
- B. Store materials in dry location, fully protected from weather and direct exposure to sunlight.

1.6 Field Conditions

- A. Maintain temperature between 50 degrees F (10 degrees C) and 80 degrees F (27 degrees C) for not less than one week prior to applying plaster and continuously after applying plaster.

- B. Maintain adequate ventilation to remove excess water while plaster dries.

PART 2 PRODUCTS

2.1 Lime Plastering

- A. Applications:
 - 1. Flat plaster walls.
 - 2. Flat plaster ceilings.
- B. Plaster Mixes: See Section 09 25 23

PART 3 EXECUTION

3.1 Period Treatment, General

- A. See Section 013591 for special procedure requirements related to elements and features of historical significance and value.

3.2 Examination

- A. Verify existing conditions are satisfactory before starting work.
- B. Plastering Substrates:
 - 1. Masonry: Verify joints are cut flush and surface is ready to receive work of this section. Verify there are no bituminous or water repellent coatings on masonry surface.
 - 2. Lath: Verify lath is flat, secured to substrate, and joint and surface perimeter accessories are in place.

3.3 Preparation

- A. General: Remove and salvage elements and hardware for reinstallation; tag and protect surface-mounted items.
- B. Install temporary protection measures.
- C. Removal of Existing Damaged Plaster: Remove only portions indicated to be repaired or replaced.
 - 1. Remove soft or crumbled plaster using hand tools.
 - 2. Remove delaminated but otherwise sound plaster and lath using saws or grinders.
 - 3. Remove each coat to extent that will allow blending or keying new work into edges of existing installation.
- D. Plastering on Masonry Substrates:
 - 1. Dampen masonry surfaces to reduce excessive suction.
 - 2. Roughen smooth surfaces.

3.4 Installation - Lath and Accessories

- A. Install wood lath to match key spacing of existing lath, but leave keys no narrower than 1/4 inch (6 mm), unless indicated otherwise.

3.5 STATIC Crack PLASTER REPAIR

- A. Fill crack with plaster finish coat material.

3.6 Tolerances

- A. Maximum Variation from True Flatness: 1/8 inch in 10 feet (3 mm in 3 m).

END OF SECTION

SECTION 09 05 61
COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. This section applies to floors identified in Contract Documents that are receiving the following types of floor coverings:
 - 1. Resilient tile and sheet.
 - 2. Carpet tile.
- B. Removal of existing floor coverings.
- C. Preparation of new and existing concrete floor slabs for installation of floor coverings.
- D. Testing of concrete floor slabs for moisture and alkalinity (pH).
- E. Remediation of concrete floor slabs due to unsatisfactory moisture or alkalinity (pH) conditions.
 - 1. Contractor shall perform all specified remediation of concrete floor slabs. If such remediation is indicated by testing agency's report and is due to a condition not under Contractor's control or could not have been predicted by examination prior to entering into the contract, a contract modification will be issued.
- F. Patching compound.
- G. Remedial floor coatings.

1.2 REFERENCE STANDARDS

- A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50 mm] Cube Specimens); 2021.
- B. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters, and Gypsum Concrete; 2020.
- C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2022.
- D. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2023.
- E. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.
- F. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; 2018.

1.3 ADMINISTRATIVE REQUIREMENTS

1.4 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Visual Observation Report: For existing floor coverings to be removed.
- C. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
 - 1. Moisture and alkalinity (pH) limits and test methods.
 - 2. Manufacturer's required bond/compatibility test procedure.
- D. Testing Agency's Report:
 - 1. Description of areas tested; include floor plans and photographs if helpful.
 - 2. Summary of conditions encountered.
 - 3. Moisture and alkalinity (pH) test reports.
 - 4. Copies of specified test methods.
 - 5. Recommendations for remediation of unsatisfactory surfaces.
 - 6. Product data for recommended remedial coating.
 - 7. Submit report to Architect.
 - 8. Submit report not more than two business days after conclusion of testing.
- E. Adhesive Bond and Compatibility Test Report.

1.5 QUALITY ASSURANCE

- A. Moisture and alkalinity (pH) testing shall be performed by an independent testing agency employed and paid by Contractor.
- B. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified.
 - 1. Submit evidence of experience consisting of at least 3 test reports of the type required, with project Owner's project contact information.
- C. Contractor's Responsibility Relating to Independent Agency Testing:
 - 1. Provide access for and cooperate with testing agency.
 - 2. Confirm date of start of testing at least 10 days prior to actual start.
 - 3. Allow at least 4 business days on site for testing agency activities.
 - 4. Achieve and maintain specified ambient conditions.
 - 5. Notify Architect when specified ambient conditions have been achieved and when testing will start.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, handle, and protect products in accordance with manufacturer's instructions and recommendations.
- B. Deliver materials in manufacturer's packaging; include installation instructions.

- C. Keep materials from freezing.

1.7 FIELD CONDITIONS

- A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F (18 degrees C) or more than 85 degrees F (30 degrees C).
- B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:
 - 1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.
 - 2. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.
 - 3. Products:
 - a. ARDEX Engineered Cements; ARDEX Feather Finish: www.ardexamericas.com/#sle.
 - b. H.B. Fuller Construction Products, Inc; TEC Feather Edge Skim Coat: www.tecspecialty.com/#sle.
 - c. USG Corporation; Durock Brand Advanced Skim Coat Floor Patch: www.usg.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Alternate Flooring Adhesive: Floor covering manufacturer's recommended product, suitable for the moisture and pH conditions present; low-VOC. In the absence of any recommendation from flooring manufacturer, provide a product recommended by adhesive manufacturer as suitable for substrate and floor covering and for conditions present.
- C. Remedial Floor Coating: Single- or multi-layer coating or coating/overlay combination intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.
 - 1. Thickness: As required for application and in accordance with manufacturer's installation instructions.
 - 2. Products:
 - a. ARDEX Engineered Cements: www.ardexamericas.com/#sle.
 - b. H.B. Fuller Construction Products, Inc: www.tecspecialty.com/#sle.
 - c. Sika Corporation; : www.sikafloorusa.com/#sle.
 - d. USG Corporation: www.usg.com/#sle.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.1 CONCRETE SLAB PREPARATION

- A. Follow recommendations of testing agency.
- B. Perform following operations in the order indicated:
 - 1. Existing concrete slabs (on-grade and elevated) with existing floor coverings:
 - a. Visual observation of existing floor covering, for adhesion, water damage, alkaline deposits, and other defects.
 - b. Removal of existing floor covering.
 - 2. Existing concrete slabs with coatings or penetrating sealers/hardeners/dustproofers:
 - a. Remove existing coatings and curing agents from surface according to recommendations of remedial coating manufacturer.
 - 3. Preliminary cleaning.
 - 4. Moisture vapor emission tests; 3 tests in the first 1000 square feet (100 square meters) and one test in each additional 1000 square feet (100 square meters), unless otherwise indicated or required by flooring manufacturer.
 - 5. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
 - 6. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
 - 7. Specified remediation, if required.
 - 8. Patching, smoothing, and leveling, as required.
 - 9. Other preparation specified.
 - 10. Adhesive bond and compatibility test.
 - 11. Protection.
- C. Remediations:
 - 1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.
 - 2. Excessive Moisture Emission or Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating or remedial sheet membrane over entire suspect floor area.
 - 3. Excessive Alkalinity (pH): If remedial floor coating is necessary to address excessive moisture, no additional remediation is required; if not, if an adhesive that is resistant to the level present is available and acceptable to the flooring manufacturer, use that adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching compound over entire suspect floor area.

3.2 REMOVAL OF EXISTING FLOOR COVERINGS

- A. Comply with local, State, and federal regulations and recommendations of RFCI (RWP), as applicable to floor covering being removed.
- B. Dispose of removed materials in accordance with local, State, and federal regulations and as specified.

3.3 PRELIMINARY CLEANING

- A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.
- B. Do not use solvents or other chemicals for cleaning.

3.4 MOISTURE VAPOR EMISSION TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F1869 and as follows.
- D. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet (1.4 kg per 93 square meters) per 24 hours.
- F. Report: Report the information required by the test method.

3.5 INTERNAL RELATIVE HUMIDITY TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F2170 Procedure A and as follows.
- D. Testing with electrical impedance or resistance apparatus may not be substituted for the specified ASTM test method, as the values determined are not comparable to the ASTM test values and do not quantify the moisture content sufficiently.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if any test value exceeds 75 percent relative humidity.
- F. Report: Report the information required by the test method.

3.6 ALKALINITY TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

- B. The following procedure is the equivalent of that described in ASTM F710, repeated here for the Contractor's convenience.
- C. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

3.7 PREPARATION

- A. See individual floor covering section(s) for additional requirements.
- B. Comply with requirements and recommendations of floor covering manufacturer.
- C. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.
- D. Do not fill expansion joints, isolation joints, or other moving joints.

3.8 ADHESIVE BOND AND COMPATIBILITY TESTING

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

3.9 APPLICATION OF REMEDIAL FLOOR COATING

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

3.10 APPLICATION OF REMEDIAL FLOOR TREATMENT

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

3.11 PROTECTION

- A. Cover prepared floors with building paper or other durable covering.

END OF SECTION

SECTION 09 21 16
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Cementitious backing board.
- C. Joint treatment and accessories.

1.2 RELATED REQUIREMENTS

- A. Section 05 40 00 - Cold-Formed Metal Framing: Structural steel stud framing.
- B. Section 07 21 00 - Thermal Insulation: Acoustic insulation.
- C. Section 09 22 16 - Non-Structural Metal Framing.

1.3 REFERENCE STANDARDS

- A. AISI S220 - North American Standard for Cold-Formed Steel Nonstructural Framing; 2020.
- B. AISI S240 - North American Standard for Cold-Formed Steel Structural Framing; 2015, with Errata (2020).
- C. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2018.
- D. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 2019.
- E. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 2015.
- F. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2017 (Reapproved 2022).
- G. ASTM C514 - Standard Specification for Nails for the Application of Gypsum Board; 2004 (Reapproved 2020).
- H. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing; 2003 (Reapproved 2017).
- I. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2020.
- J. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2023.

- K. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2022.
- L. 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.
- M. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2019.
- N. ASTM C1325 - Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units; 2022, with Editorial Revision (2023).
- O. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.
- P. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2023.
- Q. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels; 2019, with Editorial Revision (2020).
- R. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.
- S. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).
- T. ASTM E413 - Classification for Rating Sound Insulation; 2022.
- U. GA-216 - Application and Finishing of Gypsum Panel Products; 2021.
- V. GA-226 - Application of Gypsum Board to Form Curved Surfaces; 2019.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the installation of gypsum board assemblies with size, location, and installation of service utilities.

1.5 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data:
 - 1. Provide data on gypsum board, accessories, and joint finishing system.
- C. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.
- D. Evaluation Service Reports: Show compliance of grid suspension systems with specified requirements.

1.6 QUALITY ASSURANCE

- A. Designer Qualifications: Perform design under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is

located.

1.7 Delivery, Storage, and Handling

- A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.
- B. Store gypsum products and accessories indoors and keep above freezing. Elevate boards above floor, on nonwicking supports, in accordance with manufacturer's recommendations.
- C. Store metal products to prevent corrosion.

PART 2 PRODUCTS

2.1 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
- B. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with the following characteristics:
 - 1. Acoustic Attenuation: STC as indicated calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- C. Shaft Walls at HVAC Shafts: Provide completed assemblies with the following characteristics:
 - 1. Air Pressure Within Shaft: Sustained loads of 5 lbf/sq ft (0.24 kPa) with maximum mid-span deflection of L/240.
 - 2. Acoustic Attenuation: STC of 35-39 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- D. Shaft Walls at Elevator Shafts: Provide completed assemblies with the following characteristics:
 - 1. Air Pressure Within Shaft: Intermittent loads of 5 lbf/sq ft (0.24 kPa) with maximum mid-span deflection of L/240.
 - 2. Acoustic Attenuation: STC of 35-39 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

2.2 METAL FRAMING MATERIALS

- A. Steel Sheet: ASTM A1003/A1003M, subject to the ductility limitations indicated in AISI S220 or equivalent.
- B. Nonstructural Steel Framing for Application of Gypsum Board: See Section 09 22 16.
- C. Nonstructural Framing System Components: AISI S220; 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 (L/120 at 240 Pa).
 - 1. Studs: C-shaped with knurled or embossed faces.
 - 2. Runners: U shaped, sized to match studs.
- D. Shaft Wall Studs and Accessories: AISI S220; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 and specified performance requirements.

2.3 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. Gold Bond Building Products, LLC provided by National Gypsum Company; ____: www.goldbondbuilding.com/#sle.
5. USG Corporation; ____: www.usg.com/#sle.
6. Substitutions: See Section 01 60 00 - Product Requirements.

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.

1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
2. At Assemblies Indicated with Fire-Resistance Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
3. Thickness:
 - a. As indicated on drawings.
4. Paper-Faced Products:
 - a. American Gypsum Company; LightRoc Gypsum Wallboard: www.americangypsum.com/#sle.
 - b. American Gypsum Company; FireBloc Type X Gypsum Wallboard: www.americangypsum.com/#sle.
 - c. American Gypsum Company; FireBloc Type C Gypsum Wallboard: www.americangypsum.com/#sle.
 - d. CertainTeed Corporation; Type C Drywall: www.certainteed.com/#sle.
 - e. CertainTeed Corporation; Type X Drywall: www.certainteed.com/#sle.
 - f. Georgia-Pacific Gypsum; ToughRock: www.gpgypsum.com/#sle.
 - g. Georgia-Pacific Gypsum; ToughRock Fireguard X: www.gpgypsum.com/#sle.
 - h. Georgia-Pacific Gypsum; ToughRock Fireguard C: www.gpgypsum.com/#sle.
 - i. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond Fire-Shield Gypsum Board: www.goldbondbuilding.com/#sle.
 - j. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond Fire-Shield C 5/8" Gypsum Board: www.goldbondbuilding.com/#sle.
 - k. USG Corporation; Sheetrock Brand EcoSmart Panels Firecode X 5/8 in. (15.9 mm): www.usg.com/#sle.
 - l. USG Corporation; Sheetrock Brand Firecode X Panels 5/8 in. (15.9 mm): www.usg.com/#sle.
 - m. USG Corporation; Sheetrock Brand UltraLight Panels Firecode ULIX 5/8 in. (15.9 mm): www.usg.com/#sle.
 - n. Substitutions: See Section 01 60 00 - Product Requirements.
5. Mold-Resistant, Paper-Faced Products:
 - a. American Gypsum Company; M-Bloc: www.americangypsum.com/#sle.
 - b. American Gypsum Company; M-Bloc Type X: www.americangypsum.com/#sle.
 - c. American Gypsum Company; M-Bloc Type C: www.americangypsum.com/#sle.
 - d. CertainTeed Corporation; M2Tech 1/2" Moisture & Mold Resistant Drywall: www.certainteed.com/#sle.
 - e. CertainTeed Corporation; M2Tech 5/8" Type X Moisture & Mold Resistant Drywall: www.certainteed.com/#sle.
 - f. Georgia-Pacific Gypsum; ToughRock Mold-Guard: www.gpgypsum.com/#sle.

- g. Georgia-Pacific Gypsum; ToughRock Fireguard X Mold-Guard:
www.gpgypsum.com/#sle.
 - h. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond XP Gypsum Board: www.goldbondbuilding.com/#sle.
 - i. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond XP Fire-Shield Gypsum Board: www.goldbondbuilding.com/#sle.
 - j. USG Corporation; Sheetrock Brand EcoSmart Panels Mold Tough Firecode X 5/8 in. (15.9 mm): www.usg.com/#sle.
 - k. USG Corporation; Sheetrock Brand Mold Tough Firecode SCX Panels 5/8 in. (15.9 mm): www.usg.com/#sle.
 - l. USG Corporation; Sheetrock Brand UltraLight Panels Mold Tough 1/2 in. (12.7 mm): www.usg.com/#sle.
 - m. Substitutions: See Section 01 60 00 - Product Requirements.
6. Glass Mat Faced Products:
- a. CertainTeed Corporation; 1/2" GlasRoc Interior: www.certainteed.com/#sle.
 - b. CertainTeed Corporation; 5/8" GlasRoc Interior Type X:
www.certainteed.com/#sle.
 - c. Georgia-Pacific Gypsum; DensArmor Plus: www.gpgypsum.com/#sle.
 - d. Georgia-Pacific Gypsum; DensArmor Plus Fireguard C:
www.gpgypsum.com/#sle.
 - e. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond eXP Interior Extreme Fire-Shield Gypsum Panel:
www.goldbondbuilding.com/#sle.
 - f. USG Corporation; Sheetrock Brand Glass-Mat Panels Mold Tough Regular 1/2 in. (12.7 mm): www.usg.com/#sle.
 - g. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Abuse Resistant Wallboard:
- 1. Application: High-traffic areas indicated.
 - 2. Surface Abrasion: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.
 - 3. Indentation: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
 - 4. Soft Body Impact: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
 - 5. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 6. Paper-Faced Type: Gypsum wallboard, as defined in ASTM C1396/C1396M.
 - 7. Type: Fire-resistance-rated Type X, UL or WH listed.
 - 8. Thickness: 5/8 inch (16 mm).
 - 9. Edges: Tapered.
 - 10. Paper-Faced Products:
 - a. American Gypsum Company; M-Bloc AR Type X:
www.americangypsum.com/#sle.
 - b. CertainTeed Corporation; Extreme Abuse Resistant Drywall with M2Tech:
www.certainteed.com/#sle.
 - c. USG Corporation; Fiberock Brand Aqua-Tough AR Interior Panels Regular 1/2 in. (12.7 mm): www.usg.com/#sle.
 - d. USG Corporation; Fiberock Brand AR Interior Panels Regular 1/2 in. (12.7 mm):
www.usg.com/#sle.
 - e. USG Corporation; Fiberock Brand AR Interior Panels FRX-G 5/8 in. (15.9 mm):
www.usg.com/#sle.

- f. USG Corporation; Fiberock Brand AR Interior Panels Regular 5/8 in. (15.9 mm): www.usg.com/#sle.
- g. USG Corporation; Sheetrock Brand AR Firecode X Panels 1/2 in. (12.7 mm): www.usg.com/#sle.
- h. USG Corporation; Sheetrock Brand AR Firecode X Panels 5/8 in.. (15.9 mm): www.usg.com/#sle.
- i. USG Corporation; Sheetrock Brand Mold Tough AR Firecode X 5/8 in. (15.9 mm): www.usg.com/#sle.
- j. Substitutions: See Section 01 60 00 - Product Requirements.

D. Impact Resistant Wallboard:

- 1. Application: High-traffic areas indicated.
- 2. Surface Abrasion: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
- 3. Indentation: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
- 4. Soft Body Impact: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
- 5. Hard Body Impact: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.
- 6. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
- 7. Paper-Faced Type: Gypsum wallboard, as defined in ASTM C1396/C1396M.
- 8. Type: Fire-resistance-rated Type X, UL or WH listed.
- 9. Thickness: 5/8 inch (16 mm).
- 10. Edges: Tapered.
- 11. Paper-Faced Products:
 - a. American Gypsum Company; M-Bloc IR Type X: www.americangypsum.com/#sle.
 - b. CertainTeed Corporation; Extreme Impact Resistant Drywall with M2Tech: www.certainteed.com/#sle.
 - c. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond XP Hi-Impact Gypsum Board: www.goldbondbuilding.com/#sle.
 - d. USG Corporation; Sheetrock Brand Mold Tough VHI Firecode X Panels 5/8 in. (15.9 mm): www.usg.com/#sle.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.

E. Backing Board For Wet Areas: One of the following products:

- 1. Application: Surfaces behind tile in wet areas including tub and shower surrounds and shower ceilings.
- 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
- 3. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.
 - a. Thickness: 1/2 inch (13 mm).
 - b. Products:
 - 1) PermaBASE Building Products, LLC provided by National Gypsum Company; PermaBase Cement Board: www.goldbondbuilding.com/#sle.
 - 2) USG Corporation; Fiberock Brand Aqua-Tough AR Interior Panels Regular 1/2 in. (12.7 mm): www.usg.com/#sle.
 - 3) USG Corporation; Fiberock Brand Aqua-Tough AR Interior Panels Regular 5/8 in. (15.9 mm): www.usg.com/#sle.

- F. Backing Board For Non-Wet Areas: Water-resistant gypsum backing board as defined in ASTM C1396/C1396M; sizes to minimum joints in place; ends square cut.
1. Application: Vertical surfaces behind thinset tile, except in wet areas.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 3. At Assemblies Indicated with Fire-Resistance Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 4. Type: Regular and Type X, in locations indicated.
 5. Type X Thickness: 5/8 inch (16 mm).
 6. Type C Thickness: 1/2 inch (13 mm).
 7. Regular Board Thickness: 1/2 inch (13 mm).
 8. Edges: Tapered.
 9. Products:
 - a. American Gypsum Company; M-Bloc: www.americangypsum.com/#sle.
 - b. American Gypsum Company; M-Bloc Type X: www.americangypsum.com/#sle.
 - c. Georgia-Pacific Gypsum; ToughRock Mold-Guard Gypsum Board: www.gpgypsum.com/#sle.
 - d. Georgia-Pacific Gypsum; DensArmor Plus: www.gpgypsum.com/#sle.
 - e. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond XP Fire-Shield Gypsum Board: www.goldbondbuilding.com/#sle.
 - f. Substitutions: See Section 01 60 00 - Product Requirements.
- G. 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: 1/2 inch (13 mm).
 3. Edges: Tapered.
 4. Products:
 - a. CertainTeed Corporation; Interior Ceiling Drywall: www.certainteed.com/#sle.
 - b. CertainTeed Corporation; 1/2" Easi-Lite: www.certainteed.com/#sle.
 - c. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond High Strength LITE Gypsum Board: www.goldbondbuilding.com/#sle.
 - d. USG Corporation; Sheetrock Brand UltraLight Panels 1/2 in. (12.7 mm): www.usg.com/#sle.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
- H. Shaftwall and Coreboard: Type X; 1 inch (25 mm) thick by 24 inches (600 mm) wide, beveled long edges, ends square cut.
1. Paper-Faced Type: Gypsum shaftliner board or gypsum coreboard as defined ASTM C1396/C1396M; water-resistant faces.
 2. Glass Mat Faced Type: Glass mat shaftliner gypsum panel or glass mat coreboard gypsum panel as defined in ASTM C1658/C1658M.
 3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 4. Paper-Faced Products:
 - a. American Gypsum Company; M-Bloc Shaft Liner: www.americangypsum.com/#sle.
 - b. CertainTeed Corporation; M2Tech Type X Shaftliner: www.certainteed.com/#sle.
 - c. Georgia-Pacific Gypsum; ToughRock Shaftliner: www.gpgypsum.com/#sle.
 - d. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond Shaftliner XP: www.goldbondbuilding.com/#sle.

- e. USG Corporation; Sheetrock Brand Gypsum Liner Panels 1 in. (25.4 mm) SLX: www.usg.com/#sle.
- f. USG Corporation; Sheetrock Brand Mold Tough Gypsum Liner Panels 1 in. (25.4 mm) SLX: www.usg.com/#sle.
- g. Substitutions: See Section 01 60 00 - Product Requirements.
- 5. Glass Mat Faced Products:
 - a. American Gypsum Company; M-Glass Shaft Liner: www.americangypsum.com/#sle.
 - b. CertainTeed Corporation; GlasRoc Shaftliner Type X: www.certainteed.com/#sle.
 - c. Georgia-Pacific Gypsum; DensGlass Shaftliner (mold-resistant): www.gpgypsum.com/#sle.
 - d. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond eXP Shaftliner: www.goldbondbuilding.com/#sle.
 - e. USG Corporation; Sheetrock Brand Glass-Mat Liner Panels Mold Tough 1 in. (25.4 mm): www.usg.com/#sle.
 - f. Substitutions: See Section 01 60 00 - Product Requirements.

2.4 GYPSUM BOARD ACCESSORIES

- A. Acoustic Insulation: See Section 07 21 00.
- B. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, unless noted otherwise.
 - 1. Corner Beads: Low profile, for 90 degree outside corners.
 - a. Products:
 - 1) CertainTeed Corporation; AquaBead: www.certainteed.com/#sle.
 - 2) ClarkDietrich: www.clarkdietrich.com/#sle.
 - 3) Phillips Manufacturing Co; gripSTIK Vinyl Corner Bead: www.phillipsmfg.com/#sle.
 - 4) Trim-Tex, Inc: www.trim-tex.com/#sle.
 - 5) Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. L-Trim with Tear-Away Strip: Sized to fit 1/2-inch (13 mm) thick gypsum wallboard.
 - a. Products:
 - 1) Phillips Manufacturing Co; gripSTIK L-Tear: www.phillipsmfg.com/#sle.
 - 2) Trim-Tex, Inc..
 - 3) Substitutions: See Section 01 60 00 - Product Requirements.
- C. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
 - 1. Fiberglass Tape: 2 inch (50 mm) wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
 - 2. Paper Tape: 2 inch (50 mm) wide, creased paper tape for joints and corners, except as otherwise indicated.
 - 3. Joint Compound: Drying type, vinyl-based, ready-mixed.
 - 4. Joint Compound: Setting type, field-mixed.
- D. Finishing Compound: Surface coat and primer, takes the place of skim coating.
- E. High Build Drywall Surfer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.
 - 1. Products:
 - a. CertainTeed Corporation; Level V Wall and Ceiling Primer/Surfer with M2Tech: www.certainteed.com/#sle.

- b. USG Corporation; USG Sheetrock Brand Tuff-Hide Primer-Surfacer: www.usg.com/#sle.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches (0.84 mm) in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.
- G. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch (0.84 to 2.84 mm) in Thickness: ASTM C954; steel drill screws, corrosion-resistant.
- H. Nails for Attachment to Wood Members: ASTM C514.
- I. Adhesive for Attachment to Wood, ASTM C557 and Metal:
 - 1. Products:
 - a. Franklin International, Inc; Titebond Drywall Plus Construction Adhesive: www.titebond.com/#sle.
 - b. Liquid Nails, a brand of PPG Architectural Coatings; ____: www.liquidnails.com/#sle.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.2 SHAFT WALL INSTALLATION

- A. Shaft Wall Framing: Install in accordance with manufacturer's installation instructions.
 - 1. Install studs at spacing required to meet performance requirements.
- B. Shaft Wall Liner: Cut panels to accurate dimensions and install sequentially between special friction studs.

3.3 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Sound Isolation Tape: Apply to vertical studs and top and bottom tracks/runners in accordance with manufacturer's instructions.
- C. Acoustic Sealant: Install in accordance with manufacturer's instructions.
 - 1. Place continuous bead at perimeter of each layer of gypsum board.

3.4 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

- B. Single-Layer Nonrated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
 - 1. Exception: Tapered edges to receive joint treatment at right angles to framing.
- C. Double-Layer, Nonrated: Use gypsum board for first layer, placed parallel to framing or furring members, with ends and edges occurring over firm bearing. Use glass mat faced gypsum board at exterior walls and at other locations as indicated. Place second layer perpendicular to framing or furring members. Offset joints of second layer from joints of first layer.
- D. Fire-Resistance-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- E. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.
- F. Cementitious Backing Board: Install over steel framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.
- G. Installation on Metal Framing: Use screws for attachment of gypsum board except face layer of nonrated double-layer assemblies, which may be installed by means of adhesive lamination.
- H. Installation on Wood Framing: For rated assemblies, comply with requirements of listing authority. For nonrated assemblies, install as follows:
 - 1. Single-Layer Applications: Adhesive application.
- I. Curved Surfaces: Apply gypsum board to curved substrates in accordance with GA-226.

3.5 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
 - 1. Not more than 30 feet (10 meters) apart on walls and ceilings over 50 feet (16 meters) long.
 - 2. At exterior soffits, not more than 30 feet (10 meters) apart in both directions.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.
- D. Moisture Guard Trim: Install on bottom edge of gypsum board according to manufacturer's instructions and in locations indicated on drawings.

3.6 JOINT TREATMENT

- A. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.
- B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 - 1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
 - 2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 - 3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.

- 4. Level 1: Fire-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.
- C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 - 1. Feather coats of joint compound so that camber is maximum 1/32 inch (0.8 mm).
- D. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.
- E. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

3.7 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet (3 mm in 3 m) in any direction.

3.8 Cleaning

- A. Clean _____.

3.9 Protection

- A. Protect installed gypsum board assemblies from subsequent construction operations.

END OF SECTION

SECTION 09 22 16
NON-STRUCTURAL METAL FRAMING

PART 2 PRODUCTS

1.1 FRAMING MATERIALS

- A. Non-Loadbearing Framing System Components: AISI S220; sheet steel, of size and properties necessary for the spacing indicated, with maximum deflection of wall framing of $L/240$ at 5 psf ($L/240$ at 240 Pa).
1. Studs: C-shaped with flat faces.
 2. Runners: U-shaped, sized to match studs.

END OF SECTION

SECTION 09 25 23
LIME BASED PLASTERING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Interlime based plastering.

1.2 Reference Standards

- A. ASTM C35 - Standard Specification for Inorganic Aggregates for Use in Gypsum Plaster; 2001 (Reapproved 2019).
- B. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2018.
- C. ASTM C842 - Standard Specification for Application of Interior Gypsum Plaster; 2005 (Reapproved 2021).
- D. PCA EB049 - Portland Cement Plaster/Stucco Manual; 2003.

1.3 Submittals

- A. See Section 01 30 00 - Administrative Requirements for submittals procedures.
- B. Product Data: Submit manufacturer's product data and installation instructions for systems specified, demonstrating compliance with requirements.
- C. Samples:
 - 1. Plaster Finish: Submit 12 inch by 36 inch (305 mm by 914 mm) sample of each required plaster finish. Divide each panel into thirds to illustrate each coat.
 - a. Mount on plywood or hardboard using standard metal lath as a key.
- D. Manufacturer's qualification statement.
- E. Plasterwork restorer's qualification statement.

1.4 Quality Assurance

- A. Conservation Treatment Quality Control Plan: Prior to commencing work of this section, receive written approval of plan of proposed restoration work. Include the following:
 - 1. Describe methods of protecting surrounding construction and landscape features.
 - 2. Describe sequencing, work procedures, materials, and tools proposed for each type of conservation treatment specified.
 - 3. Describe methods for surveying original plasterwork.
 - 4. Describe methods and approach to assure repair materials' matching and compatibility with original building materials.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of documented experience.

- C. Plasterwork Restorer Qualifications: Company specializing in period plaster restoration with minimum five years of documented experience.
 - 1. Plastering Mechanics: Experienced, with demonstrated proficiency in lime plaster on historic structures.
 - 2. Experience based solely on application of veneer plaster, gypsum plaster, or cement plaster is not sufficient.
- D. Copies of Documents at Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.

1.5 MOCK-UPS

- A. Provide one mock-up in a discreet location to be approved by the architect. Location to include existing and new plaster. Location must be no smaller than a 3 square foot repair.
 - 1. Divide mockup into three sections:
 - a. Install base coat on the entire panel.
 - b. Install second coat full height of panel by width of panel less approximately 6 inches (____ mm).
 - c. Install finish coat full height of panel by panel width less approximately 12 inches (____ mm).
 - d. Cure mock-up for two weeks using procedures appropriate for weather conditions. Obtain Architect's review and approval.
 - e. If the review requires rework, prepare second mock-up panel of the same dimensions and characteristics as the first and incorporate Architect's review comments.
- B. Mock-up may remain as part of the work.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original and unopened packaging, with brand names and manufacturer's labels intact and legible.
- B. Store materials in dry location, fully protected from weather.

PART 2 - PRODUCTS

2.1 Materials

- A. Hydrated Lime: ASTM C207, Type S.
- B. Aggregate for Base Coats: Natural sand complying with ASTM C35.
- C. Aggregate for Finish Coats: ASTM C842.
- D. Lath and Accessories:
 - 1. Wood Lath: Pine, fir, or cedar strips, kiln-dried. Match width and thickness of existing lath.
 - 2. Fasteners: Nails, staples, or other approved metal supports, of type and size to suit application, compatible with lath and plaster, and rigidly securing lath and accessories in place.

- E. Fiber Reinforcement Binder: Materials that provide closest functional match to fibers used in existing plaster.
 - 1. Animal Fibers: Animal hair, processed and cut to appropriate length.
- F. Plaster Mixing:
 - 1. Mix materials in accordance with manufacturer's instructions.

PART 3 - EXECUTION

3.1 Examination

- A. Areas of full or partial removal of existing plaster are indicated on drawings.
- B. Examine areas indicated for removal and sound them out to confirm extent of work. Additional sections of existing plaster may have deteriorated subsequent to issuance of Contract Documents.
- C. Sound out existing plaster to determine extent of hollow, separated installation. Mark extent of hollow, separated installation of existing surfaces .
 - 1. Assist Architect in examining marked area to confirm extent of area requiring full or partial removal.

3.2 Existing Plaster Removal

- A. In areas indicated, remove existing plaster to expose underlying masonry, lath, or gypsum block substrate.
- B. Select, employ, and control methods of removal.
 - 1. Do not remove sound plaster.
 - 2. Protect substrate and adjacent materials to remain from damage.
 - 3. Provide scoured or fractured aggregate face on plaster to remain.
 - 4. Leave square-edged profile, 75 degrees to 105 degrees measured between plane of wall and edge thickness, between areas of partial depth and full depth removal.

3.3 Preparation

- A. Masonry Substrates with Wood Lath: Install wood lath to match keying spacing of existing lath, but not less than 1/4 inch (6 mm), unless otherwise indicated.
- B. Grounds and Screeds: Install temporary grounds and screeds to ensure accurate rodding of plaster to true surfaces; coordinate with scratch coat work.
- C. Protection: Protect adjacent surfaces from soiling and damage.

3.4 Plaster Mixing on Site

- A. Mix plaster in accordance with manufacturer's instructions. Do not add water or other materials unless recommended by the manufacturer to obtain desired workability.
- B. Do not use admixtures in lime based plaster mixes.

3.5 Plaster Application

A. General:

1. Comply with lime manufacturer's instructions.

B. Install coats as follows:

1. First or Scratch Coat: 3/8-inch (9.5 mm) nominal thickness.
2. Second, Strengthening, or Brown Coat: 3/8-inch (9.5 mm) nominal thickness.
3. Top or Finish Coat: One layer of 1/8-inch (3 mm) nominal thickness.
 - a. Surface Texture: Match existing; PCA EB049.
4. After consolidating the scratch coat and when thumbprint hard, scratch the surface to provide key for subsequent coat.
5. Compact each base coat using a wood float. Rewet, by misting, and float brown coat at least twice to consolidate mortar during drying. Float to open-grained surface to provide sufficient key for finish coat.
6. Float finish coat to compact and provide uniform texture and color finish. Do not overwork. Patch minor imperfections by floating small quantities of fairly dry finish coat mixture into the surface.
7. Uniformity:
 - a. Obtain uniform texture to match approved mock-up.
 - b. Obtain uniform color within the limits of color variation, as determined by the Architect.
8. Tolerances: Deviation from plane not to exceed 1/8 inch in 10 feet (3 mm in 3 m), measured with a straightedge at any location on surface.
9. Curing:
 - a. Allow approximately one to three weeks or more curing time between coats according to temperature and humidity.
 - b. Rewet cured coats before applying subsequent coats.

3.6 Jointing

- #### A.
1. Do not bridge expansion or control joints.

3.7 Curing

- #### A.
- Protect plaster against uneven and excessive evaporation of moisture and from strong, dry airflow.
1. Apply and cure plaster as required by climatic and job conditions to prevent drying out during curing period.
 2. Cover with plastic sheeting to protect from frost, heavy rain, strong winds, and direct sunlight for minimum of 72 hours after application.
 3. Mist plaster surfaces three times per day - morning, noon, and evening - to ensure plaster environment remains at 90 percent relative humidity during the first 72 hours of curing each coat.
 4. Do not use commercial curing compounds.

3.8 Adjusting

- #### A. Corrective Measures: Cut out and replace defective areas and repair to match acceptable work.
1. Defective Work: Includes, but is not limited to:

- a. Areas showing cracks, dents, crazing, blisters, and other surface imperfections.
- b. Areas where bond to substrate has failed.

3.9 Cleaning

- A. Remove and discard temporary protection after plaster work in each area has been completed. Remove plaster from other exposed surfaces, leaving them in undamaged condition; dispose of packaging materials and plaster debris.

END OF SECTION

SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

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

1.2 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 E1264 - Standard Classification for Acoustical Ceiling Products; 2023.

1.3 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.

1.4 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on suspension system components and acoustical units.
- C. Samples: Submit two full size samples illustrating material and finish of acoustical units.
- D. Samples: Submit two samples each, 12 inches (305 mm) long, of suspension system main runner, cross runner, and perimeter molding.
- E. Manufacturer's Installation Instructions: Indicate special procedures.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Acoustical Units: Quantity equal to 5 percent of total installed.

1.5 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.

1.6 FIELD CONDITIONS

- A. Maintain uniform temperature of minimum 60 degrees F (16 degrees C), and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

2.2 ACOUSTICAL UNITS

- A. Acoustical Panels, Type as scheduled per drawings: Painted mineral fiber, with the following characteristics:
 - 1. Classification: ASTM E1264 Type III.
 - 2. Size: 24 by 24 inches (610 by 610 mm).
 - 3. Thickness: 3/4 inch (19 mm).
 - 4. Panel Edge: Reveal.
 - 5. Tile Edge: Beveled.
 - a. Joint: Kerfed and rabbeted.
 - 6. Color: White.
 - 7. Suspension System: Exposed grid as scheduled on drawings.
 - 8. Products:
 - a. Armstrong World Industries, Inc; Product Ultima 15/16" Beveled Tegular: www.armstrongceilings.com/#sle.
 - b. USG Corporation; Eclipse Acoustical Panels: www.usg.com/ceilings/#sle.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

2.3 SUSPENSION SYSTEM(S)

- A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices as required.
- B. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices as required.
- C. Exposed Suspension System: Hot-dipped galvanized steel grid with aluminum cap.
 - 1. Structural Classification: Intermediate-duty, when tested in accordance with ASTM C635/C635M.
 - 2. Profile: Tee; 15/16 inch (24 mm) face width.
 - 3. Finish: White Painted.
 - 4. Products:
 - a. USG Corporation: www.usg.com/ceilings/#sle.
 - b. Armstrong World Industries, Inc; Product Prelude: www.armstrong.com.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

2.4 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application and ceiling system flatness requirement specified.
- B. Hanger Wire: 12 gauge, 0.08 inch (2 mm) galvanized steel wire.
- C. Hold-Down Clips: Manufacturer's standard clips to suit application.
- D. Perimeter Moldings: Same metal and finish as grid.
 - 1. Angle Molding: L-shaped, for mounting at same elevation as face of grid.
- E. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.

3.2 Preparation

- A. Install after major above-ceiling work is complete.
- B. Coordinate the location of hangers with other work.

3.3 INSTALLATION - SUSPENSION SYSTEM

- A. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- B. Locate system on room axis according to reflected plan.
- C. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Use longest practical lengths.
- D. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- 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 (152 mm) of each corner, or support components independently.
- H. Do not eccentrically load system or induce rotation of runners.

3.4 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 acoustical units level, in uniform plane, and free from twist, warp, and dents.
- E. Cutting Acoustical Units:
 - 1. Cut to fit irregular grid and perimeter edge trim.
 - 2. Make field cut edges of same profile as factory edges.
 - 3. Double cut and field paint exposed reveal edges.
- F. Where round obstructions occur, provide preformed closures to match perimeter molding.
- G. Install hold-down clips on panels within 20 ft (6 m) of an exterior door.

3.5 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet (3 mm in 3 m).
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION

SECTION 09 65 00
RESILIENT FLOORING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Resilient tile flooring.
- B. Resilient base.
- C. Resilient stair accessories.

1.2 RELATED REQUIREMENTS

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

1.3 REFERENCE STANDARDS

- A. ASTM F1700 - Standard Specification for Solid Vinyl Floor Tile; 2020.
- B. ASTM F1861 - Standard Specification for Resilient Wall Base; 2021.
- C. ASTM F2169 - Standard Specification for Resilient Stair Treads; 2015 (Reapproved 2020).

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project Site.
 - 1. Review methods and procedures related to resilient flooring including, but not limited to, the following:
 - a. Examination and preparation of substrates to receive resilient flooring.
 - b. Installation; including seamless installation techniques.

1.5 ACTION SUBMITTALS

- A. See Section 01 30 00 - 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. Shop Drawings: For each type of resilient flooring. Include floor-covering layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets and cutouts.
 - 1. Show details of special patterns
 - 2. Show locations of inscribed maintenance tiles.
 - 3. Submit grounding diagram showing location of grounding strips and connections.
- D. Samples: Full-size units of each color, texture and pattern of floor tile required. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.

- E. Samples for Initial Selection: For each type of floor tile indicated.
- F. Product Schedule: Use same designations indicated on Drawings.

1.6 INFORMATIONAL SUBMITTALS

- A.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of resilient flooring to include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Furnish extra flooring material [from the same product run,] that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - a. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color and pattern of floor tile installed.
 - 3. Furnish extra wall base that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - a. Wall Base: Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.9 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in installing specified flooring with minimum three years documented experience.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.11 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following periods:
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.

- E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 PRODUCTS

2.1 TILE FLOORING

- A. Luxury Vinyl Tile - LVT:
 - 1. Manufacturers:
 - a. Armstrong Flooring; Terra: www.armstrongflooring.com/#sle.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. Minimum Requirements: Comply with ASTM F1700, of Class corresponding to type specified.
 - 3. Total Thickness: 0.100 inch (2.5 mm).
 - 4. Color: As indicated on drawings.

2.2 COMPONENTS

- A. See finish schedule and elevations.

2.3 INSTALLATION MATERIALS

- A. Trowelable leveling and patching compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated
- C. Seamless-Installation Accessories:
 - 1. Chemical-Bonding Compound: Manufacturer's product for chemically bonding seams.

2.4 STAIR COVERING

- A. Stair Treads: Vinyl; full width and depth of stair tread in one piece; tapered thickness.
 - 1. Manufacturers:
 - a. Johnsonite, a Tarkett Company: www.johnsonite.com/#sle.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. Minimum Requirements: Comply with ASTM F2169, Type TV, vinyl, thermoplastic.
 - 3. Nosing: Square.
 - 4. Color: To be selected by Architect from manufacturer's full range.

2.5 RESILIENT BASE

- A. Resilient Base (VB): ASTM F1861, Type TV, vinyl, thermoplastic; style as scheduled.
 - 1. Manufacturers:
 - a. Johnsonite, a Tarkett Company: www.johnsonite.com/#sle.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. Height: 4 inches (100 mm).
 - 3. Thickness: 0.125 inch (3.2 mm).

4. Finish: Matte.
5. Color: As indicated on drawings.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the work.
 1. 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.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 1. Installation of resilient products indicates acceptance of surfaces and condition.

3.2 PREPARATION

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Concrete Substrates: Prepare according to ASTM F 710
 1. Verify that substrates are dry and free of curing compounds, sealers and hardeners.
 2. Remove substrate coatings and other substances that are incompatible with floor-covering adhesives and that contain soap, wax, oil or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 4. Moisture Testing: Perform tests recommended by manufacturer and as follows. proceed with installation only after substrates pass testing.
 - a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water / 1000 sq. ft. in 24 hours.
 - b. Perform relative-humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative-humidity level measurement.
- C. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.
- D. Prohibit traffic until filler is fully cured.
- E. Do not install floor tiles until materials are the same temperature as space where they are to be installed.
 1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- F. Sweep and vacuum substrates to be covered by resilient flooring immediately before installation.

3.3 INSTALLATION

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install in accordance with manufacturer's written instructions.
- C. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 - 1. Lay tiles square with room axis.
- D. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 - 1. Lay tiles with grain running in one direction.
- E. Scribe, cut and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frame.
- F. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- H. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abutcovers and to cover perimeters.
- I. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks and other surface imperfections.
- J. Seamless Installation:
 - 1. Chemically Bonded Seams: Bond seams with chemical-bonding compound to permanently fuse sections into a seamless floor covering. Prepare seams and apply compound to produce tightly fitted seams without gaps, overlays or excess bonding compound on floor-covering surfaces.

3.4 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.

3.5 Installation - Resilient Base

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 8 inches (205 mm) between joints.
- B. Install base on solid backing. Bond tightly to wall and floor surfaces.

3.6 Installation - Stair Coverings

- A. Adhere over entire surface. Fit accurately and securely.

3.7 CLEANING

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile
- B. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove excess adhesive from floor, base, and wall surfaces without damage.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil
- C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover floor tile until Substantial Completion.
- E. Clean in accordance with manufacturer's written instructions.

END OF SECTION

SECTION 09 68 13
TILE CARPETING

PART 1 GENERAL

1.1 SECTION INCLUDES

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

1.2 REFERENCE STANDARDS

- A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2022.
- B. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2023.
- C. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.

1.3 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Shop Drawings: Submit floor plans, drawn to scale, indicating extent of each type of carpet and location, pile/ pattern direction, type of seams, and transition details of other flooring materials.
- D. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules:
 - 1. Carpet: 12-inch minimum square sample.
 - 2. Exposed edge stripping accessory: 12 inch long samples. Refer to Room Finish Schedule for additional trim accessories.
- E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- F. Operation and Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

1.4 WARRANTY

- A. Submit warranty in conformance with this specification.
- B. Furnish copies with Operating and Maintenance Manual.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.
- C. Pre-Installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to carpet including, but not limited to the following:
 - 1. Review and finalize construction schedule and verify availability of materials, Installers personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Review requirements for verification and testing of subfloor condition, subfloor preparation, and environmental conditions required at time of flooring installation.

1.6 FIELD CONDITIONS

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.
 - 1. Store materials in a covered, climate controlled facility, with temperatures between 40 degrees F and 90 degrees F.
 - 2. Store materials off ground or floor in protective packaging. Do not permit materials to become wet.
- B. Areas scheduled to receive carpeting shall be fully enclosed and provided with sufficient ventilation and supplemental heating or cooling to match design environment a minimum of 72 hours prior to the start of installation.
- C. Moisture vapor transmission rate: Concrete subfloors shall have a maximum moisture vapor transmission rate of 3 pounds per 1000 square feet per 24 hours prior to installing flooring. Refer to Part 3 Execution for detailed testing requirements.
- D. Concrete internal relative humidity: Concrete sub-floors shall have a maximum internal relative humidity, measure with in-situ probes at 1/4 the depth, of 75 percent.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Tile Carpeting:
 - 1. Patcraft: <https://www.patcraft.com/>.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 MATERIALS

- A. Tile Carpeting: Provide products, sizes, types and styles as indicated on the drawings and as selected by the Architect from the manufacturer's full lines.

2.3 ACCESSORIES

- A. Trowelable leveling and patching compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Edge Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints., color as selected by Architect.
- C. Adhesives:
 - 1. Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive carpet tile.
- C. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to subfloor surfaces.
- D. Cementitious Subfloor Surfaces: Verify that substrates are ready for flooring installation by testing for moisture and alkalinity (pH).
 - 1. Test as Follows:
 - a. Alkalinity (pH): ASTM F710.
 - b. Internal Relative Humidity: ASTM F2170.
 - c. Moisture Vapor Emission: ASTM F1869.
 - 2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.
- E. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

- A. Remove existing carpet tile.
- B. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- C. Remove subfloor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler.

- D. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- E. Vacuum clean substrate.

3.3 INSTALLATION

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.
- F. Locate change of color or pattern between rooms under door centerline.
- G. Fully adhere carpet tile to substrate.
- H. Trim carpet tile neatly at walls and around interruptions.
- I. Complete installation of edge strips, concealing exposed edges.

3.4 CLEANING

- A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.
- B. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- C. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 09 83 00
ACOUSTIC FINISHES

PART 2 PRODUCTS

1.1 ACOUSTIC FINISHES

- A. General:
 - 1. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Acoustic Coatings: Spray-applied, vinyl acrylic dry-fall coatings.
 - 1. Provide nonbridging coating to cover acoustical tile and ceiling grid system.
- C. Accessory Materials: Provide primers, sealers, cleaning agents, and clean up materials as required for completion of acoustic finish.

END OF SECTION

SECTION 09 91 13
EXTERIOR PAINTING

PART 1 GENERAL

1.1 SECTION INCLUDES

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

1.2 REFERENCE STANDARDS

- A. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2020.
- B. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.

2.2 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready-mixed, unless required to be a field-catalyzed paint.
 - 1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Supply each paint material in quantity required to complete entire project's work from a single production run.

3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is described explicitly in manufacturer's product instructions.
- B. Colors: To be selected from manufacturer's full range of available colors.
 1. Selection to be made by Architect after award of contract.

2.3 PAINT SYSTEMS - EXTERIOR

- A. Paint E-OP - Exterior Surfaces to be Painted, Unless Otherwise Indicated: Including concrete, concrete masonry units, fiber cement siding, primed wood, and primed metal.
 1. Two top coats and one coat primer.
 - a. Products:
 2. Top Coat Sheen:
 - a. Velvet: MPI gloss level 2; use this sheen for wood window exteriors.
 3. Primer: As recommended by top coat manufacturer for specific substrate.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin application of paints and finishes 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. Fiber Cement Siding: 12 percent.
 2. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
 3. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.

3.2 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- F. Concrete:
- G. Masonry:

- H. Fiber Cement Siding: Remove dirt, dust and other foreign matter with a stiff fiber brush. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
- I. Exterior Wood Surfaces to Receive Opaque Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior calking compound after prime coat has been applied. Back prime concealed surfaces before installation.

3.3 APPLICATION

- A. Exterior Wood to Receive Opaque Finish: If final painting must be delayed more than 2 weeks after installation of woodwork, apply primer within 2 weeks and final coating within 4 weeks.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- 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. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- F. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.4 CLEANING

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

3.5 PROTECTION

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

END OF SECTION

SECTION 09 91 23
INTERIOR PAINTING

PART 1 GENERAL

1.1 SECTION INCLUDES

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

1.2 REFERENCE STANDARDS

- A. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.
- B. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).

1.3 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g., "alkyd enamel").
 - 2. MPI product number (e.g., MPI #47).
 - 3. Cross-reference to specified paint system products to be used in project; include description of each system.
 - 4. Manufacturer's installation instructions.
- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches (216 by 279 mm) in size, illustrating range of colors available for each finishing product specified.

1. Where sheen is specified, submit samples in only that sheen.
- D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.
- E. Manufacturer's Instructions: Indicate special surface preparation procedures.
- F. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 2. Extra Paint and Finish Materials: 1 gal (4 L) of each color; from the same product run, store where directed.
 3. Label each container with color in addition to the manufacturer's label.

1.4 QUALITY ASSURANCE

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

1.5 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 (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

1.6 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 materials when relative humidity exceeds 85 percent, at temperatures less than 5 degrees F (3 degrees C) above the dew point, or to damp or wet surfaces.
- D. Minimum Application Temperatures for Paints: 50 degrees F (10 degrees C) for interiors unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 fc (860 lux) measured mid-height at substrate surface.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Paints:
 - 1. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
- B. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- C. Material Compatibility:
 - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- D. Low-Emmitting Materials:
 - 1. For field applications that are inside the weatherproofing system, 90 percent of paints and coatings shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- E. Colors: As indicated on drawings.

2.2 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready-mixed, unless intended to be a field-catalyzed paint.
 - 1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 - 3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
 - 4. Supply each paint material in quantity required to complete entire project's work from a single production run.
 - 5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin application of paints and finishes until substrates have been adequately prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- E. Test shop-applied primer for compatibility with subsequent cover materials.
- F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums:
 - 1. Gypsum Wallboard: 12 percent.

3.2 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- F. Aluminum: Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.

3.3 APPLICATION

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

3.4 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection.

3.5 CLEANING

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

3.6 PROTECTION

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

END OF SECTION

SECTION 09 93 00
STAINING AND TRANSPARENT FINISHING

PART 1 GENERAL

1.1 Section Includes

- A. Field application of stains.

1.2 Related Requirements

1.3 REFERENCE STANDARDS

- A. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.

PART 2 PRODUCTS

2.1 Stains and Transparent Finishes - General

- A. Finishes:
 - 1. Provide finishes capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Provide materials compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 - 3. Supply each finish material in quantity required to complete entire project's work from a single production run.
 - 4. Do not reduce, thin, or dilute finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

2.2 Interior Stain and Transparent Finish Systems

- A. Finish on Wood - Vertical Surfaces:

PART 3 EXECUTION

3.1 Preparation

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

3.2 Application

- A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- C. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- D. Reinstall items removed prior to finishing.

END OF SECTION

SECTION 10 28 00
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Commercial toilet accessories.
- B. Under-lavatory pipe supply covers.

1.2 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2022.
- C. ASTM C1036 - Standard Specification for Flat Glass; 2021.
- D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.
- E. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2018.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023c.
- G. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).
- H. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.3 ADMINISTRATIVE REQUIREMENTS

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

1.4 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
- C. Samples: Submit two samples of each accessory, illustrating color and finish.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Commercial Toilet, Shower, and Bath Accessories:
 - 1. American Specialties, Inc; _____: www.americanspecialties.com/#sle.
 - 2. Bradley Corporation; _____: www.bradleycorp.com/#sle.
 - 3. Georgia-Pacific Professional; _____: www.gppro.com/#sle.
 - 4. Substitutions: Section 01 60 00 - Product Requirements.

2.2 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 3 keys for each accessory to Owner; master key lockable accessories.
- C. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.
- D. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.
- E. Mirror Glass: Tempered safety glass, ASTM C1048; and ASTM C1036 Type I, Class 1, Quality Q2, with silvering as required.

2.3 FINISHES

2.4 Commercial Toilet Accessories

- A. Toilet Paper Dispenser: Double roll, surface mounted, for coreless type rolls.
- B. Paper Towel Dispenser: Electric, roll paper type.
 - 1. Cover: Stainless steel.
 - 2. Paper Discharge: Touchless automatic.
 - 3. Capacity: 6 inch diameter roll.
 - 4. Mounting: Semi recessed.
 - 5. Power: Battery operated.
 - 6. Refill Indicator: Illuminated refill indicator.
- 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.
- D. Mirrors: Stainless steel framed, 1/4 inch (6 mm) thick annealed float glass; ASTM C1036.
- E. Grab Bars: Stainless steel, smooth surface.
 - 1. Standard Duty Grab Bars:
 - a. Push/Pull Point Load: 250 pound-force (1112 N), minimum.
 - b. Dimensions: 1-1/4 inch (32 mm) outside diameter, minimum 0.05 inch (1.3 mm) wall thickness, exposed flange mounting, 1-1/2 inch (38 mm) clearance between

- ## 2.5 UNDER-LAVATORY PIPE AND SUPPLY COVERS

1. Insulate exposed drainage piping, including hot, cold, and tempered water supplies under lavatories or sinks to comply with ADA Standards.
2. Exterior Surfaces: Smooth non-absorbent, non-abrasive surfaces.
3. Construction: 1/8 inch (3.2 mm) flexible PVC.
 - a. Surface Burning Characteristics: Flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
 - b. Comply with ICC A117.1.
 - c. Microbial and Fungal Resistance: Comply with ASTM G21.
4. Color: Gray.
5. Products:
 - a. Substitutions: See Section 01 60 00 - Product Requirements.

3.1 EXAMINATION

D. Verify that field measurements are as indicated on drawings.

B. Provide templates and rough-in measurements as required.

3.3 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.
 - 1. Grab Bars: As indicated on drawings.
 - 2. Other Accessories: As indicated on drawings.

3.4 PROTECTION

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

END OF SECTION

SECTION 10 44 00
FIRE PROTECTION SPECIALTIES

PART 2 PRODUCTS

1.1 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.

END OF SECTION

SECTION 12 36 00
COUNTERTOPS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Countertops for architectural cabinet work.

1.2 RELATED REQUIREMENTS

- A. Section 06 41 00 - Architectural Wood Casework.

1.3 REFERENCE STANDARDS

- A. AWI (QCP) - Quality Certification Program; Current Edition.
- B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.
- D. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.
- E. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

1.4 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Specimen warranty.
- C. Shop Drawings: Complete details of materials and installation ; combine with shop drawings of cabinets and casework specified in other sections.
- D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.
- F. Test Reports: Chemical resistance testing, showing compliance with specified requirements.
- G. Certificate: Submit labels and certificates required by quality assurance and quality control programs.
- H. Installer's qualification statement.

- I. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.5 QUALITY ASSURANCE

- A. Quality Certification:
 - 1. Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: www.awiqcp.org/#sle.
 - 2. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
 - 3. Provide designated labels on shop drawings as required by certification program.
 - 4. Provide designated labels on installed products as required by certification program.
 - 5. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

1.6 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.

1.7 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

2.1 COUNTERTOPS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
 - 1. Flat Sheet Thickness: 1/2 inch (12 mm), 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:
 - 1) Wilsonart: www.wilsonart.com/#sle.
 - 2) Substitutions: See Section 01 60 00 - Product Requirements.
 - b. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
 - c. Color and Pattern: As indicated on drawings.
 - 3. Other Components Thickness: 1/2 inch (12 mm), minimum.

4. Back and End Splashes: Same sheet material, square top; minimum 4 inches (102 mm) high.
5. Fabricate in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 11 - Countertops, Premium Grade.

2.2 MATERIALS

- A. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
- B. Joint Sealant: Mildew-resistant silicone sealant, white.

2.3 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 (25 mm) 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 (102 mm), unless otherwise indicated.
- C. Solid Surfacing: Fabricate tops and wall panels up to 144 inches (3,657 mm) long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.

PART 3 EXECUTION

3.1 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.

3.2 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.

3.3 INSTALLATION

- A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- B. Seal joint between back/end splashes and vertical surfaces.

3.4 TOLERANCES

- A. Variation From Horizontal: 1/8 inch in 10 feet (3 mm in 3 m), maximum.
- B. Offset From Wall, Countertops: 1/8 inch (3 mm) maximum; 1/16 inch (1.5 mm) minimum.
- C. Field Joints: 1/8 inch (3 mm) wide, maximum.

3.5 CLEANING

- A. Clean countertops surfaces thoroughly.

3.6 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

**SECTION 220501
COMMON WORK RESULTS FOR PLUMBING**

PART 1 GENERAL

1.01 REFERENCE

- A. All applicable requirements of other portions of the Contract Documents apply to the work of this Section, including, but not limited to, Division 01, General Requirements.
- B. INDIANA CODES
 - 1. General Administration Rules (675 IAC 12): Amended 12/01/2014
 - 2. Building Code: Effective 12/01/2014
 - 3. Fire Code: Effective 12/01/2014
 - 4. Plumbing Code: Effective 12/24/2012
 - 5. Electrical Code: Effective 08/26/2009
 - 6. Mechanical Code: Effective 12/01/2014
 - 7. Handicapped Accessibility Code: 2014
 - 8. Energy Code: Effective 05/07/2010
 - 9. Elevator Safety Code: 2011:
 - 10. Fuel Gas Code: Effective 12/01/2014

1.02 GUARANTEE

- A. In entering into a contract covering this work, the Contractor accepts the Specifications and Drawings and guarantees that the work will be carried out in accordance with the requirements of the Specifications and Drawings or such authorized modifications as may be made in the Contract Documents. Contractor further guarantees that the workmanship and material will be first class and that only experienced workers, familiar with each particular class of work, will be employed. Contractor further guarantees to replace and make good at their own expense any defects due to faulty workmanship or material which may develop within one (1) year after final payment and acceptance by the Owner, upon receipt of written notification of defect from the Owner.

1.03 QUALITY ASSURANCE

- A. Regulations and Standards: All equipment, apparatus, and systems are to be fabricated and installed in complete accordance with fire and insurance rules and regulations, the Life Safety Code, and the latest edition or revision of the following applicable regulations, standards, and codes:
 - 1. AIA American Institute of Architects
 - 2. ASME American Society of Mechanical Engineers
 - 3. ASTM American Society for Testing and Materials
 - 4. NFPA National Fire Protection Association
 - 5. NEC National Electric Code
 - 6. OSHA Occupational Safety and Health Administration
 - 7. UL Underwriter's Laboratories, Inc.
 - 8. MCAA Mechanical Contractors Association of America, Inc.
 - 9. ANSI American National Standard Institute
 - 10. AWWA American Water Works Association
 - 11. AGA American Natural Gas Association
 - 12. PDI Plumbing and Drainage Institute
 - 13. NACE National Association of Corrosion Engineers
 - 14. State and Local Inspection Authorities
 - 15. Division 01 Sections "Regulatory Requirements: and "Reference Standards" of the Project Specifications

16. References on the Drawings or in the Specifications to "code" or "building code" not otherwise identified shall mean the specific codes applicable to this Project location, together with all additions, amendments, changes, and interpretations adopted by code authorities having jurisdiction over this Project.
17. The applicable edition of all codes shall be that adopted at the time of issuance of permits by the authorities having jurisdiction, and shall include all modifications and additions adopted by that jurisdiction.
18. Give all required notices so as to comply with, and meet, all inspections required by Federal, State, and Local authorities.
19. It is not the intent herewith to modify, reduce, or change any rules, standards, regulations, or requirements that are applicable under local, state and federal codes, ordinances, or regulations of the various authorities having jurisdiction. Where the standards differ among the various authorities, the most restrictive shall apply. Where the requirements shown on the Drawings or called for in the Specifications exceed code requirements, these Drawings and Specifications shall take precedence. Where the requirements within the specifications of this division of work and the Drawings conflict with the referenced Divisions, Sections, and other documents, the documents having the most restrictive and the higher cost requirements shall apply.

1.04 JOB CONDITIONS AND COORDINATION

A. Local Conditions

1. Each Trade Contractor is to inform himself of the conditions under which the work is to be performed, the site of the work, the structure of the ground, the obstacles that may be encountered, the availability and location of necessary facilities and all relevant matters concerning the work to be done.
2. Utility Coordination: Contractors shall contact, coordinate, and review indicated utility data with the local utility companies. Verify existing utility locations, verify new pipe tap locations and piping routes with the utility.
 - a. Water: Contractor to verify water meter and backflow requirements.
 - b. Gas: Contractor to verify meter requirements.
 - c. Sewer: Contractor to verify all proposed sewer connection points.

B. Present Job Site Inspection

1. Each contractor shall schedule through the Construction Manager a visit to the present site proposed for the work before presenting a Bid and shall make a careful inspection of the existing conditions.
2. During the site visit, each Trade Contractor is to investigate for any existing conditions and responsibilities which are not clearly defined by the Drawings and Specifications. If any such conditions exist, they shall bring them to the attention of the A/E in writing. The A/E will then make the required written clarification. The absence of questions before the opening of bids shall indicate a clear understanding of the scope of work and the Contractor's responsibility.

C. Concrete Housekeeping Pads and Supporting Foundations

1. Unless otherwise specified or noted on the Drawings, the Concrete Contractor is to provide concrete pads and foundations as indicated on the Drawings for all mechanical equipment.
2. Unless otherwise specified or noted on the Drawings, the Contractor or Subcontractor whose equipment the concrete pad or foundation services is to locate, size, and pay the Concrete Contractor to provide concrete pads and foundations as indicated on the Drawings for all of their equipment.
3. Concrete pads as may be indicated are based upon the design and layout-based manufacturer and model of equipment and devices as specified or as scheduled or noted on the Drawings.

4. The individual Trade Contractor furnishing the equipment or devices is to verify and coordinate all concrete pad sizes so as to have same of proper size to serve the equipment or device supplied and verify the position of all anchor bolts.
 5. Any additional cost for larger than indicated pad or foundation sizes to fit the approved manufacturer and model of the equipment or devices is to be borne by the Trade Contractor who supplies such equipment or devices.
 6. Concrete equipment pads shall extend a minimum of 6" beyond the equipment of product mounted thereon.
 7. Contractor shall verify equipment pad size and locations with nearby floor drain locations.
- D. Permits and Fees: This Contractor is to obtain all permits and pay all fees required for the work under Division 22 of the Work.
- E. Royalties and Patents
1. The Trade Contractor is to pay all royalties and license fees. They shall defend, indemnify, and hold the Owner and A/E harmless from any and all suits, demands or claims for infringement of any patent rights.
 2. The review by A/E or Owner of any method of construction, invention, appliance, process, article, device or material of any kind is to be for adequacy of work, and is not to be construed as an approval of the use thereof by the Contractor in violation of any patent or other rights of any third person.
- F. Wiring and Conduit Requirements: In general, most wiring and conduit requirements are addressed, either upon the Drawings as a part of a packaged equipment assembly specifications, or within Divisions 26, 27 and 28 of the Specifications. However, should an equipment component, panel, or system device need additional wiring and conduit so as to be complete, approved and fully operational, the Contractor who supplied the equipment component, panel or system device shall be responsible for the required wiring and conduit as well as circuit disconnect and protection for same when it is not otherwise covered by the Project Drawings and Specifications.
- G. Coordination: Coordinate the exact location of this work with the work of other trades prior to fabrication or installation of same. Verify all dimensions and elevations. Provide additional offsets and sections of material as may be required to meet the applicable job condition requirements. Coordinate with and review all related construction Drawings and Shop Drawings of all equipment suppliers prior to start of work.

1.05 SPECIFICATIONS AND DRAWINGS

- A. These specifications and Drawings are intended to describe and provide for a complete and finished project. They are intended to be complementary. All items of work called for by either shall be as binding as if called for by both. The work described shall be complete in every detail, notwithstanding the fact that every item necessarily involved is not particularly mentioned or shown. If the Bidder, Supplier or Contractor sees anything to question, it must be brought to the attention of the A/E immediately.
- B. Minor Deviations: The Drawings accompanying these Specifications indicate the general design and arrangement of equipment, apparatus, fixtures, accessories and piping necessary to complete the installation of the system. The exact location or arrangement of the apparatus and equipment, unless otherwise dimensioned, is subject to minor changes necessitated by field conditions and shall be required without additional cost to the Owner. Measurements shall be verified through actual observation at the construction site. Each Trade Contractor shall be responsible for fitting all of their work into place in a satisfactory and workmanlike manner, to the approval of the A/E and Owner.
- C. Provide all labor and materials necessary for the completion of the work described. Referenced codes and industry standards and methods shall apply when no other specifics are indicated. Bring questions relating to this paragraph to the attention of the A/E for resolution prior to the receipt of Bids.

- D. All Work indicated on Drawings, diagrams, or details in part only are to continue throughout unless distinctly marked otherwise. The same applies to other parts of the project where merely a typical reference plan, diagram, or section of the drawing is complete. The balance is intended to be the same as the typical plan, section, or diagram as shown and is to be figured accordingly.
- E. The specifications are divided into trades and divisions only for the distinct purpose of facilitating the work. However, the Trade Contractor will become responsible for furnishing all labor and materials necessary to complete the project as contemplated by the Drawings and Specifications. Any item mentioned under any heading of the Specifications must be supplied even though it is not called for again under the heading for the respective work.
- F. Should discrepancies occur within the Contract Documents, the more stringent and more costly approach shall apply for bidding purposes. The Contractor is to notify the A/E of discrepancies for clarification. Clarifications issued after the Contract is awarded shall be incorporated by the Contractor at no additional costs and shall be reviewed by the A/E to determine if a reduction in cost is justified.

1.06 TRADE CONTRACTORS, SUBCONTRACTORS AND SUPPLIERS

- A. The Trade Contractor is any person or organization who contracts to perform work for the Project. Wherever the word "Contractor" is used on the Drawings or in the Specifications, it shall be construed to mean the Trade Contractor applicable to the Title Division of these specifications.
- B. A Sub-Contractor is a person or organization who has a direct contract with a Trade Contractor to perform any of the Work at the site and includes all who furnish material worked to a special design in accordance with the Drawings and Specifications, but excludes suppliers or persons furnishing material not specially designed. Wherever the term "Sub-Contractor" is encountered in the Contract Documents, it shall mean the Sub-Contractor and/or their Sub-Sub-Contractors and/or their Material Suppliers.
- C. A Sub-Sub-Contractor is a person or organization who has a direct or indirect contract with a Sub-Contractor to perform any of the Work at the project site or for the subject project.
- D. A Material Supplier is a person or organization who has a direct contract with a Trade Contractor to furnish material not specially designed.
- E. It shall be the responsibility of each Trade Contractor to be fully familiar with various local trade jurisdictional requirements and to engage the services of any other Sub-Contractors as may be required within the various trades to complete all of the work as indicated upon the Drawings and within the Specifications under their respective division or section. Only Trade Sub-Contractors with established knowledge and skills of their specific trade shall be used, so that all work is performed in a complete, finished, and professional manner.
- F. Whenever any provisions of the Specifications conflict with any agreements or regulations in force among members of any Trade Associations, Unions, or Councils which regulate or distinguish what work shall or shall not be included in the work of any particular trade, the Trade Contractor shall make all necessary efforts to reconcile any such conflict without delay, damage or cost to the Owner.
- G. If the progress of the work is affected by any undue delay in furnishing or installing any items of material or equipment required under the contract because of a conflict involving any such agreement or regulation, the A/E may require that other material or equipment of equal kind and quality be provided at no additional cost to the Owner.
- H. Any Trade Contractor, subcontractor, or material supplier not normally employing union labor shall make all provisions necessary to avoid any resulting disputes with labor unions and shall be responsible for any delays, damages or extra cost caused by employment of such non-union labor, except as otherwise governable by state or federal rules and regulations.
- I. Each Trade Contractor shall pay for all applicable Federal, State and local taxes on all materials, labor or services furnished by him, and all taxes arising out of their operations under

the Contract Documents which may be imposed upon or collectable from the Owner or become a lien against their property. Such taxes shall include, but not be limited to, Occupational, Sales, Use, Excise, Social Security and Unemployment Taxes, customs duties, and all income taxes and other taxes now in force or enacted prior to final acceptance of the work. The Trade Contractor shall assume all liability for the payment of and shall pay any unemployment benefits payable under any Federal or State law to individuals employed by him during the progress of the work covered by the Contract.

- J. It is the responsibility of each Trade Contractor to coordinate the various related equipment requirements between their subcontractors, suppliers, and other trade contractors, and to also follow the approved manufacturer's installation instructions.

1.07 OPERATIONAL AND MAINTENANCE INSTRUCTIONS

- A. All operational and maintenance instructions that are provided to various Owner-selected members of the facility engineering and/or maintenance staff are, at the same time presented, to be fully recorded on DVD by the Contractor so that all such sessions can be later reviewed by the Owner's staff on a retraining basis as needed. All such DVDs are to become the property of the Owner at the end of each applicable training period, with one copy of each also being supplied to the A/E for the A/E project files.

PART 2 PRODUCTS

2.01 MANUFACTURERS/PRODUCTS/SUBMITTALS

- A. Under the Base Bid, no other manufacturers except those indicated on the Drawings or those listed within the Sections of this Division, that are, in turn, able to comply with the contract document requirements and minimum standards of these specifications, will be acceptable. In addition to specific required "Alternates," proposed substitutions that may or may not be acceptable to the Owner may be submitted by the Contractor only at the time of initial base bid submittal.
- B. Although design-based models of various manufacturers may be indicated within the various schedules, it is the responsibility of the various equipment manufacturers to verify the model selections so that all items of equipment comply with the minimum standards of performance that are indicated within the schedules, as well as the requirements within various sections of the specifications under which the equipment is also specified.
- C. All submittals shall conform completely to the requirements of the Contract Documents, including all requirements set forth in Division 01 Section "Submittals".
- D. Shop Drawings are to be submitted on each item of specified or scheduled equipment, valves, specialties, insulation, fixtures, drains, controls and related accessories. All control submittals must include a typed sequence of control for each system.

2.02 ACCESS DOORS AND PANELS

- A. Unless otherwise indicated, each Trade Contractor is to locate and furnish all access doors required for non-accessible surfaces (such as ceilings, walls, chases, and similar locations), so that all valves and similar items are easily accessible for operation, inspection and maintenance. Access doors for ceiling, walls, chases, etc. are to be installed by the General Contractor. The Trade Contractor is to bear the costs of the installation of the access doors.
- B. See Section 08 3113 for access door types and specifications. The size of the access doors shall provide proper access for service, routine maintenance, removal and replacement of the product. Minimum size to be 12 inch x 12 inch, or as indicated or required to allow inspection of items served.
- C. LAY-IN CEILING: Removable lay-in ceiling tiles in 2 X 2 foot or 2 X 4 foot configuration, provided under Lay-Section 09500, are sufficient to use as access panels no additional access provisions are required unless specifically indicated.
- D. Concealed Spline Ceilings: Removable sections of ceiling tile held in position with metal slats or tabs compatible with the ceiling system used will be provided under Section 09500.

- E. Plaster Walls and Ceilings: 16-gauge frame with not less than a 20-gauge hinged door panel, prime coated steel for general applications, stainless steel for use in toilets, showers, and similar wet areas, concealed hinges, screwdriver operated cam latch for general applications, key lock for use in public or secured areas, UL listed for use in fire rated partitions if required by the application. Use the largest size access opening possible, consistent with the space and the item needing service; minimum size is 12" by 12"

2.03 EXCAVATION AND BACKFILL

- A. See Civil Specifications for all additional requirements.
- B. Perform all excavation and backfill work necessary to accomplish indicated plumbing systems installation. Excavate to bottom of pipe and structure bedding, 4" in stable soils, 6" in rock or wet trenches and 8" in unstable soil. Finish bottoms of excavations to true, level surface.
- C. At no time place excavated materials where they will impede surface drainage unless such drainage is being safely rerouted away from the excavation.
- D. Excavate whatever materials are encountered as required to place at the elevations shown, all pipe, manholes, and other work. Remove debris and rubbish from excavations before placing bedding and backfill material.
- E. Remove surplus excavated materials from site.
- F. Verify the locations of any water, drainage, gas, sewer, electric, telephone or steam lines which may be encountered in the excavation. Underpin and support all lines. Cut off service connections encountered which are to be removed at the limits of the excavation and cap.
- G. Provide and maintain all fencing, barricades, signs, warning lights, and/or other equipment necessary to keep all excavation pits and trenches and the entire subgrade area safe under all circumstances and at all times. No excavation shall be left unattended without adequate protection.
- H. Elevations shown on the plans are subject to such revisions as may be necessary to fit field conditions. No adjustment in compensation will be made for adjustments up to two (2) feet above or below the grades indicated on the plans.
- I. Install lines passing under foundations with minimum of 1-1/2 inch clearance to concrete and insure there is no disturbance of bearing soil.
- J. Bed pipe up to a point 12" above the top of the pipe. Take care during bedding, compaction and backfill not to disturb or damage piping.
- K. Mechanically compact bedding and backfill to prevent settlement. The initial compacted lift to not exceed 24" compacted to 95% density per Modified Proctor Test (ASTM D-1557). Subsequent lifts under pavements, curbs, walks and structures are not to exceed 12" and be compacted to 95% density per Modified Proctor Test. In all other areas where construction above the excavation is not anticipated within 2 years, mechanically compact backfill in lifts not exceeding 24" to 90% density per Modified Proctor Test. Route the equipment over each lift of the material so that the compaction equipment contacts all areas of the surface of the lift.

2.04 SHEETING, SHORING AND BRACING

- 1. Provide shoring, sheet piling and bracing in conformance with State and Local codes to prevent earth from caving or washing into the excavation. Shore and underpin to properly support adjacent or adjoining structures. Abandon in place shoring, sheet piling and underpinning below the top of the pipe, or, if approved in advance by the engineer, maintained in place until other permanent support approved by the engineer is provided.

2.05 DEWATERING

- A. See dewatering requirements in specification 22 05 07, 3.2

2.06 EQUIPMENT NOISE AND VIBRATION

- A. Vibration from equipment shall not be apparent in occupied areas of the building,

- B. Measured sound levels exceeding design criteria is grounds for modification as required to comply with manufacturers recommendations at no additional cost to the Owner.

2.07 BUILDING ACCESS

- A. Arrange for the necessary openings in the building to allow for admittance or removal of all apparatus. When the building access was not previously arranged and must be provided by this contractor, restore any opening to its original condition after the apparatus has been brought into the building.

2.08 EQUIPMENT ACCESS

- A. Install all piping, conduit and accessories to permit access to equipment for maintenance and service. Coordinate the exact location of wall and ceiling access panels and doors with the General Contractor, making sure that access is available for all equipment and specialties. Access doors in general construction are to be furnished by the Plumbing Contractor and installed by the General Contractor.

2.09 COORDINATION

- A. Coordinate all work with other contractors prior to installation. Any work that is not coordinated and that interferes with other contractor's work shall be removed or relocated at the installing contractor's expense.
- B. Verify that all devices are compatible for the type of construction and surfaces on which they will be used.

2.10 PIPE SLEEVES

- A. Provide galvanized, schedule 40 pipe sleeves for pipe penetrations through interior and exterior walls to provide a backing for sealant or firestopping. Patch wall neatly around sleeve to match adjacent wall construction and finish. Grout area around sleeve in masonry construction. In finished spaces where pipe penetration through wall is exposed to view, sheet metal sleeve shall be installed flush with face of wall. Install sleeves for piping passing through penetrations in floors, partitions and walls.
- B. Install vertical sleeves in concrete floors and concrete walls as new slabs and walls are constructed.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.
 - 2. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.
- C. Install sleeves for pipes passing through interior partitions.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - 2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
 - 3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth.
- D. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials.
- E. Pipe penetrations in areas subject to public view shall have an escutcheon plate.

2.11 SPACE REQUIREMENTS FOR EQUIPMENT

- A. Equipment has been selected to fit into physical space provided, while allowing room for access, servicing, removal and replacement of parts. Typically allow a minimum of 24" clear space between pieces of equipment.
- B. Since space requirements and equipment arrangements vary according to manufacturer, the responsibility for space and access requirements, is the responsibility of the installing contractor.

- C. Contractor shall provide proper space and access for equipment in accordance with code requirements and the requirements of the local inspection department and the recommendations of the equipment manufacturer.
- D. Contractor shall verify the size and weight limitations of the space in which it is to be installed and that doors or other building openings are adequate size to permit the entry of the equipment without alterations to the building. The cost of such alterations caused by failure to comply with these instructions shall be borne by the Contractor.

PART 3 EXECUTION

3.01 GENERAL

- A. Provide all materials, labor, equipment, and services necessary for a complete and operable installation as specified and shown on the Drawings. The word "Provide" shall mean "Furnish and install."
- B. Provide new material and equipment in strict accordance with these Specifications and the Project Drawings.
- C. At all times, take such precautions as are necessary to protect materials from damage. Close all pipe openings to prevent obstructions and contamination.

3.02 CUTTING AND PATCHING IN BUILDINGS

- A. Each Contractor is responsible for all costs associated with the necessary cutting and patching as required for the installation of their work, unless otherwise indicated.
- B. Patching is to be performed by the trade proper for each material to be patched. Patching shall leave premises and finishes in a complete and neat condition comparable to the original. Painting of patched surfaces to be by the painting sub-contractor of the General Contractor, unless otherwise specifically indicated or the plumbing/fire protection contractor is the prime contractor for the project. Maintain the fire integrity of all walls, floors, ceilings, and partitions.

3.03 PROTECTION

- A. Protect equipment and trim against damage and injury due to building materials, acid, tools, equipment and any causes incidental to construction. Cover the finished surface of each piece of equipment with building paper or similar protection. Replace all equipment damaged by any cause and any trim with marred or scratched finish at no cost to the Owner, upon receipt of written notification from the A/E.
- B. Where materials to be installed are being stored at or near the project during construction, arrange such materials so as to minimize the possibility of contamination, corrosion and damage. Keep ends of pipe, equipment, and specialties properly closed during construction and installation to avoid the possibility of miscellaneous materials being placed in the openings.

3.04 PAINTING

- A. See Division 09 Section "Interior Painting".

3.05 ADJUST AND CLEAN

- A. Inspect all equipment and put in satisfactory working order.
 - 1. Clean all exposed and concealed items.
 - 2. Clean floor drains, cleanouts, and plumbing fixtures.
 - 3. Clean specialties.
 - 4. Clean all covers.
 - 5. Clean exposed piping.
 - 6. Adjust pumps, balancing valves, and faucets for proper flow rates.
 - 7. Adjust water heaters and thermostatic mixing valves for required temperatures.

END OF SECTION

**SECTION 220502
SELECTIVE DEMOLITION**

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Demolish and remove all items required to complete the work indicated.
 - 2. Demolish designated building equipment and fixtures.
 - 3. Demolish designated construction.
 - 4. Cutting and alterations for completion of the Work.
 - 5. Protecting items designated to remain.
 - 6. Removing demolished materials.
 - 7. Cap and identify existing utilities.
 - 8. Provide adequate shoring and bracing.

1.02 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Demolition Schedule: Indicate overall schedule and interruptions required for utility and building services.
- C. Shop Drawings:
 - 1. Indicate demolition and removal sequence.
 - 2. Indicate location of items designated for reuse or Owner's retention.
 - 3. Indicate location and construction of temporary work.

1.03 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution Requirements: Requirements for submittals.
- B. Project Record Documents: Accurately record actual locations of capped utilities, concealed utilities discovered during demolition and subsurface obstructions.
- C. Operation and Maintenance Data: Submit description of system, inspection data, and parts lists.

1.04 QUALITY ASSURANCE

- A. Conform to applicable code for demolition work, dust control, products requiring electrical disconnection and re-connection.
- B. Conform to applicable code for procedures when hazardous or contaminated materials are discovered.
- C. Obtain required permits from authorities having jurisdiction.

1.05 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.06 SCHEDULING

- A. Section 01 32 16 - Network Analysis Schedules: Requirements for scheduling.
- B. Schedule Work to coincide with new construction.
- C. Cooperate with Owner in scheduling noisy operations and waste removal that may impact Owners operation and in adjoining spaces.
- D. Perform noisy or dusty work as scheduled with the Owner.
- E. Coordinate utility and building service interruptions with Owner.
 - 1. Do not disable or disrupt building fire or life safety systems without three days prior written notice to Owner.

2. Schedule tie-ins to existing systems to minimize disruption.
3. Coordinate Work to ensure fire sprinklers, fire alarms, smoke detectors, emergency lighting, exit signs and other life safety systems remain in full operation in occupied areas.

1.07 PROJECT CONDITIONS

- A. Conduct demolition to minimize interference with adjacent and occupied building areas.
- B. Cease operations immediately if structure appears to be in danger and notify Architect/Engineer. Do not resume operations until directed.

PART 2 - EXECUTION

2.01 PREPARATION

- A. Notify affected utility companies before starting work and comply with their requirements.
- B. Mark location and termination of utilities.
- C. Erect, and maintain temporary barriers and security devices, including warning signs and lights, and similar measures, for protection of the public, Owner, and existing improvements indicated to remain.
- D. Erect and maintain weatherproof closures for exterior openings.
- E. Erect and maintain temporary partitions to prevent spread of dust, odors, and noise to permit continued Owner occupancy.
- F. Prevent movement of structure; provide temporary bracing and shoring required to ensure safety of existing structure.
- G. Provide appropriate temporary signage including signage for exit or building egress.
- H. Do not close or obstruct building egress path.
- I. Do not disable or disrupt building fire or life safety systems without 3 days prior written notice to Owner.

2.02 SALVAGE REQUIREMENTS

- A. Coordinate with Owner to identify building components and equipment required to be removed and delivered to Owner.
- B. Tag components and equipment Owner designates for salvage.
- C. Protect designated salvage items from demolition operations until items can be removed.
- D. Carefully remove building components and equipment indicated to be salvaged.
- E. Disassemble as required to permit removal from building.
- F. Package small and loose parts to avoid loss.
- G. Mark equipment and packaged parts to permit identification and consolidation of components of each salvaged item.
- H. Prepare assembly instructions consistent with disassembled parts. Package assembly instructions in protective envelope and securely attach to each disassembled salvaged item.
- I. Deliver salvaged items to Owner. Obtain signed receipt from Owner.

2.03 DEMOLITION

- A. Conduct demolition to minimize interference with adjacent and occupied building areas.
- B. Maintain protected egress from and access to adjacent existing buildings at all times.
- C. Do not close or obstruct roadways or sidewalks without permits.
- D. Cease operations immediately when structure appears to be in danger and notify Architect/Engineer.
- E. Disconnect and remove designated utilities within demolition areas.

- F. Cap and identify abandoned utilities at termination points when utility is not completely removed. Annotate Record Drawings indicating location and type of service for capped utilities remaining after demolition.
- G. Demolish in orderly and careful manner. Protect existing improvements and supporting structural members.
- H. Carefully remove building components indicated to be reused.
 - 1. Disassemble components as required to permit removal.
 - 2. Package small and loose parts to avoid loss.
 - 3. Mark components and packaged parts to permit reinstallation.
 - 4. Store components, protected from construction operations, until reinstalled.
- I. Remove demolished materials from site except where specifically noted otherwise. Do not burn or bury materials on site.
- J. Remove materials as Work progresses. Upon completion of Work, leave areas in clean condition.
- K. Remove temporary Work.

END OF SECTION

**SECTION 220507
EXCAVATION AND BACKFILL**

PART 1 GENERAL

1.01 REFERENCE

- A. All applicable requirements of other portions of the Contract Documents apply to the work of this Section, including, but not limited to, Division 1, General Requirements.

1.02 DESCRIPTION OF WORK

- A. Each Trade Contractor is to provide all excavating, trenching, sheeting, bracing, pumping, and backfilling as required for the installation of his work.

1.03 QUALITY ASSURANCE

- A. Testing
 - 1. All testing is to be done by an independent testing laboratory employed by this Contractor and approved by the Owner and A/E.
 - 2. Conduct up to 10 tests per Trade per 40,000 gross square foot of compacted surface serving each Trade's specific area of work to determine the compaction density of backfill.

PART 2 PRODUCTS

2.01 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- C. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.
- D. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- E. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
- F. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.
- G. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and 0 to 5 percent passing a No. 4 sieve.
- H. Sand: ASTM C 33; fine aggregate, natural, or manufactured sand.
- I. Impervious Fill: Clay gravel and sand mixture capable of compacting to a dense state.

2.02 ACCESSORIES

- A. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:
 - 1. Yellow: Gas, oil, and dangerous materials.
 - 2. Blue: Water systems.

3. Green: Sewer systems.

PART 3 EXECUTION

3.01 GENERAL

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Provide protective insulating materials to protect subgrades and foundation soils against freezing temperatures or frost.

3.02 DEWATERING

- A. Prevent surface water and ground water from entering interior of building excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
 2. If necessary, install a temporary submersible pump and basin to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.03 EXCAVATION, GENERAL

- A. Rock Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal.
 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
 2. Remove rock to lines and grades indicated to permit installation of permanent construction.
 3. Earth excavation includes excavating visible rocks on surface and below surfaces. Intermittent drilling, ram hammering or ripping of material shall be included with the contractor's project bid.
 4. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction.
 5. Pipe trench widths to provide the following clearance on each side of pipe. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe, unless otherwise indicated. Clearance: 12 inches each side of pipe.
 6. Trench Bottom Excavate trenches 6 inches deeper than bottom of pipe elevation to allow for bedding course.

3.04 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 1. Construction below finish grade including, where applicable, sub-drainage, damp-proofing, waterproofing, and perimeter insulation.
 2. Surveying locations of underground utilities for Record Documents.
 3. Testing and inspecting underground utilities.
 4. Removing concrete formwork.
 5. Removing trash and debris.
 6. Removing temporary shoring and bracing, and sheeting.
 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.05 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings.
- D. Provide 4-inch thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping in a minimum of 4 inches of concrete before backfilling or placing roadway subbase.
- E. Place and compact initial backfill of satisfactory soil, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the utility pipe. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling and compaction at each 6" layer.
- F. Backfill voids with satisfactory soil while installing and removing shoring and bracing.
- G. Place and compact final backfill of satisfactory soil to final subgrade elevation.
- H. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.06 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
 - 1. Under steps and ramps, use engineered fill.
 - 2. Under building slabs, use engineered fill.
 - 3. Under footings and foundations, use engineered fill.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.07 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
 - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.08 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight:
 - 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
 - 2. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

3.09 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 - 1. Provide a smooth transition between adjacent existing grades and new grades.
 - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.10 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions. Scarify or remove and replace soil material to depth as directed by A/E; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.11 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION

**SECTION 220508
PIPING EXPANSION COMPENSATION**

PART 1 – GENERAL

1.01 SUMMARY:

Note: Contractor shall furnish and install necessary seismic isolation, bracing and supports in accordance with Zone "D" Rating.

- A. Section includes:
 - 1. Flexible pipe connectors.
 - 2. Expansion joints.
 - 3. Expansion compensators.
 - 4. Pipe alignment guides.
 - 5. Swivel joints.
 - 6. Pipe anchors.
- B. Related Sections:
 - 1. Section 13910 – Basic Fire Suppression Materials and Methods: Products and installation requirements for piping used in fire protection systems.
 - 2. Section 15060 – Hangers and Supports: Product and installation requirements for piping hangers and supports.
 - 3. Section 15070 – Mechanical Sound, Vibration, Seismic Control: Product and installation requirements for vibration isolators used in piping systems.
 - 4. Section 15140 – Domestic Water Piping: Product and installation requirements for piping used in domestic water systems.
 - 5. Section 15180 – Heating and Cooling Piping: Product and installation requirements for piping used in heating and cooling systems.

1.02 REFERENCES

- A. American Society of Mechanical Engineers:
 - 1. ASME B31.1 – Power Piping.
 - 2. ASME B31.5 – Refrigeration Piping.
 - 3. ASME B31.9 – Building Services Piping.
- B. American Welding Society:
 - 1. AWS D1.1 – Structural Welding Code – Steel.

1.03 DESIGN REQUIREMENTS

- A. Provide structural work and equipment required for expansion and contraction of piping.
- B. Expansion Compensation Design Criteria:
 - 1. Installation Temperature: 50 degrees F.
 - 2. Hot Water Heating System Temperature: 210 degrees F.
 - 3. Domestic Hot Water: 140 degrees F.
 - 4. Safety Factor: 30 percent.

1.04 SUBMITTALS

- A. Shop Drawings: Indicate layout of piping systems, including flexible connectors, expansion joints, expansion compensators, loops, offsets and swing joints.
- B. Product Data:
 - 1. Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per foot and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.
 - 2. Expansion Joints: Indicate maximum temperature and pressure rating, and maximum expansion compensation.
- C. Manufacturer's Installation Instructions: Submit special procedures.

- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- E. Manufacturer's Field Reports: indicate results of inspection by manufacturer's representative.

1.05 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of flexible pipe connectors, expansion joints, anchors and guides.
- B. Operation and Maintenance Data: Submit adjustment instructions.

1.06 QUALITY ASSURANCE

- A. PERFORM Work in accordance with ASME b31.9 code for installation of piping systems.

1.07 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Section 01600 – Product Requirements: Product storage and handling requirements.
- B. Accept expansion joints on site in factory packing with shipping bars in positioning devices intact. Inspect for damage.
- C. Protect equipment from exposure by leaving factory coverings, pipe end protection, and packaging in place until installation.

PART 2 - PRODUCTS

2.01 FLEXIBLE PIPE CONNECTORS

- A. Steel Piping:
 - 1. Inner Hose: Stainless Steel.
 - 2. Exterior Sleeve: Double braided stainless steel.
 - 3. Pressure Rating: 125 psig WSP and 450 degrees F.
 - 4. Joint: As specified for pipe joints.
 - 5. Size: Use pipe-sized units.
 - 6. Maximum offset: 2/4 inch on each side of installed center line.
- B. Copper Piping:
 - 1. Inner Hose: Bronze
 - 2. Exterior Sleeve: Braided Bronze.
 - 3. Pressure Rating: 125 psig WSP and 450 degrees F.
 - 4. Joint: As specified for pipe joints.
 - 5. Size: Use pipe sized units.
 - 6. Maximum offset: 3/4 inch on each side of installed center line.

2.02 EXPANSION JOINTS

- A. Stainless Steel Bellows Type:
 - 1. Pressure Rating: 125 psig WSP and 400 degrees F.
 - 2. Maximum Compression: 1 2/4 inch.
 - 3. Maximum Extension: 1/4 inch.
 - 4. Joint: As specified for pipe joints.
 - 5. Size: Use pipe sized units.
 - 6. Application: Steel piping 3 inch and smaller.
- B. External Ring Controlled Stainless Steel Bellows Type:
 - 1. Pressure Rating: 125 psig WSP and 400 degrees F.
 - 2. Maximum Compression: 15/16 inch.
 - 3. Maximum Extension: 5/16 inch.

4. Maximum Offset: 1/8 inch.
 5. Joint: Flanged.
 6. Size: Use pipe sized units.
 7. Accessories: internal flow liner.
 8. Applications: Steel piping 3 inch and larger.
- C. Double Sphere, Flexible Compensators:
1. Body: Neoprene and nylon.
 2. Working Pressure: 150 psi.
 3. Maximum Temperature: 250 degrees F.
 4. Maximum Compression: $\frac{3}{4}$ inch 1 inch.
 5. Maximum Elongation: $\frac{1}{2}$ inch.
 6. Maximum Offset: $\frac{1}{2}$ inch
 7. Maximum Angular Movement: 30 degrees.
 8. Joint: Tapped steel flanges.
 9. Size: Use pipe sized units.
 10. Accessories: Control rods.
 11. Application; Steel piping 2 inch and larger.
- D. Two-ply Bronze Bellows Type:
1. Construction: Bronze with anti-torque device, limit stops, internal guides.
 2. Pressure Rating: 125 psig WSP and 400 degrees F.
 3. Maximum Compression: 1 $\frac{3}{4}$ inch.
 4. Maximum Extension: $\frac{1}{4}$ inch.
 5. Joint: As specified for pipe joints.
 6. Size: Use pipe sized units.
 7. Application: Copper piping.
- E. Low Pressure Compensators with two-ply Bronze Bellows:
1. Working Pressure: 75 psig.
 2. Maximum Temperatures: 250 degrees F.
 3. Maximum Compression: $\frac{1}{2}$ inch.
 4. Maximum Extension: 5/32 inch.
 5. Joint: Soldered.
 6. Size: Use pipe sized units.
 7. Application: Copper or steel piping 2 inch and smaller.
- F. Copper with Packed Sliding Sleeve:
1. Maximum Temperature: 250 degrees F.
 2. Joint: As specified for pipe joints.
 3. Size: Use pipe sized units.
 4. Copper or steel piping 2 inches and larger.
 5. Application: Copper or steel piping 2 inch and larger.

2.03 ACCESSORIES

- A. Pipe Alignment Guides: Two piece welded steel with enamel paint, bolted, with spider to fit standard pipe, frame with four mounting holes, clearance for minimum 1 inch thick insulation, minimum 3 inch travel.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install Work in accordance with ASME B31.1, ASME B31.5, or ASME B31.9.
- B. Install flexible pipe connectors on pipes connected to equipment supported by vibration isolation. Refer to Section 15070. Provide line size flexible connectors.

- C. Install flexible connectors at right angles to displacement. Install one end immediately adjacent to isolated equipment and anchor other end. Install in horizontal plane unless indicated otherwise.
- D. Rigidly anchor pipe to building structure. Provide pipe guides to direct movement only along axis of pipe. Erect piping so strain and weight is not on cast connections or apparatus.
- E. Provide support and anchors for controlling expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where required. Refer to Section 15060 for pipe hanger installation requirements.
- F. Provide grooved piping systems with minimum one joint per inch pipe diameter instead of flexible connector supported by vibration isolation. Grooved piping systems need not be anchored.

3.02 MANUFACTURER'S FIELD SERVICE

- A. Furnish inspection services by flexible pipe manufacturer's representative for final installation and certify installation is in accordance with manufacturer's recommendations and connectors are performing satisfactorily.

END OF SECTION

**SECTION 220513
COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT**

PART 1 GENERAL

1.01 REFERENCE

- A. All applicable requirements of other portions of the Contract Documents apply to the work of this Section, including, but not limited to, Division 01, General Requirements.

PART 2 PRODUCTS

2.01 EQUIPMENT MOTORS

- A. Motors shall be of sufficient size for the duty to be performed and shall not exceed the motor's full-rated load when the driven equipment is operating at specified capacity under the most severe conditions likely to be encountered. Motors shall be established, U.S.-manufactured industry standard types for the service intended, having normal starting torque and low starting current characteristics, unless other characteristics are specified. When electrically driven equipment is furnished which materially differs from the contemplated design, the Contractor supplying the driving equipment shall pay for and make necessary the adjustments to the wiring, disconnect devices and branch-circuit protection to accommodate the equipment actually installed. Motors and equipment shall meet ASHRAE 90-75, and State and Local Energy Code minimum COP requirements. Provide suitable overload protection for each motor.
- B. Unless otherwise specified or noted on the Drawings, motors shall be suitable for the service intended, shall be of latest industry standards of design for maximum energy efficiency, and shall be continuous-duty-type.
- C. Motors less than 3/4 HP shall normally be 120-volt, 1-phase, 60-HZ.
- D. Coordinate and verify voltage and phase required with Electrical Drawings, as well as equipment scheduled data.
- E. It shall be the responsibility of this contractor to coordinate and verify the applicable phase and voltage requirements with the electrical contractor before submittal of Shop Drawings.

2.02 MOTOR CONTROLLERS AND DISCONNECTS

- A. Except as otherwise specified in each of the various sections of Division 22, motor controllers and disconnects shall be as specified under Divisions 26, 27 and 28.
- B. Verify applicable voltage, phase, and protective device requirements with electrical contractor before manufacture or installation of equipment.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Installation shall comply with manufacturer's latest published instructions and all applicable inspection and code authority requirements.

3.02 MOTOR EFFICIENCIES

- A. Drip-Proof Motors

HP	3600 RPM NOMINAL FULL- LOAD EFFICIENCY PERCENT	HP	1800 RPM NOMINAL FULL- LOAD EFFICIENCY PERCENT
1-1/2	81.0	1	84.0
2	84.0	1-1/2	84.0

3	86.0	2	84.0
5	87.0	3	88.0
7-1/2	87.0	5	88.0

B. Totally Enclosed, Fan-Cooled Motors

HP	3600 RPM	HP	1800 RPM
	NOMINAL FULL-LOAD EFFICIENCY PERCENT		NOMINAL FULL-LOAD EFFICIENCY PERCENT
1-1/2	81.0	1	81.0
2	84.0	1-1/2	84.0
3	84.0	2	82.0
5	86.0	3	82.0
7-1/2	88.0	5	85.0

END OF SECTION

SECTION 220519 METERS AND GAUGES

PART 1 GENERAL

1.01 REFERENCE

- A. All applicable requirements of other portions of the Contract Documents apply to the work of this Section, including, but not limited to, Division 01, General Requirements.

1.02 SUMMARY

- A. This Section includes the following types of meters and gauges: Temperature gauges and fittings. Pressure gauges and fittings.
- B. Meters and gauges furnished as part of factory-fabricated equipment are specified as part of equipment assembly in other Division 22 specifications.

1.03 QUALITY ASSURANCE

- A. UL Compliance: Comply with applicable UL standards pertaining to meters and gauges.
- B. ASME and ISA Compliance: Comply with applicable portions of ASME and Instrument Society of America (ISA) standards pertaining to construction and installation of meters and gauges.

1.04 SUBMITTALS

- A. Shop Drawings: Each equipment and material item specified.
- B. Product Data: Product data for each type of meter and gauge. Include scale range, ratings, and calibrated performance curves, certified where indicated. Submit meter and gauge schedule showing manufacturer's figure number, scale range, location, and accessories for each meter and gauge.
- C. Samples: Not required for review.
- D. Contract Close-Out Information: Maintenance data for each type of meter and gauge in each building for inclusion in Operating and Maintenance Manuals specified in Division 01, and Division 22. Portable test plug test kit and portable meter receipts as described in this Section.

PART 2 PRODUCTS

2.01 THERMOMETERS, GENERAL

- A. Accuracy: Plus or minus 1% of range span or plus or minus one scale division to maximum of 1.5% of range span. Scale Range: Temperature ranges for services listed as follows: Domestic Hot Water: 30 deg to 240 deg with 2 deg scale divisions (0 deg to 115deg C with 1 deg scale divisions). Domestic Cold Water: 0 deg to 100 deg F with 2 deg scale divisions (minus 18 deg to 38 deg C with 1 deg scale divisions).

2.02 THERMOMETERS

- A. Weiss Model DVU35 digital self-powered, glass passivated thermistor, internal potentiometer with 6" stem. Thermometer wells to be brass or stainless steel, 2" extension in insulated piping. Provided threaded cap nut and cap.
- B. Manufacturers: Weiss, Ashcroft, Weksler, Terice, Miljoco, or Marshalltown.

2.03 DIAL-TYPE INSERTION THERMOMETERS

- A. Type: Bimetal stainless steel case and stem, 1-inch diameter dial, dust and leakproof, 1/8-inch diameter tapered-end stem with nominal length of 5 inches.
- B. Manufacturers: Ashcroft Dresser Industries/Instrument Div., Terice (H.O.) Co., Weiss Instruments, Inc., Weksler.

2.04 SOLAR DIGITAL THERMOMETERS

- A. Type: Bi-directional digital display, high impact ABS black plastic case.
 - 1. Stem 3-1/2" zinc.
 - 2. Range: -58 deg. to 302 deg.F

- B. Manufacturers: Weksler.

2.05 THERMOMETER WELLS

- A. Brass or stainless steel, pressure-rated to match piping system design pressure; with 2-inch extension for insulated piping and threaded cap nut with chain permanently fastened to well and cap.
- B. Manufacturers: Marshalltown Instruments, Inc., Terice (H.O.) Co., Weiss Instruments, Inc., Weksler.

2.06 PRESSURE GAUGES

- A. Type: General use, ASME B40.1, Grade A, phosphor bronze bourdon-tube-type, bottom connection.
- B. Case: Drawn steel or brass, glass lens, 4-1/2-inch diameter.
- C. Connector: Brass, 1/4-inch NPS.
- D. Scale: White coated aluminum, with permanently etched markings.
- E. Accuracy: Plus or minus 1% of range span.
- F. Range: Conform to the following: Vacuum: 30-inch Hg to 15 psi, All fluids: 2 times operating pressure
- G. Manufacturers: Ametek, U.S. Gauge Div., Ashcroft Dresser Industries/Instrument Div., Marsh Instrument Co., Unit of General Signal, Marshalltown Instruments, Inc., Terice (H.O.) Co., Weiss Instruments, Inc., Weksler.

2.07 PRESSURE GAUGE ACCESSORIES

- A. Siphon: 1/4-inch NPS straight coil constructed of brass tubing with threads on each end.
- B. Snubber: 1/4-inch NPS brass bushing with corrosion-resistant porous metal disc. Disc material shall be suitable for fluid served and rated pressure.
- C. Manufacturers: Ametek, U.S. Gauge Div., Ashcroft Dresser Industries/Instrument Div., Marsh Instrument Co., Unit of General Signal, Marshalltown Instruments, Inc., Terice (H.O.) Co., Weiss Instruments, Inc., Weksler.

2.08 TEST PLUGS

- A. Test plugs shall be nickel-plated brass body, with 1/2-inch NPS fitting and two self-sealing valve-type core inserts suitable for inserting a 1/8-inch O.D. probe assembly from a dial-type thermometer or pressure gauge. Test plug shall have gasketed and threaded cap with retention chain and body of length to extend beyond insulation. Pressure rating shall be 500 psig.
- B. Core Material: Conform to the following for fluid and temperature range: Air, Water, Oil, and Gas, 20 deg to 200 deg F (minus 7 deg to 93 deg C): Neoprene, Air and Water, minus 30 deg to 275 deg F (minus 35 deg to 136 deg C): EPDM
- C. Ranges of pressure gauge and thermometers shall be approximately two times systems operating conditions.
- D. Manufacturers: MG Piping Products Co., Peterson Equipment Co., Inc., Sisco, A Spedco, Inc. Co., Terice (H.O.) Co., Watts Regulator Co., Flow Design, Inc.

PART 3 EXECUTION

3.01 THERMOMETER INSTALLATION

- A. Install thermometers in vertical and tilted positions to allow reading by observer standing on floor.
- B. Thermometer Wells: Install in piping tee where thermometers are indicated, in vertical position. Fill well with oil or graphite and secure cap.

3.02 INSTALLATION OF PRESSURE GAUGES

- A. Install pressure gauges in piping tee with pressure gauge valve, located on pipe at most legible position.
- B. Pressure Gauge Needle Valves: Install in piping tee with snubber. Install siphon in lieu of snubber for steam pressure gauges.
- C. Install pressure gauges on the inlet side and outlet side of all Backflow Preventers.

3.03 INSTALLATION OF TEST PLUGS

- A. Test Plugs: Install in piping tee where indicated, located on pipe at most legible position. Secure cap. Install test plugs adjacent to each piping point where a temperature sensing device is required by control specifications.
- B. Test Kit: Provide test kit consisting of one pressure gauge, gauge adapter with probe, two bimetal dial thermometers, and carrying case. Turn over to Owner at completion of job and obtain written receipt. Forward copy of receipt to A/E as part of close-out documents.

3.04 ADJUSTING AND CLEANING

- A. Adjusting: Adjust faces of meters and gauges to proper angle for best visibility.
- B. Cleaning: Clean windows of meters and gauges and factory-finished surfaces. Replace cracked and broken windows and repair scratched and marred surfaces with manufacturer's touch-up paint.

3.05 CONNECTIONS

- A. Piping installation requirements are specified in other sections of Division 22. The drawings indicate the general arrangement of piping, fittings, and specialties. The following are specific connection requirements:
- B. Install meters and gauges to allow for easy visual observation.

END OF SECTION

SECTION 220523 DUTY VALVES

PART 1 GENERAL

1.01 REFERENCE

- A. All applicable requirements of other portions of the Contract Documents apply to the work of this Section, including, but not limited to, Division 01, General Requirements.

1.02 QUALITY ASSURANCE

- A. Valve Bodies, Shells and Seats: Factory-tested.
- B. Standard for 125 psi and 150 psi saturated steam rated valve pressure containing parts: ASTM B62.
- C. Standard for 200 psi and 300 psi valves with metallic seats: ASTM B61.
- D. Iron Body Valves: Pressure-Containing Parts: ASTM A126, Grade B, Face-to-Face and End-to-End Dimensions: ANSI B16.10, Design, Workmanship, Materials, Testing: MSS-SP-70, 71, Use domestically manufactured valves where required by a Buy American Plan.
- E. Butterfly Valves: Face-to-Face and End-to-End Dimensions: MSS-SP-67.
- F. Valve Stems: ASTM B371, Alloy C69400; ASTM B371, Alloy C65100H04 (rolled silicon brass); or other material equally resistant to dezincification.
- G. Pressure Castings: Free of impregnating materials.
- H. Manufacturer's name or trademark and working pressure stamped or cast into body.

1.03 SUBMITTALS

- A. Shop Drawings: Schedule indicating proposed valve for each application.
- B. Product Data: Manufacturer's cut sheets and/or literature, Performance data.
- C. Samples: Not required for review.
- D. Reference Submittals: Not required for review.
- E. Contract Closeout Information: Valve chart indicating valve identification number, valve type, service, manufacturer and model number, and location of valve, Operating and maintenance manuals.

1.04 JOB CONDITIONS

- A. Coordinate the exact application and location of this work with the work of other trades prior to installation within various piping systems. Verify all positions and elevations. Provide additional offsets and section of piping as required to position valves for equipment clearance and accessibility as well as system and valve operational conditions.
- B. Valve manufacturer to verify indicated figure or model numbers so that selection meets required description and conditions specified. Specified data for valve shall take precedence over indicated figure or model number. Provide proper seat and seal material for applicable temperature, pressure and service indicated for each valve application.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Gate, Butterfly, Check & Ball Valves: Jomar, Nibco, Hammond, Crane, Jenkins, Milwaukee, Apollo, Mueller.

2.02 DOMESTIC WATER VALVES

- A. For gauge valves within steel or copper lines of 1/8 inch or 1/4 inch size, threaded or solder, 150 psig steam or 300 psig w.o.g., union bonnet, integral seat, renewable seat and disc, bronze globe valve conforming to MSS-SP-80, ASTM B-62.

- B. For service valves within steel piping of 1/4 inch through 2 inch size; two-piece ball valve with bronze solder ends, lever handle, stainless steel ball and stem, Class 150 SWP-600 w.o.g.
- C. For check valves within horizontal steel or copper lines through 2 inch size, bronze check valve with teflon disc, threaded ends, Class 150 swp-300 w.o.g., as follows:

	Part	Specifications
1.	Body	Bronze, ASTM B62
2.	Cap	Bronze, ASTM B62
3.	Lever	Bronze, Commercial
4.	Disc	Teflon
5.	Disc Holder	Brass, ASTM B16 1/4 inch & 1/2 inch Bronze, ASTM B62 3/4 inch to 2 inch included
		Bronze, ASTM B62 3/4 inch to 2 inch included
6.	Pin	Stainless Steel, Commercial
7.	Plug	Bronze, ASTM B16
8.	Retaining Ring	Stainless Steel, Commercial
9.	Disc Nut	Bronze, Commercial

- D. Optional check valves for vertical type of installation within steel or copper lines, similar to that of above sub-paragraph G, except vertical lift up-flow, bronze with threaded ends.
- E. Hot Water Return – Balancing Valves: B&G Circuit Setter-Plus. Leadfree construction, brass valve body with stainless steel ball. Install along with line size check valve. Manufacturers: B&G, Taco, Armstrong, Nexus.
- F. Flow Rates For Valve Sizing:
 - 1. * flow = 3.0 - 5.0 gpm use Circuit Setter-Plus Model CB-3/4"S-LF
 - 2. * flow = 6.0 - 10.0 gpm use Circuit Setter-Plus Model CB-1"S-LF

2.03 NATURAL GAS SYSTEM

- A. All types of valves used shall be local utility company as well as AGA approved for the service and pressure intended.
- B. Refer to Section 22 20 00 "Natural Gas Systems".

PART 3 EXECUTION

3.01 INSTALLATION

- A. Installation shall be in accordance with manufacturer's written instructions, and all valves must be suitable for the service intended.
- B. Provide service (isolation) valve at every piece of equipment. Service valves to be positioned in a manner to allow for ease of service and removal of equipment with minimum disruption of the piping system.
- C. All shut-off valves in plumbing water systems 2 inch and smaller shall be ball-type.

END OF SECTION

**SECTION 220529
HANGERS AND SUPPORTS**

PART 1 GENERAL

1.01 REFERENCE

- A. All applicable requirements of other portions of the Contract Documents apply to the work of this Section, including, but not limited to, Division 01, General Requirements.

1.02 DESCRIPTION OF WORK

- A. Work of this Section includes, but is not limited to: Pipe hanger and supports, Pipe and equipment anchors, Pipe sleeves.

1.03 QUALITY ASSURANCE

- A. Pipe Hanger Standards: Manufacturers Standardization Society (MSS) SP-58, SP-89, and SP-69, as referenced.
- B. SMACNA.
- C. NFPA

1.04 SUBMITTALS

- A. Shop Drawings: Miscellaneous steel layout. Indicate all point loads where miscellaneous steel is supported by structural members, Brace spacing, layout, connection method and details.
- B. Product Data: Catalog cuts and performance data.
- C. Samples: Not required for review.
- D. Reference Submittals: Not required for review.
- E. Contract Closeout Information: Operating and maintenance data, Warranty.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Pipe Hangers: Elcen Metal Products Co., B-Line Systems Inc., Carpenter and Paterson Inc., Anvil.
- B. Concrete Anchors: Phillips, Hilti.
- C. Insulated Pipe Supports: Pipe Shields Inc., Anvil, Power Piping.
- D. Pipe and Equipment Anchors: Shop-fabricated, Field-fabricated.
- E. Sleeves: Shamrock Industries, "Crete-sleeve" plastic hole forms, Proset Systems Inc., "Proset" fire-safe pipe penetrations, Shop for field fabricated.
- F. Sleeves, Pre-Manufactured Fire and Smoke Wall Barrier: Pipe Shields, Inc.
- G. Roof Piping Supports: Miro, Dura-Blok

2.02 PIPE HANGERS AND SUPPORTS

- A. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Cadmium plated carbon steel, adjustable swivel split ring. Use PVC coated or copper plated for copper piping.
- B. Hangers for Pipe Sizes 2 and Over: Carbon steel, adjustable, clevis type. Use copper plated for copper piping.
- C. Hangers for piping that gets insulated shall be sized to allow insulation to be continuous through hangers.
- D. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
- E. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp; adjustable steel yoke and cast iron roll for hot pipe sizes 6 inches and over.
- F. Vertical Support: Steel riser clamp.

- G. Floor Support for Pipe Sizes to 8 Inches: Cast iron adjustable pipe saddle, locknut nipple, floor flange, and concrete pier or steel support.
- H. Shield for Insulated Piping 2 Inches and Smaller: 18 gage galvanized steel shield over insulation in 180 degree segments, minimum 12 inches long at pipe support.
- I. Shields for insulated piping 2 1/2 inches and larger shall be waterproof hydrous calcium silicate, encased in 360o galvanized steel shield.
- J. Roof Piping Supports shall be pre-manufactured devices. Wood block supports will not be acceptable.

2.03 HANGER RODS AND ATTACHMENTS

- A. Steel Hanger Rods: Threaded both ends, threaded one end, or continuous threaded. Use cadmium plated rods where unconcealed or exposed to the elements.
- B. Minimum pipe hanger rod sizes are as follows:

Pipe Size	Rod Diameter
Up to 2 Inches	3/8 Inch
2-1/2 Inches & 3 Inches	1/2 Inch
4 Inches	5/8 Inch
6 Inches	3/4 Inch
8 Inches to 12 Inches	7/8 Inch

- C. Beam Clamps (up to 8-inch diameter pipe): Top beam clamp, steel jaw, hook rod with nut and spring washer steel eye-bolt. C-clamps by themselves are expressly prohibited unless otherwise approved by Structural Engineer

2.04 INSERTS

- A. Inserts: Malleable iron case of steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.05 PIPE SLEEVES AND SEALANTS

- A. Sleeves – General: Sleeve all piping passing through walls, floors, roofs, foundations, footings and grade beams sufficient to allow free movement of piping. Box out openings larger than 14 inch diameter.
- B. Sleeves, Steel Pipes: Use in following locations:
 - 1. Fire-rated and smoke-rated construction.
 - 2. Structural steel members (when approved by A/E).
 - 3. Floors: Galvanized.
 - 4. Concrete walls.
 - 5. Mechanical rooms, tunnels, and stairwells.
 - 6. Polyethylene hole forms (Crete-Sleeve): Optional use in poured concrete walls and floors.
- C. Sleeves for Plastic Piping
 - 1. Provide pipe sleeves for all plastic-type piping (PVC, CPVC and polypropylene) at fire-rated assembly and floor slab penetrations.
 - 2. Size sleeves per following schedule:

Pipe Size (In.)	Sleeve Size (In.)	Extension Beyond Barrier (Ft.)
1 or less	3	2
1-1/4 to 2	4	2
3	5	3
4	6	4

- 3. Extend sleeve listed distance beyond wall or floor on both sides.

4. Insulate plastic pipe with minimum 1 inch thick calcium silicate or 2400 deg F aluminasilica within sleeve length.
- D. Sleeves, pre-manufactured fire and smoke wall barrier: Optional, similar to Pipe Shields, Inc.
1. Bare Pipe through Fire Walls and Floors: Model WFB, DFB, or QDFB.
 2. Insulated Pipe through Fire Walls and Floors: Model WFB, DFB, or QDFB.
 - a. Insulated chilled water and DX lines: Type CS-CW.
 - b. Other insulated pipes: Type CS.
 3. Plastic Pipe through Fire Walls and Floors: Type WFB with 1-inch-thick calcium silicate insulation encased in metal sleeve extension 2 ft. either side of fire-rated walls or floor.
- E. Sleeve Sizes
1. Length: Ends flush with finished surfaces.
 2. Diameter
 - a. Minimum 3 inch.
 - b. Minimum 1 inch larger than pipe and pipe insulation.
 - c. In concrete, 1-1/2 inch larger than pipe.
 - d. Diameter suitable for construction tolerances and to receive sealant, when indicated.
- F. Sealants: Seal annular space around piping.
1. For fire- and smoke-rated floors, walls and partitions: Use UL-listed firestopping material that maintains fire-rated wall and floor integrity. Provide proper material for each typical application as described by manufacturer.
 2. Acceptable Manufacturers: Dow Corning "Fire Stop", Nelson "Flameseal", 3M "Fire Barrier", Pipe Shields Inc., Model WFB, DFB, or QDFB Series, Proset Systems.
 3. For Non-Rated Walls and Partitions: Use mineral or glass fiber insulation.
 4. For Exterior and Foundation Walls: Use synthetic rubber seals, "Link-Seal" waterproof material or system.

PART 3 EXECUTION

3.01 GENERAL

- A. Structural Considerations
1. Steel or concrete roof/floor system, including slabs or roof deck shall be in place and complete before installation of any mechanical piping system.
 2. Space hangers so maximum individual hanger load will not exceed values listed in paragraph "Pipe Hanger Loading."
 3. Do not attach hangers to steel roof deck.
 4. Do not attach hangers to bottom of concrete filled floor deck, except by permission of A/E.
 5. Attach hangers to beams whenever possible.
- B. Install piping systems with approved hangers and supports to prevent sagging, warping and vibration of piping systems. Install pipe hangers and supports to allow for expansion, contraction, and drainage of piping. Place hangers and supports close to valves, vertical riser drops, heavy equipment, specialties, and each piping change of direction.
- C. Connect hanger rods to approved "I" beams or channel clamps, concrete inserts or expansion shields. Provide all concrete inserts and structural members required for the proper support of the piping systems with proper approved distribution of weight.
- D. Do not weld to structural steel without special permission of the A/E. Do not use wooden plugs for any form of fastening.
- E. Space pipe hangers for horizontal piping as indicated, unless otherwise directed. Provide pipe hangers with the minimum rod sizes shown, complete with full length machined threads, and adjusting and lock nuts.
- F. Run piping substantially as shown on the Drawings. Run pipe as directly as possible, avoiding unnecessary offsets and interferences, maintaining maximum headroom and concealed in all rooms or areas, except mechanical equipment rooms, unless otherwise noted. Coordinate

exact locations of mains, risers and runouts in the field with the various Trade Contractors and the A/E.

- G. Arrange pipe lines to give ample room for pipe insulation. Run piping parallel to or at right angles with the lines of the building.
- H. Assemble and install piping without undue strain and stress and with provision for expansion, contraction and structural settlement. Do not cut or notch structural members unless adequate provision is made with the approval of the A/E. Anchors shall be approved by the A/E before they are used.

3.02 PIPE HANGERS AND SUPPORTS

- A. For standard steel and copper piping, locate hangers at each change of direction as well as within remaining lengths spaced at or within following maximum limits:

Pipe Diameter	Standard Liquid	Steel Vapor	Copper Liquid	Copper Vapor
1/2 - 1 inch	7 ft.	8 ft.	5 ft.	6 ft.
1-1/4 - 2 inch	7 ft.	9 ft.	7 ft.	9 ft.
2-1/2 - 3 inch	11 ft.	14 ft.	9 ft.	13 ft.
3-1/2 - 4 inch	13 ft.	16 ft.	11 ft.	15 ft.
5 - 6 inch	16 ft.	19 ft.	13 ft.	18 ft.
8 - 14 inch	16 ft.	24 ft.	16 ft.	16 ft.
	16 in		20 ft.	24 ft.

- B. For Schedule 40 or Schedule 80 PVC piping, locate hangers at each change of direction and space at or within the following maximum limits:

Schedule 40 or 80 PVC			
Pipe Diameter	Liquid		Vapor
1/2 - 1 inch	3 Ft.		3 Ft.
1-1/4 - 2 inch	3 Ft.		3 Ft.
2-1/2 - 3 inch	6 Ft.		6 Ft.
3-1/2 - 4 inch	7 Ft.		7 Ft.
5 - 6 inch	8 Ft.		8 Ft.
8 - 14 inch	12 Ft.		12 Ft.

- C. Provide a hanger within one (1) foot or less of each horizontal elbow and valves that are above three (3) inches in size. If spacing between horizontal elbows (or plugged tees used as elbows) is less than six (6) feet, provide only one (1) hanger located between the elbows. No hanger size or requirements shall ever be less than the minimum recommended by the Mechanical Contractor's Association of America, Inc.
- D. For cast iron pressure piping, space maximum 12 feet o.c. Provide minimum of one hanger per pipe section close to joint on barrel and at change of direction and branch connections.
- E. For cast iron soil piping, space maximum 10 feet o.c. Provide minimum of one hanger per pipe section close to joint on barrel and at change of direction and branch connections.
- F. For piping of other materials, space hangers according to manufacturer's recommendations.
- G. Pipe Hanger Loading
 - 1. Total hanger rod load (including piping, insulation, and fluid) not exceeding following limits:

Nominal Rod Diameter	Maximum Load
3/8 inch	610 lb.
1/2 inch	1,130 lb.
5/8 inch	1,810 lb.

3/4 inch	2,710 lb.
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2. Do not exceed manufacturer's recommended maximum safe load if smaller than above.

- H. Trapeze Hangers: Suspend trapeze hangers from concrete inserts of approved structural clips. Construct trapeze hangers of galvanized angle iron, channels or other structural shapes with flat surfaces for point of support.
- I. Vertical Pipe Supports: Support all vertical pipe runs in pipe chases at base of riser. Support pipes for lateral movement with clamps or brackets.
- J. Concrete Inserts: Provide individual or continuous slot concrete inserts for use with hangers for piping and equipment exposed in finished areas, and as required. Provide concrete inserts in time for installation in concrete.

3.03 ANCHORS

- A. All connections to the structure shall be sized according to actual applied load plus any seismic vertical component increase.
- B. Pipe Anchors: Provide as indicated and required to permit complete installation of system. Do not anchor piping to plaster or gypsum wallboard partition walls. Provide anchoring devices at locations indicated. Do not use powder driven fasteners, expansion nails, or friction spring clamps.

3.04 MISCELLANEOUS STEEL

- A. Piping Contractor (or Plumbing Contractor, as applicable) to provide all miscellaneous steel as required to accommodate pipe supports and hangers.
- B. Provide Shop Drawings detailing miscellaneous steel layout and connection to structural members. Indicate all point loads where miscellaneous steel is supported by structural members.
- C. All miscellaneous steel to be galvanized steel. Repair galvanized steel at field cuts and connections.

END OF SECTION

**SECTION 220553
PIPE AND EQUIPMENT IDENTIFICATION**

PART 1 GENERAL

1.01 REFERENCE

- A. All applicable requirements of other portions of the Contract Documents apply to the work of this Section, including, but not limited to, Division 01, General Requirements.

1.02 DESCRIPTION OF WORK

- A. Work of this Section includes, but is not limited to: Piping identification, Valve identification, Equipment identification.

1.03 QUALITY ASSURANCE

- A. Piping System Identification: ANSI A13.1-1981, "Scheme for the Identification of Piping Systems."

1.04 SUBMITTALS

- A. Shop Drawings: Not required for review.
B. Product Data: Manufacturer's cut sheets and/or literature.
C. Samples: Not required for review.
D. Reference Submittals: Not required for review.
E. Contract Closeout Information: Valve chart showing valve numbers, type, and location.

PART 2 PRODUCTS

2.01 PIPE MARKERS

- A. Conform to ANSI A13.1-81.
1. Pressure-sensitive vinyl (self-sticking) material.
 2. Mechanically Fastened Type: Snap-on or strap-on. For dirty greasy, oily pipe where pressure-sensitive markers may not perform satisfactorily.
 3. Provide with direction of flow arrows.
 4. Pipe Labeling Color Schedule
 - a. Domestic Cold Water Piping:
 - 1) Background Color: Green.
 - 2) Letter Color: White.
 - b. Soft Cold Water Piping:
 - 1) Background Color: Green.
 - 2) Letter Color: White.
 - c. Domestic Hot Water Piping:
 - 1) Background Color: Yellow.
 - 2) Letter Color: Black
 - d. Domestic Hot Water Return Piping:
 - 1) Background Color: Yellow.
 - 2) Letter Color: Black.

5. Size of Letters Legend

Outside Diameter of Pipe or Pipe Covering	Length of Color Field	Size of Letters and Arrows
3/4 to 1-1/4 inch	8 inch	1/2 inch
1-1/2 to 2 inch	8 inch	3/4 inch
2-1/2 to 6 inch	12 inch	1-1/4 inch
8 to 10 inch	24 inch	2-1/2 inch
Over 10 inch	32 inch	3-1/2 inch

2.02 VALVE TAGS

- A. Brass or Anodized Aluminum Type
 - 1. Brass: Minimum 19 ga, polished, 1-1/2-inch diameter with following lettering:
 - a. Service: 1/4 inch stamped black filled letters.
 - b. Valve numbers: 1/2 inch stamped black filled letters.
 - 2. Aluminum: 2-inch diameter, 0.032 inch thick, with following lettering:
 - a. Service: 1/4 inch engraved letters.
 - b. Valve numbers: 1/2 inch engraved letters.
- B. Valve Tag Fasteners: 4-ply 0.018 copper or monel wire meter seals, brass "S" hooks or No. 16 brass jack chain.

2.03 EQUIPMENT NAME PLATES

- A. 1/16-inch rigid plastic "Setonply," "Emedolite," or bakelite with 4 edges beveled, or engraved aluminum with black enamel background and natural aluminum border and letters.
 - 1. Two 3/8-inch mounting holes.
 - 2. Lettering size: Minimum 1/2-inch high.
 - 3. Fasteners: Commercial quality, rust-resisting nuts and bolts with backwashers and self-tapping screws or rivets.

2.04 CHART AND DIAGRAM FRAMES

- A. Extruded aluminum with plexiglass or glass windows.

2.05 ACCEPTABLE MANUFACTURERS

- A. Pipe, Valve, and Equipment Markers: Craftmark Identification Systems, W. H. Brady Co, EMED Company, Inc., Kolbi Industries, Inc., 3M Co., Seton Name Plate Corp.

PART 3 EXECUTION

3.01 VALVE AND EQUIPMENT IDENTIFICATION

- A. Designate all equipment and valves by distinguishing numbers and letters on charts and/or diagrams. Tag and locate following equipment items: Valves, All items indicated on drawing equipment schedules.
- B. Install tags on all devices with numbers and letters corresponding to charts.
- C. Fasten tags securely to devices with tag fasteners in manner for easy reading.
- D. Attach equipment nameplates in conspicuous location on item of equipment or apparatus such as starters, pumps, and control panels. Secure nameplates with self-tapping screws, or nuts and bolts.
- E. For unsuitable conditions, such as high temperature or lack of space, use copper or brass rings or chains to attach tags.
- F. Furnish 4 charts including device number, location (room number, department) and purpose. Mount 1 chart in frame and secure on wall in location directed by Owner. Include remaining 3 sets in "Operation and Maintenance Manuals."
- G. Provide all devices located above ceilings with additional identification. Use access panel markers (metal-tack-style) for acoustical tile ceilings, or engraved plastic style, 3/4 inch square, for mounting on panel door. Coordinate with Owner on identification method and color codes.

3.02 PIPE IDENTIFICATION

- A. Soil, waste, and vent piping do not require color coded paint or bands.
- B. Locate pipe markers as follows:
 - 1. Next to each valve and fitting, except on plumbing fixtures and equipment.
 - 2. At each branch or riser take-off.
 - 3. At each passage through walls, floors, and ceilings.
 - 4. At each pipe passage to underground.

5. On all horizontal pipe runs every 20 ft., at least once in each room and each story traversed by piping system.
 6. Identify piping contents, flow direction, supply and return.
- C. Install markers with tape color bands over each end of marker, extending around pipe and overlapping a minimum of 30 degrees.
- D. Where supplementary color identification of medical gas piping is used, paint in accordance with gases and colors indicated in CGA Pamphlet C-9.

3.03 SERVICE ABBREVIATIONS

- A. General
1. CW Domestic Cold Water
 2. HW (___) Domestic Hot Water Supply (indicate temperature)
 3. HWR Domestic Hot Water Circulating
 4. P Discharge Plumbing-Sump Pump
 5. G Natural Gas

END OF SECTION

**SECTION 220561
PREPARATION OF PLUMBING SYSTEMS**

PART 1 GENERAL

1.01 REFERENCE

- A. All applicable requirements of other portions of the Contract Documents apply to the work of this Section, including, but not limited to, Division 01, General Requirements.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 CLEANING AND PREPARATION FOR SERVICE

- A. Flushing Mains. Immediately upon completion of the water distribution system, test valves to ensure their full opening. Flush the system as follows: Open valve and permit the flow to continue until the water runs clear. Repeat the operation at the next valve and proceed in order to the valve farthest from the source of supply. Use outlets in building to flush the upper ends of mains and service lines. During such flushing operation, the A/E may test the flows from valves and, before final acceptance of the work, make further tests of flows to ascertain that lines are clear.
- B. Interior and Exterior Sterilization of Water Distribution System. After the water distribution system has been flushed, sterilize the system by the following or other, more rigid methods satisfactory to the A/E and the State and Local Plumbing Authorities.
1. Introduce chlorine or a solution of calcium or sodium hypochlorite, filling the lines slowly and applying the sterilizing agent at a rate of 50 parts per million of chlorine, as determined by residual chlorine tests at the ends of the lines. Open and close all valves and hydrants while chlorinating the system.
 2. After sterilization agent has been applied for 24 hours, test for residual chlorine at the ends of the lines. If less than 25 ppm is indicated, repeat the sterilization process.
 3. When tests show at least 25 ppm of residual chlorine, flush the system until all traces of the chemical are removed.
- C. The Owner reserves the right to require testing of the water again at any time prior to final acceptance of the work and, if found bacteriologically unsafe, to require the Contractor to re-chlorinate the system until the water is proven equal to that supplied by the public system.

3.02 SANITARY WASTE/VENT AND STORM DRAINAGE SYSTEMS

- A. Test systems as recommended by Local and State Plumbing Inspection Authorities.

3.03 OPERATIONAL TEST

- A. Upon completion of and prior to acceptance of the installation, the Contractor shall subject the plumbing system to operating tests to demonstrate satisfactory functional and operational efficiency. Such operating tests shall cover a period of not less than 8 hours for each system and shall include the following information in a report with conclusion as to the adequacy of the system:
1. Time, date, and duration of test.
 2. Water pressure at the most remote and the highest fixtures.
 3. Operation of each fixture and fixture trim.
 4. Operation of each valve, hydrant, and faucet.
 5. Pump suction and discharge pressures.
 6. Temperature of each domestic hot water supply.
 7. Operation of each floor and roof drain by flooding with water.
 8. Operation of each vacuum breaker and backflow preventer.

END OF SECTION

**SECTION 220700
PLUMBING PIPE INSULATION**

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ASTM International (ASTM).
- B. American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE).
- C. North American Insulation Manufacturers Association (NAIMA).
- D. NAIMA – "Guide to Insulating Chilled Water Piping Systems with Mineral Fiber Pipe Insulation".
- E. "National Commercial & Industrial Insulation Standards" – MICA Manual.
- F. National Fire Protection Association (NFPA).
- G. Underwriter's Laboratories (UL).
- H. Underwriter's Laboratories Environment (UL Environment).
 - 1. All applicable requirements of other portions of the Contract Documents apply to the work of this Section, including, but not limited to, Division 01, General Requirements.

1.02 DESCRIPTION OF WORK

- A. Work of this Section includes, but is not limited to: Pipe insulation, Equipment insulation, Insulation adhesives, mastics and caulking.
- B. Definitions
 - 1. Concealed Insulated Surfaces: Piping and equipment in walls, partitions, floors, pipe chases, pipe shafts, duct shafts, sealed alleyways, and above suspended ceilings.
 - 2. Exposed Insulated Surfaces: Piping and equipment located in mechanical rooms, tunnels, and rooms without suspended ceilings.

1.03 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics with a minimum of 10 years field experience who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Products shall not contain formaldehyde, asbestos, lead, mercury, or mercury compounds [if available]. Products shall be Certified UL GREENGUARD Gold or Indoor Advantage Gold [if available].
- C. Recycled Content: A minimum of 50 percent recycled glass content certified and UL Validated.
- D. Products shall contain no polybrominated diphenyl ethers (PBDE) such as Penta-BDE, Octa-BDE or Deca-BDE fire retardants; whenever available.
- E. Comply with fire and smoke hazard ratings indicated.
 - 1. Test by procedure ASTM E84, NFPA 255, and UL 723.
 - 2. Accessories such as adhesives, mastics, cements, tapes, and glass fabric, same or better component ratings.
 - 3. Following are rating requirements: Flame spread (maximum): 25, Smoke developed (maximum): 50
 - 4. Properly identify products and/or their shipping cartons for flame and smoke ratings.
 - 5. Where prohibited by code or local ordinances, do not use elastomeric-type insulation anywhere within ceiling plenum return air systems.

1.04 SUBMITTALS

- A. Shop Drawings: Submit schedule indicating service, application, thickness and finishes.
- B. Product Data: Manufacturer's cut sheets and literature, Performance data.
- C. Samples: Not required for review.
- D. Reference Submittals: Not required for review.

- E. Contract Close-Out Information: Manufacturer's installation, maintenance, and painting data, Guarantees.
- F. EPD or HPD Submittals: Third Party Validated.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Glass Fiber Pipe Covering: Knauf Insulation, Manville, Owens-Corning, Manson,
- B. Fire-Retardant Adhesive: Manville, Benjamin Foster, 3M, Insul-Coustic, Childers.
- C. Lagging Adhesive: Manville, Benjamin Foster, Borden, Insul-Coustic.
- D. Elastomeric Pipe Insulation and Equipment Covering: Armstrong Armaflex, IMCOA, Imcolock, Ultrafoam.
- E. Insulated Fitting Covers: Knauf Proto, Manville, Certain-Teed,
- F. Insulation Caulking: Dow No. 11.

2.02 GENERAL

- A. Provide fire and smoke hazard ratings as indicated for entire composite (insulation, jacket or facing, and adhesive used to adhere the facing or jacket to the insulation).
- B. Do not use material that exceeds specified flame and smoke ratings.
- C. Use permanent treatments to jackets or facings to impart specified fire ratings.
- D. Use of water-soluble treatments is prohibited.
- E. At Hangers and Bracing: See Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment".

2.03 PIPE INSULATION, NON-FLEXIBLE

- A. Pipe Insulation, Non-flexible
 - 1. Knauf Insulation Earthwool 1000 Pipe Insulation ASJ+/SSL+ pipe insulation Thermal conductivity (K value): Not greater than 0.23 at mean temperature of 75 deg F.
 - 2. Insulation thicknesses shall meet the minimum suggested requirements of ASHRAE 90.1 2013, IECC 2015 or local code requirements.
 - 3. Apply to the following piping in thickness indicated:
 - a. Domestic Potable & non-potable Cold Water:

Pipe Size	Insulation Thickness
2 inch and smaller	1/2 inch
2-1/2 inch and larger	1 inch

- b. Domestic Hot/Recirculating Water (thru 140 deg F):

Pipe Size	Insulation Thickness
1-1/2 inch and smaller	1 inch
2-1/2 inch and larger	1-1/2 inch

- c. Storm Water Piping: Including all vertical and horizontal rain leaders shall be 1 inch.

2.04 PIPE INSULATION, FLEXIBLE

- A. Pipe Insulation, Flexible
 - 1. Armstrong self-seal AP Armaflex flexible elastomeric pipe insulation.
 - 2. Thermal conductivity (K value): Not greater than 0.27 at mean temperature of 75 deg F.
 - 3. Apply to following piping in thickness indicated: Waste piping from water coolers and drinking fountains: All sizes 1/2 inch

2.05 INSULATION FASTENERS

- A. Insulation Adhesive: Childers CP-82.
- B. Insulation Mastic: Childers CP-30.

- C. Insulation Caulking: Dow No. 11.

PART 3 EXECUTION

3.01 APPLICATION - GENERAL

- A. Do not insulate piping until satisfactory completion of required pressure tests.
- B. Apply insulation to clean, dry surfaces with pipe surfaces at room temperature.
- C. Butt insulation firmly together with longitudinal and end joints sealed with compatible jackets, facings and adhesives as specified.
- D. Apply adhesives, mastics and coatings per manufacturer's recommendations and as specified.
- E. On cold surfaces where vapor barrier jackets are used, apply insulation with a continuous, unbroken vapor seal. Adequately insulate and vapor seal hangers, supports, and anchors that are secured directly to cold surfaces to prevent condensation.
- F. Continue insulation through sleeves and wall and ceiling openings except insulation shall not continue through fire-rated (2-hour or greater) partitions, walls, floor-ceiling systems.
- G. Insulate all fittings, valve bodies, flanges and other pipeline accessories.
- H. At hangers and bracing, install in accord with Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment".
- I. Contractors shall consult manufacturer's Technical Bulletins for detailed information on safety precautions in using all insulation products, polyurethanes, polyisocyanurates, and related materials. The data shall describe fire and other risks, safety in handling, toxicity, threshold limit values, physiological effects of inhalation and eye and skin contact, incompatibilities and other essential information regarding use. Obtain six (6) copies for distribution and use at jobsite and for submittal with shop drawing submittals.
- J. Roof Conductors: Insulate all horizontal and vertical piping.

3.02 FIBERGLASS INSULATION INSTALLATION

- A. Insulation Installation on Straight Pipes and Tubes.
 - 1. Secure pipe insulation to pipe using self-sealing lap system.
 - 2. On high temperature piping, above 500 deg. F (260 deg. C), apply insulation using double layer and staggered joints. For double layer installation, secure the unjacketed inner layer using filament tape; without deforming insulation material. All joints and ends must be firmly butted and secured with appropriate securing material.
 - 3. Firmly rub all longitudinal and circumferential joints using a squeegee or sealing tool.
 - 4. Longitudinal jacket laps for pipe insulation installed on piping systems with operating temperatures below ambient shall be vapor sealed with factory-applied pressure sensitive adhesive vapor retarder, self-sealing lap. For proper sealing, firmly rub lap joints with reasonable pressure being applied with a plastic squeegee or sealing tool. Vapor seal all circumferential joints with factory-furnished, matching pressure sensitive butt strips installed with reasonable pressure being applied with a plastic squeegee or sealing tool. Additionally, coat raw edges of pipe insulation sections with vapor retarder mastic at 12 foot (3.6 m) to 21 foot (6.4 m) intervals; at Engineer's discretion on straight piping, and on either side of all fittings, flanges, or valves. Vapor retarder mastic shall completely coat the ends of the pipe and extend onto the bore of the pipe insulation and onto the jacketing a minimum of 2 inches (51 mm). Follow NAIMA's "Guide to Insulating Chilled Water Piping Systems with Mineral Fiber Pipe Insulation" for additional details.
 - 5. Install metal shields between hangers or supports and the pipe insulation. Install rigid insulation inserts as required between the pipe and the insulation shields. Inserts shall be of equal thickness to the adjacent insulation, and shall be vapor sealed as required. Insulation shields shall be no less than the following lengths:
 - a. 1-1/2 inch to 2-1/2 inch IPS: 10 inch (254 mm) long.
 - b. 3 inch to 6 inch IPS: 12 inch long.
 - c. 8 inch to 10 inch IPS: 16 inch long.

- d. 12 inch and over IPS: 22 inch long
 - 6. For piping subject to abuse in mechanical rooms or high traffic areas, protect insulation from mechanical abuse by the use of appropriate thickness of PVC jacketing, metal jacketing, or laminated self-adhesive water and weather seal.
 - 7. For piping exposed to the elements, install a jacket that shall be UV resistant PVC with a minimum thickness of 0.030 inch, a minimum 0.016 inch thick aluminum jacket with factory-applied moisture barrier, or a minimum 0.010 inch thick stainless steel jacket with factory-applied moisture barrier. Fittings shall be of similar materials or outdoor weatherable PVC. Apply all jacketing per manufacturer's recommendations for the conditions.
- B. Insulation Installation for Pipe Flanges:
- 1. Install preformed pipe insulation to outer diameter of pipe flange.
 - 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with fiberglass blanket insulation.
 - 4. Install jacket material using manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.
- C. Insulation Installation on Pipe Fittings and Elbows:
- 1. Install preformed formaldehyde free fiberglass fittings; minimum 50 percent recycled glass content, of same material as straight segments of pipe insulation when available.
 - 2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.
- D. Insulation Installation on Valves and Pipe Fittings:
- 1. Install preformed formaldehyde free fiberglass fittings; minimum 50 percent recycled glass content, of same material as straight segments of pipe insulation when available.
 - 2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to valve body.
 - 3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - 4. Install insulation to flanges as specified for flange insulation application.

3.03 APPLICATION OF FLEXIBLE PIPE INSULATION

- A. Install tubing wherever possible by slipping material over piping. Otherwise, slit pipe insulation, tightly butt ends and seal butt joints and slit seams with suitable adhesive.
- B. Insulate fittings and valve bodies with segments cut from pipe insulation. Apply with adhesive.
- C. Insulate piping at hanger points with fiberglass material protected with metal saddles.

END OF SECTION

**SECTION 221116
DOMESTIC WATER PIPING AND DEVICES**

PART 1 - GENERAL

1.01 REFERENCE

- A. All applicable requirements of other portions of the Contract Documents apply to the work of this Section, including, but not limited to, Division 01, General Requirements.

1.02 DESCRIPTION OF WORK

- A. This Section applies to:
1. Potable Cold Water Piping
 2. Hot Water Piping
 3. Hot Water Recirculation Piping
 4. Raw Cold Water Piping
 5. Strainers
 6. Water Hammer Arrestors
 7. Vacuum Breaker
 8. Drain Valves
 9. Temperature and Pressure Relief Valves
 10. Pressure Reducing Valve
 11. Escutcheons
 12. Backflow Preventors

1.03 QUALITY ASSURANCE

- A. General: Provide all supervision, labor, tools, materials, equipment, accessories and specialties necessary to completely install, clean and test the plumbing systems. All materials shall be free from defects impairing strength and durability and shall be of the best quality for the indicated purposes. All Work shall have structural properties sufficient to solely sustain or withstand strain and stresses to which it is normally subjected; all Work shall be true to detail.
- B. Codes and Standards (Division 22 Section "Common Work Results for Plumbing" Listings and the following).
1. Plumbing installation shall be in accordance with the state and local plumbing code, and all other codes having jurisdiction.
 2. American Standard Code for Pressure Piping ANSI B31.1
 3. National Association of Corrosion Engineers
 4. American National Standards Institute (ANSI)
 5. American Society of Mechanical Engineers (ASME)
 6. American Society for Testing and Materials (ASTM)
 7. American Water Works Association
 8. Manufacturer's Standardization Society of the Valve and Fitting Industry
 9. Plumbing and Drainage Institute
 10. State Plumbing Code
 11. State Building Code
- C. Material Standards
1. ASTM B32-94: Specification for Solder, Metal Sizes.
 2. ASTM B42-93: Specification for Seamless Copper Pipe, Standard Size.
 3. ASTM B75-93: Specification for Seamless Copper Tube.
 4. ASTM B88-93a: Specification for Seamless Copper Water Tube.
 5. ASTM B251-93: Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube.
 6. ASTM B302-92: Specification for Threadless Copper Pipe.
 7. ASTM A53-94: Specification for Pipe, Steel, Black and Hot Dipped, Zinc-Coated Welded and Seamless.

8. AWWA C651-92: Standard for Disinfecting Water Mains.

1.04 SUBMITTALS

- A. Shop Drawings" Valves: Submit in separate packages for each service/schedule as specified.
- B. Product Data: Catalog cuts.
- C. Samples: Not required for review.
- D. Reference Submittals: Not required for review.

1.05 HANDLING, DELIVERY, AND STORAGE

- A. General: Handling, delivery, and storage shall be in accordance with the manufacturer's recommendations. No extra cost shall be charged the Owner for handling, delivery, or storage. In no case shall the pipe or appurtenance be dumped, dropped, or thrown.

PART 2 - PRODUCTS

2.01 PIPING

- A. General: The outside of all piping and fittings shall bear the Manufacturer's standard marking for type, pressure, etc. The A/E does not guarantee the accuracy of the figure numbers as listed.
- B. Pipe - General
 - 1. All carbon steel pipe shall be fabricated from open hearth or electrical furnaces. No Bessemer pipe shall be installed.
 - 2. All pipe and fittings shall be equal to or better than the grade specified.
 - 3. Whenever Specifications call for close bending or coiling, use Grade B pipe.
 - 4. All piping material shall be new and free from defects and shall be subject to standard mill test before being shipped.
 - 5. Pipe shall be labeled.
 - 6. Fittings and valves shall have the Manufacturer's name or trademark legibly raised or cut into each piece.
 - 7. All pipe shall be cut off even and reamed full bore. Threads shall be cut smooth, true and to full standard size. Piping shall be installed clean of chips, burrs or oil.
 - 8. No salvaged or used pipe shall be used without the written approval of the A/E or Owner. Wherever such approval is given, recut the ends of the pipe, square, cut new threads on screwed pipe, and thoroughly clean the pipe of all rust, dirt, scale and foreign matter before installation.
- C. Domestic Water Pipe 4-inch Size and Smaller
 - 1. **Pipe:**
 - a. Copper tube, seamless, type L hard temper, ASTM B-88, above ground, and type K soft temper, 2-inch and smaller, below ground.
 - b. Copper Press-Connect, ASME B16.51
 - 2. **Fittings:**
 - a. Cast brass or wrought copper, solder type, ASTM 75, ANSI B16.22..
 - 3. **Joints:** Soldered, 95-5 tin-antimony solder above ground, and silver solder below ground.
 - 4. **Unions:** Sweat-end, 150 lb. cast brass, ground joint.
 - 5. **Press Fittings**
 - a. Manufacturers: Pro-Press, Apollo, Streamline, Viega
 - b. Pipe: Copper press fittings may be used as an option, per ASTM B16.18 or ASTM B16.22.
 - c. Fittings: Press-Type fittings shall be joined using appropriate sized Tools per ASTM B88. Manufacturers: ProPress
 - 6. Mechanically formed tee connections and couplings, such as T-drill, are NOT acceptable.

2.02 PIPING AUXILIARIES / SPECIALTIES

- A. General: All auxiliaries and specialties shall be guaranteed by the manufacturer for the pressure, temperature and materials being handled. All auxiliaries and specialties shall be suitable for the piping to which they are attached.
- B. Strainers: Manufacturers: Sarco, Anderson, Armstrong, Crane, or Watts. Sarco type BT or BF-150, bronze body with stainless steel screen. Provide drain valve on strainer. Furnish and Install a "line-size" Y-Strainer on the inlet side of the backflow preventor.
 - 1. Furnish and Install a "line-size" Y-Strainer on the inlet side of the backflow preventor.
- C. Vacuum Breakers
 - 1. Manufacturers: Watts, Chicago Faucet, Febco, Wilkins, Conbraco, or Woodford.
 - 2. Hose Connections: ASSE 1011, Watts #8A, 3/4-inch hose thread. (#8AC in finished areas).
 - 3. Pressure Type Vacuum Breaker: ASSE 1020, Watts #800QT with ball valves and gauge cocks for 1-1/4 inch thru 2 inch size. ASSE 1056, Watts #008QT anti-spill-type for 1/2 inch through 1 inch size.
- D. Drain Valves: Powell 502-HS with cap and chain, or equal by Hammond, Keystone, or Watts.
- E. Temperature and Pressure Relief Valves: ASME-coded, All-bronze construction with seat-to-disc alignment that will not stick or freeze. Shall start to open at 230 deg F and shall be fully open at 240 deg F. Shall have snap action thermostat and sensing bulb sized to water heater Manufacturer's recommendations. Manufacturers: Watts, McDonnell, Wilkins, Conbraco.
- F. Pressure Reducing Valve: Valve shall automatically reduce a higher inlet pressure to a steady lower downstream pressure. Must meet "Reduction of Lead in Drinking Water Act". All bronze body and cover. Outlet pressure shall be set to 65.0 psi
Manufacturer: Cla-Val Model CRD-L for sizes 1/2" to 2-1/2" pipe sizes
- G. Escutcheons shall be one-piece, steel type with polished, chrome-plated finish and setscrew fastener. Install pipe escutcheons at ALL pipe penetrations thru walls that are visible by public view.
- H. Backflow Preventor: Where indicated on the plumbing drawings furnished and install a Reduced Pressure Zone Assembly to prevent backsiphonage and backpressure conditions. The Lead-Free assembly shall consist of two shut-off valves, relief valve and two check valves.
 - 1. Provide with Air-Gap device and route drain piping to floor drain.
 - 2. Furnish and Install a "line-size" Y-Strainer on the inlet side of the backflow preventor.
 - a. Sizes 2" and larger shall be a flanged, Wye Pattern cast-iron strainer similar to Watts # 77F-DI-FDA-125
 - b. Sizes less than 2" in size shall be Wye-Pattern, lead free cast strainer Watts # LF777SI
 - 3. Install center-line of backflow preventor + 24" A.F.F.
 - 4. Backflow Assemblies less than 2" in size shall be similar to Watts # LF909

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. General
 - 1. Comply with Division 22 Section "Common Work Results for Plumbing", as well as the requirements of Division 22 Sections "Hangers and Supports for Plumbing Piping, and "Plumbing Insulation".
 - 2. Piping shall be installed in a manner which permits easy removal of valves and disconnection of equipment. Unions or flanged joints shall be installed for this purpose.
 - 3. Piping shall be installed, supported, guided, and anchored to properly provide for movement due to expansion and contraction without undue strains on the joints and in such a manner that it will not sag, buckle or sway.
 - 4. Piping shall not be supported from other pipes, conduits, ducts or similar installations.

5. No piping shall be supported by the equipment to which it is connected. Install base elbows, hangers or other approved independent method of support for the pipe.
 6. Connections to equipment shall be arranged to facilitate ease of removal and service without dismantling of the run-outs of main piping, and shall be installed by the use of multiple elbows or other similar methods to minimize strain on the equipment connections.
 7. No field-fabricated welding fittings shall be permitted. All welding tees, elbows, reducers, and caps shall be commercially manufactured products.
 8. Do not obstruct passageways, headroom, door and window operation, and similar areas with the installation of the piping.
 9. All open ends of pipes, including equipment connections, shall be properly sealed at all times during installation to keep dirt and all foreign material out of the piping. Plugs used shall be commercially manufactured products.
 10. Pipe size reductions shall be made with factory-fabricated eccentric reducers or reducing fittings and shall be installed in a manner which does not cause pocketing or inhibit the flow of the material.
 11. Install shut-off service valves with unions on all connections to equipment and on each side of control valves as required for ease of proper servicing and maintenance; see Division 22 Section "General Duty Valves for Plumbing Piping".
 12. Unless otherwise indicated, the discharge from pressure-and temperature-relief valves and equipment drains shall be piped to the nearest floor drain, hub drain, or mop sink, installed with an approved air gap as required, and arranged for safe discharge.
 13. No pipe shall penetrate any structural member without the written approval of the A/E. Where such penetration is allowed, the structural member shall be reinforced subject to the approval of the A/E.
 14. Dielectric Separation: Provide dielectric separation at all copper piping and valves connected to ferrous piping. Brass or bronze valves installed in ferrous piping shall not require dielectric separation. Connections between copper piping and ferrous flanged piping and equipment connections shall be with a bronze companion flange with dielectric separation for flanges and bolts. Connections between copper piping and screwed ferrous piping shall be Clearflow Dielectric Waterway fittings.
 15. Movement: Mains: Provide adequate offsets, bends, loops, flexible joints and guides as required to prevent over-stressing of piping and/or the structure. Branches: Provide for expansion and contraction by means of offsets, swings, joints or loops to eliminate stress on connected piping, valves or equipment. Provide for proper drainage as required. Maintain a free floating, properly braced and supported piping system.
 16. Provide all rough-in and final connections to equipment and services indicated in the Contract Documents for equipment and services to be functional.
 17. Pipe Sleeves shall be installed at ALL pipe penetrations of floors.
- B. Cross Connections and Interconnections: No plumbing fixtures, devices, equipment or pipe connections shall be installed that will provide a cross-connection or interconnection between a potable water supply and any source of nonpotable water such as a drainage system, a soil or waste pipe, or a boiler or cooling tower where the water may be chemically treated.
- C. Painting of Piping: Refer to Division 09 Section "Interior Painting".

3.02 BUILDING PIPING SYSTEM: INSTALLATION

- A. Domestic Water: Cold, Hot, Recirculating: All piping shall be installed and pitched to provide proper drainage. Install drain valves at all low points and as required to provide drainage facilities for the piping. Wherever system is sectionalized, install drain valves between each sectional shut-off valve. All hot water piping shall be pitched to provide natural gravity recirculation regardless of a recirculation pump. Install pressure gauge in domestic cold water main at water entrances to building.
- B. Shock Elimination: All piping shall be protected against water shock. Install a water hammer arrestor of the proper size at the end of the main, at the end of all branch lines, and at the end of lines serving groups of fixtures. Water hammer arrestors shall be sized and installed as

recommended by the Plumbing and Drainage Institute (PDI) and shall eliminate water hammer. All water hammer arrestors shall be installed in locations where they are readily accessible for service. Where required, provide suitable access doors. Note: Install water hammer arrestors on each water line serving laundry clothes washers.

- C. Contamination Protection: Provide an approved in-line double check backflow preventer at each connection to a fixture where indicated or required by code. Such fixtures shall include coffee makers, ice makers, clothes washers, etc.
- D. Backflow Prevention: Install a code approved backflow preventer unit in the service main, where indicated on the Drawings, or as required by code. Include in-line strainer, dual-service shut-off valves, double-check valves, and check cocks. Install pressure gauge on inlet and outlet side of backflow preventor. Properly support unit, independent of the piping, with union connections.

END OF SECTION

**SECTION 221300
SANITARY SEWER SYSTEMS**

PART 1 - GENERAL

1.01 SCOPE

- A. This section includes specifications for:
 - 1. Floor Drains
 - 2. Trap Guards
 - 3. Hub Drains
 - 4. Cleanouts
 - 5. Backwater Valves
- B. Related Documents:
 - 1. Section 22 11 00 - Water Distribution
 - 2. Section 22 13 00 - Sanitary Sewerage (Sanitary Waste and Vent Piping)
 - 3. Section 22 14 00 - Storm Drainage

1.02 REFERENCE

- A. Applicable provisions of all Sections 22 shall govern work under this section.

1.03 REFERENCE STANDARDS

- A. ANSI A112.14.1 - Backwater Valves
- B. ANSI A112.21.1 - Floor Drains.
- C. ANSI A112.21.2 - Roof Drains.
- D. ANSI A112.26.1/PDI WH-201 - Water Hammer Arrestors.
- E. ASSE 1001 - Pipe Applied Atmospheric Type Vacuum Breakers.
- F. ASSE 1010 - Water Hammer Arrestors.
- G. ASSE 1011 - Hose Connection Vacuum Breakers.
- H. ASSE 1012 - Backflow Preventers with Intermediate Atmospheric Vent.
- I. ASSE 1013 - Reduced Pressure Principle Backflow Preventers.
- J. ASSE 1018 - Trap Seal Primer Valves.
- K. ASSE 1019 - Wall Hydrants, Frost Proof Automatic Draining, Anti-Backflow Type.

1.04 QUALITY ASSURANCE

- A. Substitution of Materials: Refer to Section GC - General Conditions of the Contract, Equals and Substitutions..
- B. Plumbing products requiring approval by the State of Indiana.

1.05 SHOP DRAWINGS

- A. Include data concerning dimensions, capacities, materials of construction, ratings, certifications, weights, manufacturer's installation requirements, manufacturer's performance limitations, and appropriate identification.

1.06 OPERATION AND MAINTENANCE DATA

- A. All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

PART 2 - PRODUCTS

2.01 FLOOR DRAINS

- A. Manufacturer: J.R. Smith, Wade, Zurn.
- B. Grates and Covers:

1. Medium duty unless specified otherwise) in areas not subject to equipment loads. Secure with vandal resistant screws.
2. Heavy duty (or reinforced) in areas which are subject to heavy equipment loads.
3. Contractor shall coordinate location of drains indicated on plumbing drawings with structural / general contractor.
4. Jails: Areas of inmate access shall have drain strainers secured with tamper resistant screws.
5. See Floor Drain Schedule on drawings for model numbers and drain descriptions.

2.02 PLUMBING DRAINS

- A. FD-1: Floor Drain. General Duty: (On / Above Grade)
 1. Duco cast iron bottom outlet body, with double drainage flashing flange and reversible clamping collar, with 5" round adjustable nickel bronze strainer assembly. Strainer diameter to be a minimum twice the outlet size of the outlet connection.
 2. Provide with cast iron p-trap or approved equal.
 3. Provide with trap-primer connection.
 4. Shower Drains connected to a PVC piping system maybe ProFlo (# PF140nc) no caulk shower drain and snap-in stainless steel strainer, install with drain trap.
 5. Floor drain is to be provided with either a J.R Smith Stink-Stopper # 2692 or SureSeal-backcheck for sewer gas control.

2.03 TRAP PRIMERS

- A. When required by local Plumbing / Building Codes, contractor shall install trap-primers to all floor drains.
- B. Manufacturers: PPP INC, J.R.Smith Fig # 2694-NP and # 2683-3 Distribution Unit, Watts 3 LFTP300.

2.04 TRAP GUARDS

- A. Manufacturers: (ICC PMG Product Certified) Rectorseal Sure-Seal # SS2009V, Zurn, IPS Corp. and PPP Inc.
- B. Flexible elastomeric PVC construction diaphragm trap guard for installation in new and existing floor drains, hub drains, and trench drains. Trap guard to prevent trap evaporation and waste backflow. Size as applicable to the drain outlet size, up to 4" size. This product to be tested and certified to the requirements of ASSE 1072 & IAPMO Research and Testing, Inc., and any subsequent submittal must contain a certificate of compliance listing all the approved sizes.
- C. Contractor to verify with local plumbing inspector that flexible type trap guard devices are allowed. When the use of trap guard devices are not allowed, install a "Watts" Series A200, flow-thru trap primer.

2.05 HUB DRAINS (WHERE INDICTED)

- A. Manufacturer: Josam, Smith, Wade, Watts, Zurn.
 1. HD-1: 3" min. cast iron hub section up 2" min. above floor level, with full-sized P-trap.
 2. HD-2: same as HD-1 except with the addition of a ball float type backwater valve. Zurn Z-415-U (modified) / Z-1099 (no-hub).

2.06 CLEANOUTS

- a. Manufacturer: Josam, J.R. Smith, Wade, Watts, Zurn.
- b. EXTERIOR UNPAVED AREAS: CO-1, Cast iron hub or plug with tapered threaded PVC closure plug, cast iron or PVC frost sleeve and cover set in 24" square by 4" min. thick reinforced concrete pad top. Neenah R-1976 with non-ferrous securing screw.
- c. INTERIOR CONCRETE FLOOR AREAS: CO-2, Enameled cast iron body with round adjustable scoriated polished nickel bronze cover, tapered threaded ABS closure plug. Zurn ZN-1400- / ZN-1400-T.

- d. INTERIOR FINISHED WALL AREAS: Line type cleanout tee with tapered threaded ABS cleanout plug, round polished stainless steel access cover secured with machine screw. Zurn Z-1446- (Note: Screw shall not pass completely through the ABS plug, trim screw as necessary)
- e. INTERIOR EXPOSED VERTICAL STACKS: Line type cleanout tee with tapered threaded ABS closure plug. Zurn Z-1445.
- f. INTERIOR HORIZONTAL LINES: Cast iron hub with tapped ferrule and tapered threaded ABS or PVC closure plug, or no-hub coupling and blind plug.
- g. EXTERIOR UNPAVED AREAS: CO-1, Cast iron hub or plug with tapered threaded PVC closure plug, cast iron or PVC frost sleeve and cover.

2.07 SEWER CAMERA INSPECTION

- 1. The cost of the camera inspection shall be at the expense of the Contractor.
- 2. The camera inspection shall be performed within 14 days after the sanitary sewer mains have been cleaned and/or rodded out.
- 3. The camera inspection shall be performed on all sanitary sewer mains 4" and larger before any new work is performed on the sewer piping.
- 4. Record inspection data using high-quality video media such as DVD or other approved media.

PART 3 - EXECUTION

3.01 INSTALLATION

- a. Coordinate location and setting of plumbing specialties with adjacent construction. Install in accordance with manufacturers recommendations.
- b. Set floor drains, roof drains, trench drains and cleanouts level and plumb adjusted to finished floor elevation, roof elevation or finished wall location. Locate where serviceable. Allow minimum of 18" clearance around cleanouts for rodding. Lubricate threaded cleanout plugs with graphite and oil, teflon tape or waterproof grease. Install trap primer connections where indicated. Provide deep seal traps on floor drains and hub drains installed in mechanical rooms, penthouses or rooms with excessive positive or negative pressure.
- c. Floor drains and hub drains installed in public restrooms, locker rooms, seldom used rooms, and areas with minute drainage flow shall have a trap guard device installed.
- d. During construction, floor drains and drench drains shall be protected from dirt and debris. Contractor shall cover drains with temporary tape or coverings to be removed once construction is complete.
- e. Adjust receiver height to drain tile inlet and outlet elevations and cleanout to finished floor elevation.
- f. Floor Drains shall be installed to allow the strainer to be recessed 1/4" below finished floor. Drain shall have a sloped 12" sweep around outside diameter of strainer.

END OF SECTION

**SECTION 221316
SANITARY WASTE AND VENT PIPING**

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Pipe, tube, and fittings.
 - 2. Specialty pipe fittings.
 - 3. Encasement for underground metal piping.

1.02 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
 - 1. Soil, Waste, and Vent Piping: 10-foot head of water.
 - 2. Waste, Force-Main Piping: 100 psig.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
 - 1. Product Data for Credit IEQ 4.1: For solvent cements and adhesive primers, documentation including printed statement of VOC content.
 - 2. Laboratory Test Reports for Credit IEQ 4: For solvent cements and adhesive primers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

1.04 INFORMATIONAL SUBMITTALS

- A. Seismic Qualification Certificates: (When Required) For waste and vent piping, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Detailed description of piping anchorage devices on which the certification is based and their installation requirements.
- B. Field quality-control reports.

1.05 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

1.06 MANUFACTURERS

- A. Charlotte Pipe and Foundry Co., North American Pipe Corp.

1.07 PROJECT CONDITIONS

- A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - 1. Notify Construction Manager and Owner no fewer than five days in advance of proposed interruption of sanitary waste service.
 - 2. Do not proceed with interruption of sanitary waste service without Construction Manager's and Owner's written permission.

PART 2 - PRODUCTS

2.01 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.02 PIPING BELOW GRADE:

- A. HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS
 - 1. Pipe and Fittings: ASTM A 74, CISPI, Service and Extra Heavy classes.
 - 2. Gaskets: ASTM C 564, rubber.
 - 3. Calking Materials: ASTM B 29
- B. PVC PIPE AND FITTINGS
 - 1. Pipe: Solid wall Schedule 40 PVC.
 - 2. Pipe Compound: ASTM D1784 Cell Class 12454.
 - 3. End Type: Belled
 - 4. Lay Length: Max. 10 ft.

2.03 PIPING ABOVE GRADE:

- 1. PVC PIPE AND FITTINGS
- B. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.
- C. Cellular-Core PVC Pipe: ASTM F 891, Schedule 40.
- D. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.
- E. Adhesive Primer: ASTM F 656.
 - 1. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Adhesive primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- F. Solvent Cement: ASTM D 2564.
 - 1. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Solvent cement shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.04 SPECIALTY PIPE FITTINGS

- A. Transition Couplings:
 - 1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
 - 2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
 - 3. Unshielded, Non-pressure Transition Couplings:
 - a. Manufacturers:
 - 1) Dallas Specialty & Mfg. Co.
 - 2) Fernco Inc.
 - 3) Mission Rubber Company; a division of MCP Industries, Inc.
 - 4) Plastic Oddities; a division of Diverse Corporate Technologies, Inc.
 - 5) Husky
 - b. Standard: ASTM C 1173.

- c. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
- d. Sleeve Materials:
 - 1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.
 - 2) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
 - 3) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
- 4. Shielded, Non-pressure Transition Couplings:
 - a. Manufacturers:
 - 1) Cascade Waterworks Mfg. Co.
 - 2) Mission Rubber Company; a division of MCP Industries, Inc.
 - b. Standard: ASTM C 1460.
 - c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

PART 3 EXECUTION

3.01 EARTH MOVING

- A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earth Moving."

3.02 PIPING INSTALLATION

- A. 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.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- E. Install piping to permit valve servicing.
- F. Install piping at indicated slopes.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Install piping to allow application of insulation.
- J. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- K. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

- L. Exterior Sewers: Maintain a minimum of 48" above top of pipe to finished grade. Verify burial depth of sewer piping with local city / county sewer department.
- M. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated: Invert elevations of sanitary waste piping are generally indicated on the Plumbing Foundation drawing.
 - 1. Building Sanitary Drain: 2 percent downward in direction of flow for piping 3 inch and smaller; 1 percent downward in direction of flow for piping 4" and larger.
 - 2. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- N. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
 - 1. Install encasement on underground piping according to ASTM A 674 or AWWA C105/A 21.5.
- O. Install steel piping according to applicable plumbing code.
- P. Install aboveground PVC piping according to ASTM D 2665.
- Q. Install underground ABS and PVC piping according to ASTM D 2321.
- R. Plumbing Specialties:
 - 1. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary drainage gravity-flow piping. Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping.
 - 2. Install drains in sanitary drainage gravity-flow piping.
- S. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- T. Install sleeves for piping penetrations of walls, ceilings, and floors.
- U. Install escutcheons for piping penetrations of walls, ceilings, and floors where exposed to public view.

3.03 JOINT CONSTRUCTION

- A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- B. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum calked joints.
- C. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.
- D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- E. Join stainless-steel pipe and fittings with gaskets according to ASME A112.3.1.
- F. Grooved Joints: Cut groove ends of pipe according to AWWA C606. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections, over gasket, with keys seated in piping grooves. Install and tighten housing bolts.
- G. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.
- H. Plastic, Nonpressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.

3.04 SPECIALTY PIPE FITTING INSTALLATION

- A. Transition Couplings:
 1. Install transition couplings at joints of piping with small differences in OD's.
 2. In Aboveground Force Main Piping: Fitting-type transition couplings.
 3. In Underground Force Main Piping:
 - a. Piping 1-1/2" and Smaller: Fitting-type transition couplings.
 - b. Piping 2" and Larger: Pressure transition couplings.

3.05 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect drainage and vent piping to the following:
 1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
 3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
 4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
 5. Install horizontal backwater valves in pit with pit cover flush with floor.
 6. Equipment: Connect drainage piping as indicated. Provide shutoff valve if indicated and union for each connection. Use flanges instead of unions for connections 2-1/2" and larger.
- D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.
- E. Make connections according to the following unless otherwise indicated:
 1. Install unions, in piping 2" and smaller, adjacent to each valve and at final connection to each piece of equipment.
 2. Install flanges, in piping 2" and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.06 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.

2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

3.07 CLEANING AND PROTECTION

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.
- D. Exposed Vent Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

END OF SECTION

**SECTION 221328
ELEVATOR SUMP PUMP**

PART 1 - GENERAL

1.01 REFERENCE

- A. All applicable requirements of other portions of the Contract Documents apply to the work of this Section, including, but not limited to, Division 01, General Requirements.

1.02 DESCRIPTION OF WORK

- A. Work of this Section includes, but is not limited to: Elevator sump pump, Oil Detection System

1.03 QUALITY ASSURANCE

- A. General: Provide all pumps, basins, and controls as necessary for a complete installation of the sump pump systems. Unless otherwise specified herein, electrical power, controls, etc., shall be provided by the Electrical Contractor. The complete installation shall be in accordance with all applicable state and local codes.

1.04 SUBMITTALS

- A. Shop Drawings: Submit shop drawings of all products in this section.
- B. Product Data: Manufacturer's cut sheets and literature, Performance data, Pump curves, Wiring diagrams for control panels.
- C. Samples: Not required for review.
- D. Reference Submittals: Not required for review.
- E. Contract Close-Out: Operating and maintenance information, Owner instruction report, Guarantees and warranties.

PART 2 - PRODUCTS

2.01 ELEVATOR SUMP PUMP WITH DETECTION CABLE

- A. One simplex submersible pump shall be furnished. Pump shall be capable of pumping storm water. Pump shall be equipped with hermetically sealed, Class F insulated motor, installed in a heavy ribbed cast iron shell, hermetically sealed motor.
- B. Pump construction to include single mechanical seal. The motor shell and pump volute shall be made of close grained cast iron. Pump shaft shall be stainless steel and all fastening hardware shall be stainless steel. The pump impeller shall be bronze closed type, accurately machined to the proper diameter, and dynamically balanced prior to installation in the pump. The impeller shall be non-overloading throughout the entire range of the pump curve. Pump and motor unit to receive a coat of red chromate primer and finish coat of water resistant metallic blue enamel.
- C. Manufacturers: Weil, Zoeller, Grundfos, Hydromatic
- D. Pump Controller: Supply one UL listed - NEMA 1 steel simplex control panel suitable for wall mounting. Panel shall be completely factory wired and bench tested for satisfactory operation prior to shipment. The pump controller shall include oil detection circuitry which will shut down the pump, sound an alarm and energize a dry contact if a hydrocarbon is present in water in the sump pit. The following features will be included in the controller:
 - 1. Properly sized NEMA rated starter pump
 - 2. High water alarm with light and silencing switch
 - 3. Main fused disconnect switch.
 - 4. Individual circuit breakers for each pump
- E. Operating Controls
 - 1. Mercury float type liquid level controls shall be furnished for proper pump and alarm operation. Supply an oil sensor to detect hydrocarbons in the sump and disable the pump.
 - 2. 3— Mercury switches, each sealed in a corrosion resistant polypropylene float shall be provided. Each switch to have a PVC coated UL listed cable and to be attached to a

corrosive-resistant bracket to a stainless steel suspension rod. The switch bracket to be provided with a reinforcing sleeve to prevent sharp bending and damage to the cable.

F. Oil Detection System

Designed to detect oil contamination and to control pump operation.

1. Pump Panel:
 - a. High Water Indicator
 - b. High Oil Indicator.
 - c. Pump Run Indicator
 - d. Power Indicator.
2. Power: 115 volt with 10 foot cord.
3. Oil sensor, containing sensor probe, connect to and extend down from the discharge pipe to detect oil in the water and shut the pump down
4. SJE – Rhombus “Oil-Spotter”

2.02 FIBERGLASS BASIN

- A. Supply a fiberglass basin as noted on pump schedule depth. Basin shall be constructed of resin reinforced with not less than 20 percent glass strands. Minimum basin diameter shall be 18”
- B. Cover plate shall be minimum ¼” thick perforated and painted steel with necessary openings for pump discharge, power and control cables.
- C. Install Anti-Float ring when indicated on pump schedule.

2.03 VALVES

- A. A Bronze check valve shall be installed on the pump discharge.
- B. A Bronze shutoff valve shall be installed on the pump discharge.

2.04 WARRANTY

- A. Warranty time shall be (1) one-year from start up or 18 months from date of shipment. Warranty shall extend to material and workmanship of the complete system.

PART 3 EXECUTION

3.01 EXECUTION

- A. See additional details and diagrams on the project drawing documents.
- B. The complete installation of all items of equipment shall be in accordance with the Manufacturer's instructions. The entire system shall be tested and adjusted under actual operating conditions.
- C. The pumps shall not be used during construction for temporary pumping purposes. The contractor will make arrangements for temporary pumping if required during construction.
- D. Flush all incoming lines to the pump basin and thoroughly clean the basin prior to placing pumps into operation.
- E. The pump manufacturer shall provide a technician for one (1) day start-up of the complete system, to insure ample time to make corrections and/or repairs. Start-up will consist of but not limited to the following: Start-up and run of pump, check all electrical devices, provide a start-up report to the contractor, within 48 hours from start-up date for review and corrections if needed.

END OF SECTION

SECTION 221400

STORM WATER SYSTEMS

PART 1 - GENERAL

1.01 SCOPE

This section contains specifications for plumbing pipe and pipe fittings for this project. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference
- Reference Standards
- Shop Drawings
- Quality Assurance
- Delivery, Storage, and Handling
- Design Criteria
- Welder Qualifications

PART 2 - PRODUCTS

- Roof Drains and Overflow Drains

- Storm Water Piping

PART 3 - EXECUTION

- General
- Preparation
- Erection
- Copper Pipe Joints
- Welded Pipe Joints
- Threaded Pipe Joints
- Solvent Welded Pipe Joints
- Mechanical Hubless Pipe Connections
- Mechanical Joint Pipe Connections
- Push-On Gasketed Pipe Connections
- Mechanical Grooved Pipe Connections
- Mechanically Formed Tee Fittings
- Storm and Clearwater Waste and Vent
- Subsoil Drain
- Piping System Leak Tests
- Construction Verification Items

1.02 RELATED WORK

- 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment

- 22 05 14 - Plumbing Specialties

1.03 REFERENCE

Applicable provisions of Division 1 govern work under this section.

1.04 REFERENCE STANDARDS

ASTM A74	Cast Iron Soil Pipe and Fittings
ASTM A105	Forgings, Carbon Steel, for Piping Components
ASTM A126	Gray Cast Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM A888	Hubless Cast Iron Soil Pipe and Fittings
ASTM C564	Rubber Gaskets for Cast Iron Soil Pipe and Fittings
ASTM C1540	Heavy Duty Shielded Couplings for Joining Hubless Cast Iron Soil Pipe and Fittings
ASTM D1785	Poly Vinyl Chloride (PVC) Plastic Pipe
ASTM D2241	Poly Vinyl Chloride (PVC) Pressure-Rated Pipe (SDR Series)
ASTM D2464	Threaded Poly Vinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D2241	Poly Vinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40
ASTM D2564	Solvent Cements for Poly Vinyl Chloride (PVC) Plastic Pipe and Fittings
ASTM D2665	Poly Vinyl Chloride (PVC) Plastic Drain, Waste and Vent Pipe and Fittings
ASTM D2729	Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings
ASTM D2855	Making Solvent Cemented Joints with Poly Vinyl Chloride (PVC) Pipe and Fittings
ASTM D3034	Type PSM Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings
ASTM D3139	Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
ASTM D3212	Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM D3311	Drain, Waste and Vent (DWV) Plastic Fitting Patterns
ASTM F437	Threaded Chlorinated Poly Vinyl Chloride (CPVC) Plastic Pipe Fittings, Schedule 80
ASTM F438	Socket Type Chlorinated Poly Vinyl Chloride (CPVC) Plastic Pipe Fittings, Schedule 40
ASTM F441	Chlorinated Poly Vinyl Chloride (CPVC) Plastic Pipe, Schedules 40 and 80
ASTM F656	Primers for Use in Solvent Cement Joints of Poly Vinyl Chloride (PVC) Plastic Pipe and Fittings

1.05 SHOP DRAWINGS

Schedule from the contractor indicating the ASTM, AWWA or CISPI specification number of the pipe being proposed along with its type and grade if known at the time of submittal, and sufficient information to indicate the type and rating of fittings for each service.

Statement from manufacturer on his letterhead that pipe furnished meets the ASTM, AWWA or CISPI specification contained in this section.

1.06 QUALITY ASSURANCE

Substitution of Materials: Refer to Section GC – General Conditions of the Contract, Equals and Substitutions.

Order all copper, cast iron, steel, PVC and polyethylene pipe with each length marked with the name or trademark of the manufacturer and type of pipe; with each shipping unit marked with the purchase order number, metal or alloy designation, temper, size, and name of supplier.

Any installed material not meeting the specification requirements must be replaced with material that meets these specifications without additional cost to the State.

1.07 DELIVERY, STORAGE, AND HANDLING

Promptly inspect shipments to insure that the material is undamaged and complies with specifications.

Cover pipe to prevent corrosion or deterioration while allowing sufficient ventilation to avoid condensation. Do not store materials directly on grade. Protect pipe, tube, and fitting ends so they are not damaged. Where end caps are provided or specified, take precautions so the caps remain in place. Protect fittings, flanges, and unions by storage inside or by durable, waterproof, above ground packaging.

Offsite storage agreements will not relieve the contractor from using proper storage techniques.

Storage and protection methods must allow inspection to verify products.

1.08 DESIGN CRITERIA

- A. Use only new material, free of defects, rust and scale, and meeting the latest revision of ASTM OR AWWA specifications as listed in this specification.

PART 2 - PRODUCTS

STORM WATER PIPING

2.01 EXTERIOR ABOVE GROUND:

- A. Manufacturers:
 - 1. North American Pipe Corp.
 - 2. Harvel Plastics Inc.
 - 3. Genova Products
 - 4. Cresline or approved equal.
- B. PVC plastic pipe, Schedule 40, Class 12454-B (PVC 1120), ASTM D1785; PVC plastic drain, waste and vent pipe and fittings, ASTM D2665; fitting patterns, ASTM F656; solvent cement.
- C. Joints: ASTM D 2665: ASTM D 3311: ASTM F 1866.

2.02 EXTERIOR BELOW GROUND 15" AND SMALLER:

- A. Manufacturers:
 - 1. North American Pipe Corp.
 - 2. Harvel Plastics Inc.
 - 3. Genova Products
 - 4. Cresline or approved equal.
- B. PVC plastic pipe, Schedule 40, ASTM D 2665.
- C. Joints: ASTM D 3034.

PART 3 - EXECUTION

3.01 GENERAL

- A. Install pipe and fittings in accordance with reference standards, manufacturer's recommendations and recognized industry practices.

3.02 PREPARATION

- A. Cut pipe ends square. Ream ends of piping to remove burrs. Clean scale and dirt from interior and exterior of each section of pipe and fitting prior to assembly.

3.03 INSTALLATION

Install all piping parallel to building walls and ceilings and at heights which do not obstruct any portion of a window, doorway, stairway, or passageway. Where interferences develop in the field, offset or reroute piping as required to clear such interferences. Coordinate locations of plumbing piping with piping, ductwork, conduit and equipment of other trades to allow sufficient clearances. In all cases, consult drawings for location of pipe spaces, ceiling heights, door and window openings, or other architectural details before installing piping.

Provide a full size cleanout at the base of each Roof Conductor.

Install underground warning tape 6"-12" below finished grade above all exterior below ground piping. Where existing underground warning tape is encountered, repair and replace.

Maintain piping in clean condition internally during construction.

Provide anchors, expansion joints, swing joints and/or expansion loops so that piping may expand and contract without damage to itself, equipment, or building.

Do not route piping through or above transformer vaults or above transformers, panelboards, or switchboards, including the required service space for this equipment.

Note: Insulate roof drains, overflow drains and all horizontal portions of the storm water piping system.

3.04 PUSH-ON GASKETED PIPE CONNECTIONS

Clean pipe end, bell, gasket seat and gasket of dirt or debris. Coat end of pipe and gasket with gasket lubricant. Insure pipe is supported off the ground so lubricant does not pick up dirt. Push spigot end into gasket bell with levered pipe joining tool recommended by pipe manufacturer. Large diameter exterior mains may be joined by pushing end of pipe section with backhoe against wood blocking over pipe end. Insert to fully seated position or to reference mark on pipe.

3.05 STORM AND CLEARWATER - DEPTH

Verify invert elevations and building elevations prior to installation. Install exterior piping pitched to drain at indicated elevations and slope. Install interior piping pitched to drain at minimum slope of 1/8" per foot for piping 3" and larger.

Install exterior piping below predicted frost level and not less than 3' bury depth to top of pipe wherever possible.

3.06 PIPING SYSTEM LEAK TESTS

Do not insulate or conceal pipe until it has been successfully tested.

For hydrostatic tests, use clean water and remove all air from the piping being tested by means of air vents or loosening of flanges/unions. Measure and record test pressure at the high point in the system.

System will not be approved until it can be demonstrated that there is no measurable loss of test pressure during the test period.

Inspect system for leaks. Where leaks occur, repair the area with new materials and repeat the test; caulking will not be acceptable.

Entire test must be witnessed by the Owner's representative and the Project Engineer.

System	Test Medium	Initial Test Pressure	Duration	Final Test Pressure	Duration
Clearwater Waste and Vent	Water	N/A	2 hr	10' Water	2 hr
Storm and Clearwater Vent	Water	N/A	2 hr	10' Water	2 hr
Pressurized Storm/Clearwater	Water/ Waste	Water	2 hr	100 psig	2 hr

END OF SECTION

**SECTION 222000
NATURAL GAS SYSTEMS**

PART 1 GENERAL

1.01 REFERENCE

- A. All applicable requirements of other portions of the Contract Documents apply to the work of this Section, including, but not limited to, Division 01, General Requirements.

1.02 JOB CONDITIONS

- A. Coordinate the exact location of this work with the work of other trades before fabrication and installation. Verify all dimensions and elevations. Provide additional offsets and section of piping as may be required to meet the applicable job conditions. Coordinate with and review all related drawings of all trades before starting work.

Contractor shall coordinate gas meter setting with local gas service provider. Verify gas piping service route and available gas pressure.

1.03 SUBMITTALS

- A. Shop Drawings: Piping, Fittings and Regulators
- B. Product Data: Manufacturer's cut sheets and/or literature.

1.04 QUALITY ASSURANCE

- A. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Installer Qualifications: Company specializing in performing the Work of this Section with minimum three (3) years documented experience.
- E. Conformance to National Fuel Gas Code.
- F. Material and installation requirements shall follow NFPA 54, state and local gas company codes.
- G. Conformance to ANSI B31.
- H. Gas regulators shall be AGA rated.

PART 2 PRODUCTS

2.01 PIPING - ASTM A 53/A 53M, BLACK STEEL, SCHEDULE 40

- A. Below-ground pipe 5 feet from the building to above-ground at the building shall be Schedule 40 welded-joint steel pipe with factory-applied protective coating, such as X-Trucote. Joints shall be field-coated with the same material applied as recommended by the manufacturer. If underground gas distribution pipe is steel, provide a dielectric union at point of connection. Install a 17-pound anode pack between the building and 5 feet outside the building next to the connection to the main service pipe. Attach the anode lead wire to the piping by means of an exothermic weld, following the instructions of the manufacturer.
- B. Above-Ground Gas Piping: Standard weight, Schedule 40, welded or screwed, black carbon steel pipe, ANSI/ASTM A53.
 - 1. 1-1/2 inches and smaller: 150 lb. screwed malleable black iron fittings.
 - 2. 1-1/2 inches and smaller in concealed spaces: Schedule 40 black steel with socket welded fittings.
 - 3. 2 inches to 2-1/2 inches: 150 lb. screwed malleable black iron fittings.
 - 4. 3 inches: Welded or forged steel butt welded, pipe and fitting.

- a. OR
- 5. PRESS-CONNECT FITTINGS
- 6. Approved Manufacturers: Viega MegaPressG
- 7. References: ANSI LC4/CSA 6.32 – Metallic Press-Connect Fittings for Fuel Gas Distribution Systems.
- 8. Building: Two pressure ranges. Primary pressure is more than 0.5 psig, but not more than 2.0 psig.
- 9. Piping Size limited to 3/4" to 2-1/2"
- C. All concealed piping shall be welded.
- D. All gas piping exposed to outside weather environment shall be protected from corrosion by application of a non-metallic-based painting system specifically designed and manufactured for protection of steel piping.
 - 1. Apply two finish coats of Rust-O-Leum, Krylon, or De Rusto heavy duty paint. Allow proper drying time between coats. Color as selected by Owner. The union of the underground coating and above-ground paint shall be at least 2 inches above finished grade.
- E. Gas piping within the building shall be electrically continuous and bonded to a grounding electrode.

2.02 VALVES, REGULATORS AND ACCESSORIES

- A. Gas cocks shall be lubricated plug.
- B. Valves: Shut-off Valves sizes 2 inches and smaller shall be iron body lubricated plug valve conforming to ASTM-A-126, U.L. Listed and A.G.A. Approved for natural gas service with threaded ends, wrench operation, rated for 200 WOG service pressure and –20 to 200 degrees F.
- C. Valves at local connections sizes 2 inches and smaller shall be bronze body, full port ball or butterfly type, U.L. Listed and A.G.A. Approved for natural gas service with threaded ends, quarter turn lever handle operation, rated for 175 W.O.G. service pressure and 30 to 275 degrees F
- D. Provide nickel-plated steel plates on exposed pipes passing through walls, ceilings, floors, and partitions.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Gas piping system installation shall conform to the Standard for the Installation of Gas Appliances and Gas Piping USA Z21.30, ANSI Z106.1, NFPA No. 54 and No. 58, the rules of local and state regulatory agencies governing the installation of gas piping, the Gas Utility Energy Code for indirect gas service, and local gas utility company.
- B. Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of piping systems. Design locations and arrangements of piping take into consideration pipe sizing, flow direction, slope of pipe, expansion, and other design considerations. So far as practical, install piping as indicated.
- C. Concealed Locations: Except as specified below, install gas piping (in masonry walls) in an airtight conduit constructed of Schedule 40 seamless black steel with welded joints. Vent conduit to the outside and terminate with a screened vent cap.
 - 1. Above-Ceiling Locations: Gas piping may be installed in accessible above-ceiling spaces (subject to the approval of the authority having jurisdiction), whether or not such spaces are used as a plenum. Valves shall not be located in such spaces. Piping in plenums shall be welded.
 - 2. In Floors: Piping installed in floors shall have protective wrapping specified in PART 2 above. Piping cast in concrete slabs shall be surrounded with a minimum of 1-1/2 inches of concrete and shall not be in physical contact with other metallic structures such as

reinforcing rods or electrically neutral conductors. Piping shall not be embedded in concrete slabs containing quick-set additives or cinder aggregate. Piping shall be welded.

3. Piping in Partitions: Concealed piping shall not be located in solid partitions.
4. Prohibited Locations: Do not install gas piping in or through a circulating air duct, clothes chute, chimney or gas vent, ventilating duct, dumbwaiter or elevator shaft. This does not apply to accessible above-ceiling space specified above.

D. Sleeves

1. Set sleeves during construction of walls, floors and foundations.
2. If a hole is required after the structure is cast, its location and size shall be approved by the A/E. Core-drill the hole. Maintain the fire integrity of the structure.
3. Where pipes pass through building construction, use proper length and gauge pipe sleeves of galvanized steel. Anchor sleeves to building construction. Size anchors to permit passage of insulation where insulation is required. Maintain the fire integrity of walls, floors, ceilings, and partitions.
4. Where pipes pass through foundation walls and footings, provide cast iron sleeve and caulk the space between sleeve and pipe with lead wool, watertight.
5. Install sleeves in floors perfectly plumb and in walls level. Center the pipe in the sleeve. Pack sleeves with fire-rated materials, per shop-drawing-approved submittals, and caulk in tight.
6. Extend floor sleeves only 3/8 inch to 1/2 inch above finished floors. Neatly level tops of sleeves.
7. Finish wall and partition sleeves flush with wall lines.

E. Seal pipe penetrations of fire barriers using fire barrier penetration sealers specified in Division 07 Section "Joint Sealants".

F. Drips and Sediment Traps

1. Install a drip leg at points where condensate may collect, at the outlet of the gas meter, and in a location readily accessible to permit cleaning and emptying. Do not install drips where condensate is likely to freeze.
2. Construct drips and sediment traps using a tee fitting with the bottom outlet plugged or capped. Use a minimum of 3 pipe diameters in length for the drip leg. Use same size pipe for drip leg as the connected pipe.
3. Drip legs at equipment connections shall be down stream of valve.

G. Use fittings for all changes in direction and all branch connections.

H. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated.

I. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.

J. Piping in walls shall be free of any joints or fittings. The concealed pipe space must be ventilated with either an open wall top, or a wall louver/grille installed.

K. Install piping tight to slabs, beams, joists, columns, walls, and other permanent elements of the building. Provide space to permit insulation applications, with 1-inch clearance outside the insulation. Allow sufficient space above removable ceiling panels to allow for panel removal.

L. Locate groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

M. Install gas piping at a uniform grade of 1/4 inch in 15 feet, upward to risers, and from the risers to the meter, or service regulator when meter is not provided, or the equipment.

N. Make reductions in pipe sizes using eccentric reducer fittings installed with the level side down.

O. Connect branch outlet pipes from the top or sides of horizontal lines, not from the bottom.

P. Conform to the table below for maximum spacing of supports:

Steel Pipe Size (NPS)	Spacing in Feet	Min Rod Size Inches
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1/2	6	3/8
3/4 to 1-1/4	6	3/8
1-1/2 to 3 (horizontal)	12	1/2
3-1/2 to 5 all sizes (vertical)	Every floor level	

- Q. Install unions in threaded pipes, adjacent to each valve, at final connections to each piece of equipment, and elsewhere as indicated. Unions are not required on flanged devices.
- R. Install dielectric unions where piping of dissimilar metals are joined.
- S. Install flanges in welded piping, on valves, apparatus, and final connections to each piece of equipment.
- T. Install strainers on the supply side of each control valve, pressure reducing valve, pressure regulating valve, solenoid valve, and elsewhere as indicated.
- U. When gas supplies and regulators are indicated to serve a gas-fired water heater a separate regulator (line-size) is required for each water heater supply line.

3.02 PIPE JOINT CONSTRUCTION

- A. Welded Joints: Comply with the requirements in ASME Boiler and Pressure Vessel Code, Section IX.
- B. Threaded Joints: Conform to ANSI B1.20.1, tapered pipe threads for field-cut threads. Join pipe, fittings, and valves as follows:
 - 1. Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint. Refer to NFPA 54, for guide for number and length of threads for field threading steel pipe.
 - 2. Align threads at point of assembly.
 - 3. Apply appropriate tape to thread compound to the external pipe threads.
 - 4. Assemble joint to appropriate thread depth. When using a wrench on valves place the wrench on the valve end into which the pipe is being threaded.
 - 5. Damaged Threads: Do not use pipe with threads which are corroded or damaged. If a weld opens during cutting or threading operations, that portion of pipe shall not be used.
- C. Flanged Joints: Align flanges surfaces parallel. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly to appropriate torque specified by the bolt manufacturer.
- D. Flexible Hose Connections: Provide as a mean for final connection of gas piping to gas-fired, movable Kitchen equipment. Provide flexible gas hose, moveable grade, braider, PVC coated, with 304 stainless steel connectors. NSF/ANSI 169 and ANSI Z21.69.CA 6.16
- E. Manufacturers: Dormont (Blue-Hose).

3.03 VALVE APPLICATIONS

- A. General: The drawings indicate valve types, locations, and arrangements.
- B. Shut-off Duty: Use gas cocks specified in PART 2 above.

3.04 VALVE INSTALLATIONS

- A. Install valves in accessible locations, protected from physical damage. Tag valves with a metal tag attached with a metal chain indicating the piping systems supplied.
- B. Install a gas cock upstream of each gas pressure regulator. Where two gas pressure regulators are installed in series in a single gas line, a manual valve is not required at the second regulator.
- C. Install pressure relief or pressure limiting devices so they can be readily operated to determine if the valve is free; so they can be tested to determine the pressure at which they will operate; and examined for leakage when in the closed position.

3.05 TERMINAL EQUIPMENT CONNECTIONS

- A. Install gas cock upstream and within 6 feet of gas appliance. Install a union or flanged connection downstream from the gas cock to permit removal of controls.
- B. Sediment Traps: Install a tee fitting with the bottom outlet plugged or capped as close to the inlet of the gas appliance as practical. Drip leg shall be a minimum of 3 pipe diameters in length. Sediment shall be downstream of shut-off valve.

3.06 ELECTRICAL BONDING AND GROUNDING

- A. Install above-ground portions of gas piping systems, upstream from equipment shut-off valves electrically continuous and bonded to a grounding electrode in accordance with NFPA 70 - "National Electrical Code."
- B. Conform to NFPA 70, National Electrical Code, for electrical connections between wiring and electrically-operated control devices.

3.07 FIELD QUALITY CONTROL

- A. Piping Tests: Inspect, test, and purge natural gas systems in accordance with NFPA 54 and local utility requirements.

END OF SECTION

**SECTION 223000
PLUMBING EQUIPMENT**

PART 1 - GENERAL

1.01 SCOPE

- A. This section includes specifications for:
 - 1. PART 1 – GENERAL
 - a. Scope
 - b. Related Documents
 - c. Reference
 - d. Quality Assurance
 - e. Shop Drawings
 - f. Operation and Maintenance Data
 - 2. PART 2 – PRODUCTS
 - a. Water Heaters – Electric
 - b. Water Softeners
 - c. Circulating Pumps
 - d. Condensate Pumps
 - e. Expansion Tanks
 - f. Thermostatic Mixing Valves
 - 3. PART 3 - EXECUTION
 - a. Installation
 - b. Construction Verification Items
 - c. Functional Performance Testing

1.02 TRAINING

1.03 RELATED DOCUMENTS

- A. Section 01 91 01 or 01 91 02 – Commissioning Process
- B. Section 22 08 00 – Commissioning of Plumbing
- C. Section 22 05 23 - General-Duty Valves for Plumbing Piping
- D. Section 22 05 15 - Piping Specialties
- E. Section 22 05 13 - Common Motor Requirements for Plumbing Equipment.
- F. Section 22 07 00 - Plumbing Insulation
- G. Division 26 00 00 - Electrical

1.04 REFERENCE

- A. Applicable provisions of Division 1 shall govern work under this section.
- B. Plumbing products requiring approval by the State of Indiana must be approved or have pending approval at the time of shop drawing submission.

1.05 SHOP DRAWINGS

- A. Include data concerning dimensions, capacities, materials of construction, ratings, certifications, weights, pump curves with net positive suction head requirements, manufacturer's installation requirements, manufacturer's performance limitations, and appropriate identification.

1.06 OPERATION AND MAINTENANCE DATA

- A. All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.
- B. NOTE: All plumbing products and devices must meet the Federal Public Law 111-380, The Reduction of Lead in Drinking Water Act, effective January 04, 2014.

PART 2 - PRODUCTS

2.01 ELECTRIC WATER HEATERS

- A. Manufacturer: Lochinvar, Rheem, State
- B. Type: Point of use, compact, electric water heater. Size and energy requirements are listed on the drawing schedule. Heater shall be provided with the following items.
- C. Adjustable Thermostat control
- D. Replaceable immersion heating elements
- E. Glass-Lined steel storage tank
- F. Temperature and pressure relief valve.
- G. Brass drain valve.
- H. Contractor shall furnish and install wall mounting self to support water heaters 20.0 gallons and larger. Mounting height if shelf @ min. 7'-0" A.F.F.
- I. Contractor shall furnish and install a thermostatic mixing valve (TMV) to externally control hot water. TMV shall be similar to Watts – Model # 3/4LF 1170-UT-M2 3/4" See valve schedule for size and flow.
- J. Warranty: 1 year, limited tank and parts.

2.02 WATER SOFTENERS

- A. Automatic Water Softener System: Complete from inlet to outlet, designed within values scheduled herein; of capacity and arrangement as shown on drawings and specified herein; furnished, installed and placed in operation.
- B. Acceptable Manufacturer(s): Aqua Systems, Puritan.
- C. Softener Tank(s) one piece, nonmetallic, seamless construction with continuous fiberglass roving outer shell; rated at 150 psig at 120°F.
- D. Minimum connection size: 3/4" female connections.
- E. Brine System: single brine measuring and salt storage tank (min. size, see plans) with salt platform (sufficiently sized for at least four regenerations at full salting); tank and cover constructed of fiberglass or molded polyethylene; full-operated plastic fitted brine valve for automatic control of brine withdraw and fresh water refill.
- F. Electrical Characteristics:
- G. As scheduled and indicated on drawings, typically 120 volt single phase.
- H. Control: Brass control "Fleck" valve, cycled to regenerate from one to twelve day period.
- I. Softener Tank (Each): Reinforced fiberglass tank with hub and lateral distribution system. See schedule on drawings for size and capacity per tank.
- J. Provide vacuum breaker on discharge pipe for each fiberglass softener tank.
- K. Brine Tank: High density polyethylene tank with a non-degradable salt platform. See schedule on drawings for size of brine tank.
- L. Control (Typical Each Resin Tank): Alternating, fully programmable, progressive flow design. Brass, piston operated multi-cycle control valves for meter initiated regeneration.
- M. Meter: Bronze construction, transmitting low voltage signal to controller.
- N. Test Kit: Provide water testing kit to make chemical tests necessary for controlling operation and adjustments of brine dosage.
- O. Sediment Filter: Furnish and install a "Spin-Down" reusable screen filter, 3/4" in size with ball type drain valve. Similar to Rusco Inc. "Sediment-Trapper"
- P. Softening Capacity: See schedule on plumbing drawings.

2.03 SOFTENER INSTALLATION

- A. Coordinate with plumbing piping and related electrical work to achieve a complete operating system.
- B. Install drain piping to nearest floor drain.
- C. Resin tank and brine tank(s) shall be installed on 4" high concrete pad, unless noted otherwise.
- D. On Inlet:
 - 1. Strainer.
 - 2. Pressure gage.
 - 3. Shut-off valve.
- E. On Outlet:
 - 1. Shut-off valve.
 - 2. Pressure gage.
 - 3. Flow meter
- F. Contractor shall provide initial salt fill, start water softening system and instruct owner in proper operation and maintenance of unit.

2.04 IN-LINE WET-ROTOR CIRCULATING PUMPS

- A. Manufacturer: Bell and Gossett, Grundfos, Taco, Patterson.
- B. Type: Circulator Pump, Maintenance Free, Wet Rotor, Inlet/Outlet Union, Housing Material Bronze, Max. Temp. 225 F, Max. Working Pressure 150 PSI, Shut-Off @ 15 Ft., Impeller Material Noryl, Thermal Protection, Warranty Length 3 Years.
- C. Housing Material : Bronze, Max. Temp. (F) : 225, Max. Working Pressure (PSI) : 150, Impeller Material: Noryl, Shaft Material : Compliance: Certified For Use In Potable Water Applications.
- D. Motor: Provide pump with impedance protected motor sized for non-overloading over the entire pump curve. Pump shall be single phase power unless otherwise indicated, Furnish, each pump and motor with a nameplate giving the manufacturer's name, serial number of pump, capacity in GPM and head in feet at design condition, horsepower, voltage, frequency, speed and full load current.
- E. Pump: Size and capacity as indicated on drawings, see Pump Schedule.

2.05 CONDENSATE PUMPS

- A. Manufacturer: Little Giant – Model VCMA-15ULT
- B. Designed for the automatic collection and removal of condensate from HVAC equipment.
- C. gallon ABS collection tank.
- D. Automatic start and stop operation.
- E. Float activate switch.
- F. Power: 115 volt, 1.0 amp, 60 watts, 6 foot long, 3-conductor power cable with grounded 3-prong plug.
- G. Motor: 1/50 hp
- H. Discharge: 3/8" OD barbed fitting.
- I. Cover Construction – ABS
- J. Check valve.
- K. Flow: 30.0 gpm @ 9 ft. of head

2.06 DOMESTIC WATER EXPANSION TANKS

- A. Manufacturer: Bell and Gossett, Wessels, Watts.
- B. Vertical steel pre-charged, diaphragm expansion tank, 125 psi ASME labeled construction, complete with replaceable flexible butyl rubber bladder, system connection fitting, Schrader

type air charge fitting, steel base ring stand, factory prime and enamel painted exterior finish, ASME relief valve. Materials exposed to water to be NSF or FDA approved for potable water service. Size as indicated on plumbing schedule, see drawings.

- C. NOTE: Tanks over 5.0 gallons of volume shall be placed on wall mounted shelf, furnished and installed by the contractor.

2.07 THERMOSTATIC MIXING VALVES

- A. TMV-1: High/Low Master Manifold System: Provide lead-free, factory assembled and tested thermostatic high-low valves, constructed of bronze body and cap with replaceable corrosion and lime resistant components, including universal mounting capability, equipped with integral check-stops, removable strainers, liquid-filled thermostat with 10 year warranty, dial thermometer.
 - 1. Provide wall mounting bracket.
 - 2. Minimum Flow: 0.5 gpm
 - 3. Manufacturers: Lawler (Series), Powers (Hydroguard X-P).
- B. TMV-2: Low Flow Valve: The valve shall be ASSE 1017 listed. Valve shall be lead free construction with integral filter washers and check valve and adjustable cap with locking feature. Rough bronze finish with dial thermometer.
 - 1. Manufacturers: Lawler (Series 66), Watts, Powers.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install plumbing equipment where indicated in accordance with manufacturer's recommendations. Coordinate equipment location with piping, ductwork, conduit and equipment of other trades to allow sufficient clearances. Locate equipment and arrange plumbing piping to provide access space for servicing all components.
- B. Set commercial water heaters, water softeners on 4" high concrete housekeeping pads. Adjust and level equipment. Some concrete pads may be existing to remain.
- C. Connect equipment to water and drain piping using unions or flanges and isolation valves.
- D. Size temperature and relief valves per CSA ratings. Route Piping of temperature and pressure relief valves to terminate over nearest floor drain or floor as indicated.
- E. Startup and test equipment adjusting operating and safety controls for proper operation.
- F. Cycle softeners and adjust for specified exchange rate, regeneration time, consumption, backflow rate, etc. Provide initial salt fill of brine tank.
- G. Lubricate pumps before startup. Adjust pumps for rated flow. Clean and blowdown strainers after 8 hours of operation.
- H. Adjust compression tank pre-charge to scheduled minimum operating pressure prior to connecting to system.

END OF SECTION

**SECTION 224000
PLUMBING FIXTURES**

PART 1 GENERAL

1.01 REFERENCE

- A. All applicable requirements of other portions of the Contract Documents apply to the work of this Section, including, but not limited to Division 01, General Requirements.

1.02 DESCRIPTION OF WORK

- A. Work of this Section includes, but is not limited to:
1. Inclusion of all plumbing fixtures, complete and ready for use. All fixtures, except as otherwise specified, shall be constructed of vitreous china with all visible exposed surfaces glazed.
 2. Providing all stops, traps, escutcheons, connections, etc., as are necessary to complete the installation of each fixture, whether such items are listed or not.
 3. Plumbing Trim: All finished exposed faucets, traps, connecting piping, stops, flush valves and other fixture trim shall be chromium-plated brass unless otherwise specified and shall be supported rigidly to fixtures and to walls with matching brackets at not more than 2'-0" center. All fastenings shall be chromium-plated brass or may be 302 stainless steel if of matching color and finish. Faucets shall be furnished as required. Vacuum breakers shall be provided as a part of the fixture trim wherever there is a possibility of back-siphoning.
 4. Fixture Stops: Shut-offs for urinal and water closet flush valves shall be an integral part of the fixture or fitting; shut-offs for all other fixtures shall be loose-key, lock-shield-type. All fixture stops shall be angle- or straight-type adapted for each particular location and shall be located immediately adjacent to the fixture. Use threaded adaptors when used in conjunction with copper tube work.
 5. All exposed screws or fasteners for plumbing fixtures and faucets shall be vandalproof. Contractor shall take care to coordinate this item with his suppliers prior to Shop Drawings submittal.
 6. Aerators, where required for sinks and lavatories shall be vandalproof type.
 7. ADA Showers: Threshold of shower shall not exceed 1/2" for transfer showers, 1/4" for roll-in showers. It is the Contractor's responsibility to set the floor level of the shower to meet this requirement. Floors may be required to have a recess area to set shower unit.
 8. Showers: All showers to be provided with proper studding to secure unit to walls. The space between the bottom of the unit and the sub-floor must be filled with bedding compound to secure and level the unit. Bedding compound shall be Gold Bond Gypsolite Plaster, US Gypsum Structo-Lite Plaster or a thin mortar mix.
 9. Sinks: Contractor shall verify the physical size of each specified sink with the proposed sink cabinet and countertop. See Architectural and Interior's design drawings for ADA required fixtures.

1.03 QUALITY ASSURANCE

- A. Meet the requirements of the following:
1. State Plumbing Code.
 2. State Department of Housing, Buildings and Construction.
- B. Material Standards
1. ANSI/ASME A112.19.2-90: Vitreous China Plumbing Fixtures.
 2. ANSI/ASME A112.19.3-87: Stainless Steel Plumbing Fixtures (Designed for Residential Use).
 3. ANSI/ASME A112.19.M-94: Porcelain Enameled Formed Steel Plumbing Fixtures.
 4. ANSI/ASME A112.19.5-79: Trim for Water Closet Bowls, Tanks, and Urinals.
 5. ANSI/ASSE 1016-90: Performance Requirements for Thermostatic, Pressure Balancing and Combination Control Valves for Bathing Facilities.

6. ANSI/ASSE 1025-78: Performance Requirements for Diverters for Plumbing Faucets with Hose Spray, Anti-Siphon-Type, Residential Applications.

1.04 SUBMITTALS

- A. Shop Drawings: Required for review.
- B. Product Data: Catalog cuts, including all fixture trim.
- C. Samples: Not required for review.
- D. Project Information: Not required for review.
- E. Contract Close-Out Information: Operating and maintenance data, Guarantees

PART 2 PRODUCTS

2.01 SEE PLUMBING FIXTURE SCHEDULE ON DRAWINGS FOR ADDITIONAL FIXTURES TYPES AND MODEL NUMBERS.

2.02 MATERIALS - GENERAL

- A. Acceptable Manufacturers
 1. Plumbing Faucets: American Standard, Kohler, Delta, and Moen.
 2. Vitreous China Plumbing Fixtures: American Standard, Kohler and Zurn.
 3. Utility Sinks: Fiat, Stern Williams and Mustee
 4. Water Closet Seats: Church, Bemis, Beneke, and Centoco.
 5. Mixing Valves: Powers, Commercial Delta, Lawler, and Bradley.
 6. Stainless Steel Sinks: Elkay, Just.
 7. Fixture Carriers: Josam, J.R. Smith, Watts and Zurn.
- B. Plumbing Fixtures – General: Constructed or equipped with anti-siphon devices to prevent siphoning waste material into potable water supply system.
- C. Escutcheons and Plates: Conceal all holes where pipes pass through walls, floors or ceilings; use plates or escutcheons.
- D. Piping Exposed in Finished Areas (including fittings and trim): Chromium-plated or nickel-plated brass with polished bright surface.
- E. Trim for Lavatories and Sinks: Provide with renewable cartridges.
- F. Vitreous Caps: Provide for water closet bolts.
- G. Sealant: Silicone-type. See Division 07 Section “Joint Sealants”.
- H. Sinks: Shall be 18 gauge 304 stainless steel with Satin finish. Verify with architectural and interior design drawings ADA requirements.
- I. Utility Sinks: Molded Stone construction, internal drain with faucet.
- J. ADA Sinks: Waste outlets for all ADA sinks shall be 90 degree offset grid drain similar to Elkay LK235L

2.03 INSULATION AT HANDICAPPED LAVATORIES

- A. Handicapped lavatories exposed waste, hot and cold water supply lines shall be insulated with a molded, flexible vinyl insulation system with all fasteners. Provide insulation for 1-1/4-inch waste offset drain, tailpiece, P-trap and waste arm and 3/8-inch supply tubing and 3/8-inch keyed stop valve. Color shall be as selected by the A/E.
- B. Insulation shall comply with ASTM E84 25/450, flame spread index of not more than 25 and a smoke-developed index of not more than 450.
- C. Manufacturers/Products: Plumbrex, Truebro, Johns Mansville.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Sink manufacturer shall provide proper template to architectural woodwork supplier for cutting of countertop. Plumber shall place sink in countertop and complete faucet and piping.
- B. Install all fixtures in accordance with Manufacturer's recommendations.
- C. Contractor shall coordinated ADA required fixtures and sinks with architectural and interior design drawings.
- D. All fixture support carriers shall be of the type necessary to permit adjustment to fit variations in construction. All grounds or special supports necessary for setting fixtures shall be provided before plastering or other finished construction work is begun. All fixtures shall be hung at standard height unless otherwise indicated by the A/E.
- E. Minimum fixture connection sizes are shown on the Drawings.
- F. Provide fixture carriers and required drainage fittings on all wall hung fixtures. Anchor carriers securely to floor.
- G. Where plumbing fixtures abut to walls, floors, and countertops, seal all joints with sealant.
- H. Provide anchors behind the wall for flush valve supply piping.
- I. Adjust self-sustaining closet seats for proper operation and to sustain in any position.
- J. Insulate the hot and cold water and waste piping under handicapped lavatories.
- K. After all fixtures have been set and are ready for use, and before the Contractor leaves the job, he shall thoroughly clean all fixtures furnished and set by him, removing all stickers, rust stains and any other matter or discoloration of fixtures, leaving every part in new condition. He shall, further, adjust all flush valves and other fixture water tempering or balancing at supplies to give proper water flow of fixtures.

END OF SECTION

SECTION 23 00 00
HVAC GENERAL REQUIREMENTS

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section includes the general requirements applicable to all Heating, Ventilation, and Air Conditioning work.
- B. Provide complete and fully operational HVAC systems controlled as indicated in the construction documentation.
- C. The construction documents are comprised of both specifications and construction drawings. Information pertinent to design intent may be included in either or both locations, which create one set of contract documents.

1.2 DEFINITIONS

- A. Basis of Design: Equipment and materials identified in the drawing schedules, notes, and specifications and identified as a specific product or example represents the intended Basis of Design. Any equipment or materials provided by the Contractor must meet or exceed the performance quality of the Basis of Design.
- B. Substitution: Any equipment or material which is not the Basis of Design.
- C. General Requirements: The provisions set forth in the Division 01 sections apply to the entire work of the contract and other elements which are included in the project. Basic contract definitions are in the General Conditions.
- D. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels generally considered normally occupiable by people.
- E. Exposed, Interior Installations: Installed indoors and exposed to viewing by people. Examples included finished spaces and mechanical rooms equipment rooms.
- F. Exposed, Exterior Installations: Exposed to view but outside the building envelope and therefore exposed to weather and ambient conditions. Examples include roof top locations.
- G. Concealed, Interior Installations: Installed within the building envelope, but concealed from view. Examples include those items installed within walls, above ceilings, below floors, or in chases.
- H. Concealed, Exterior Installations: Installed outside of the building envelope, but concealed from view and protected from weather conditions by a secondary structure, but subject to outdoor ambient conditions. Examples include installations within enclosures that are not heated or cooled.
- I. Indicated: Implication of a cross reference to a graphic representation, note, schedules, or other specification section or another area within the contract documents. The terms “shown”, “noted”, “scheduled”, and “specified” are used as synonyms to “indicated”. No limitation of

cross reference location is intended except as specifically noted.

- J. Furnish: Supply and deliver to project site, ready for unloading, unpacking, assembly, installation and similar operations. Where “furnish” applies to work for which the installation is not otherwise specified, “furnish” shall mean “furnish and install”.
- K. Install: Operations at the project site including “unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operation.
- L. Provide: To furnish and install complete and ready for intended use.

1.3 SUBMITTALS

- A. Action Submittals: These submittals are required to be returned with no exceptions prior to procuring or installing products or materials. The Submittal Review process is described in Section 01.
 - 1. Work Plans: Written Narrative of the work plan used to create the schedule. Coordinate with other trades and contractors to develop required work plans as required to develop the long term coordinated construction schedule.
 - 2. Product Data: Providing information on the actual product selection intended for use as specified in other Division 23 Specifications and the Construction Documents. All product data submittals shall clearly identify the product to be used subject to rejection.
 - 3. Shop Drawings: Providing information on the actual installation methodology to be used to install items as specified in other Division 23 Specifications and the Construction Documents
- B. Informational Submittals: These submittals are intended to facilitate coordination and construction phasing and scheduling. These submittals will not be returned unless non-conformance with the contract documents is noted.
 - 1. Construction Schedules: Schedule of work showing percent completion of milestones in the work plan. Coordinate with the general contractor, owner, or owner’s representative, to develop, maintain, and regularly update the construction schedule as required
 - 2. Coordination Documents: Drawings including Plans, Sections, Elevations, localized infrastructure crossing details, drawn to scale, on which the items below have been included utilizing information from all trades, contractors, and installers:
 - a. Building Structure and structural supports and attachments for piping, ductwork, lighting fixtures, cables, cable trays, raceways and conduit.
 - b. Building Roofs, walls, floors, windows, doors, and ceilings
 - c. Suspended Ceilings components
 - d. HVAC Equipment, piping, ductwork, controls devices, and associated electrical disconnects.
 - e. Size and Location of access doors and panels required for maintenance of products installed in walls and inaccessible ceilings.
 - f. Size and Location of penetrations through the finished floor.
 - g. Size and Location of penetrations through fire rated walls.
 - h. Items penetrating the finished ceiling, including but not limited to:
 - 1) Air outlets and inlets
 - 2) Luminaires
 - 3) Fire Suppression Sprinklers
 - 4) Fire Alarm Components, such as horns and strobes
 - 5) Life Safety Components, such as exit signs

- 6) Mass Notification Components, such as speakers
- 7) IT components, such as routers
- 8) Security components, such as cameras
- 9) Service Access Panels

- C. Substantial Completion Submittals: These submittals are required prior to achieving substantial completion from the Architect or Engineer of Record. One hard copy shall be turned over to the Owner's Maintenance Staff at Owner Training.
 - 1. Record Drawings Submittal reviewed with "No Exceptions" by Architect and/or Engineer of record.
 - 2. Commissioning Documentation as required by other specification sections provided in .PDF file format on a USB Thumb-drive and one printed copy organized by specification section in multiple three ring binders not to exceed 4", including at minimum:
 - a. Start Up Reports for all HVAC Equipment and components.
 - b. Testing, Adjusting and Balancing report returned with "No Exceptions" by the Architect and/or Engineer of record.
 - c. Manufacturer's Operation and Maintenance Data for all HVAC system Products, including all accessory sizes required, such as belt and filter sizes and types.
 - d. Emergency Service Contact including Name, email address, and Phone Number.
 - e. Written Record from Owner stating Owner's Representative system training has been successfully delivered.
 - 3. Service Valve Tag Chart and Location Maps.
 - 4. Updated Control Valve Schedule.
 - 5. Field Reports indicating successfully completing Ductwork Leakage Testing.
 - 6. Field Reports indicating successfully completing Piping Pressure Testing.
 - 7. Any and all maintenance required items as specified in other Division 23 Sections in packages with protective cover for storage and identified with labels describing contents and intended use. (i.e. FAN BELT – AHU-1 SUPPLY FAN)

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Where feasible, arrange for product delivery to the construction site when construction has progressed to allow for delivery to the final installed location protected from the weather and site security is sufficient to prevent easy theft (lockable door, container, or cage area and/or a night guard).
- B. Deliver all pipes with factory applied end caps. Caps shall be maintained through shipping and storage until such time pipe is being installed to prevent entrapment of debris and contaminants and minimize pre-construction corrosion of materials.
- C. Do not allow any materials to be stored exposed to weather, standing water, excessive dirt and dust, or in a manner to prevent the flow of traffic through the worksite.
- D. Handle all products with care and per manufacturer's written instructions for lifting and rigging. Do not install damaged items without written consent from the Owner.

1.5 COORDINATION

- A. The drawings indicate the general arrangement, routing, and scope of the systems and are to be followed as often as possible. Deviations from the drawn layout are permissible, if necessitated by field conditions and approved by the Architect or Engineer of Record through submittal and properly coordinated with all other trades.

- B. The drawings are not intended to show every minor vertical and/or horizontal offset required to navigate a complete installation of the system due to obstructions that may arise due to field conditions. Contractors shall anticipate potential additional offsets in their construction proposals.
- C. The drawings, schedules, and specifications shall be considered one cooperative document. Items may or may not appear in both drawings and specifications. Anything appearing in one or the other location shall be considered included in the contract documents and the contractor shall provide a bid based inclusive of both Specifications and Drawings. Any and all identified conflicting statements between the Specifications and Drawings that affects the final bid price shall be submitted for clarification during the bidding process.
- D. New Equipment: All equipment provided by the contractor shall be provided as “new” and not “used”. Contractor shall not energize equipment prior to substantial completion unless:
 - 1. Factory Representative and/or Owner’s Representative is in attendance for start-up testing.
 - 2. The Test, Adjusting and Balancing Contractor is actively testing the equipment
 - 3. Specific, written authorization from the Owner has been granted for:
 - a) Space Pressurization in conjunction with approved pressurization plan.
 - b) Space Tempering during finish installation.
- E. Contractor shall field verify all measurements in the field and shall be responsible for the correct fitting of all systems and components. Contractor shall coordinate all work with other branches and trades to minimize conflict and delays. Contractors shall:
 - 1. Coordinate work plan in advance with all other trades and immediately upon discovery, report any anticipated difficulty with proposed resolutions to the general contractor and/or Architect or Engineer of Record.
 - 2. Provide the General Contractor and Owner with a detailed schedule to be incorporated within the overall construction schedule to include at minimum:
 - a) Any necessary demolition, as phased by floor and area.
 - b) Temporary Construction as required to maintain any existing services.
 - c) Coordination Efforts
 - d) Architectural Rough Ins – i.e. wall and floor sleeves installation.
 - e) Product Submittals
 - f) Shop Drawing Submittals
 - g) Product Procurement and storage
 - h) Product Installation
 - i) Duct and Piping Installation
 - j) Installation of Insulation and Identification Systems
 - k) Start-Up and Commissioning of Equipment
 - l) Owner Training
 - m) Punch List Inspection
 - n) Substantial Completion
 - 3. Coordinate space needs of ductwork, piping, chases, wall, floor, and roof penetrations, with other trades during construction to allow for easy installation.
 - 4. Coordinate installation of all structural supporting elements, sleeves, sleeve seals, etc. through cast-in-place concrete and other structural components as they are constructed.
 - 5. Coordinate requirements for all access hatches, panels, doors, hand holes for HVAC items during work planning for wall and ceiling construction. Access panels and doors are specified in Division 08.

6. Coordinate any and all trenching, excavating, bedding, and backfilling with general contractor and appropriate piping specifications and earthwork specifications in other divisions.
7. Coordinate any HVAC Demolition with all aspects of demolition and temporary construction by other trades, including dust barriers and electrical demolition. Do not remove electrical components of HVAC equipment without electrical components first being locked out and removed by Division 26 demolition contractor.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Subject to compliance requirements, provide a product from one of the listed manufacturers. Any manufacturer specifically mentioned on the drawing shall be considered Basis – of – Design.
- B. Available or Acceptable Manufacturers: Manufacturers of known equivalence. When listed, provide a product by one of the manufacturers listed or submit a non-listed manufacturer's product for review. Contractor is responsible for all cost deviations arising from use of a non-listed manufacturer.

2.2 ELECTRICAL REQUIREMENTS

- A. Electrical Characteristics for HVAC Equipment: Unless otherwise approved, supply equipment with the electrical characteristics as indicated in the contract documents.
- B. Equipment with electrical characteristics different from those indicated in the contract documents shall only be supplied if the following is approved in writing:
 1. The electrical supply wiring and conduit size is properly coordinated and modified.
 2. The electrical over-current protection device is properly coordinated and modified.
 3. The changes associated with panelboards, local transformers, and disconnects are properly coordinated and modified.
 4. Any additional costs of other contractors associated with the change in electrical characteristics are the responsibility of the Mechanical Contractor

2.3 PIPE, TUBE, AND FITTINGS

- A. See Section 231113 Hydronic Piping and 231116 Hydronic Piping Specialties
- B. See Section 232300 Refrigerant Piping

2.4 DUCTWORK

- A. A. See Section 233100 HVAC Ducts and Casings and 233300 Duct Accessories

2.5 GROUT

- A. Description: ASTM C 1007B, nonshrink and nonmetallic, dry hydraulic-cement grout
 1. Post Hardening, volume adjusting, non-staining, noncorrosive, nongaseous, and recommended for interior and exterior applications
 2. 5000-PSI, 28-day compressive strength

3. Premixed or packaged

2.6 JOINING MATERIALS

- A. Refer to Division 23 Piping Sections for special joining materials not listed below. When joining materials are in conflict, utilize the joining materials specified in the piping specific application specification.
- B. Pipe-Flange Gasket Materials: Suitable chemical and thermal conditions for the specific use of the piping as specified in other Division Piping Sections
 1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless otherwise indicated
 - a) Full-Face: Flat-Face, Class 125, cast-iron and cast-bronze flanges
 - b) Narrow-Face: Raised-Face, Class 250, cast-iron and steel flanges
 2. AWWA C110, rubber, flat face, 1/8-inch-thick, full face or ring type, unless otherwise indicated
- C. Flange Bolts and Nuts: ASME B182.1, Carbon Steel, unless otherwise indicated
- D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material as recommended by piping system manufacturer for intended service, unless otherwise indicated.
- E. Solder Filler Metals: ASTM B 32, lead-free alloys with ASTM B 813 water flushable flux. Melting point suitable for service.
- F. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorous alloys for general-duty brazing, unless otherwise indicated.
 1. Refrigerant Piping Brazing Filler Metals: AWS A5.8, Bagl, Silver alloy, unless otherwise specified by the manufacturer's written installation instructions.
- G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for the wall thickness and chemical composition of the steel pipe being welded.
- H. Solvent Cements for Plastic Pipe
 1. PVC Piping:
 - a) Solvent Cement: ASTM 2564
 - b) Primer: ASTM F 6565
 2. CPVC Piping:
 - a) Solvent Cement: ASTM 493

PART 3 - EXECUTION

3.1 PRE-WORK INSPECTION

- A. Examine the work area before beginning installation. Ensure
 1. Conditions are safe and satisfactory for working.
 2. Rough-In work is installed properly.
 3. All coordination activities are successfully completed.
 4. The area is free of conflicts to proper installation.
- B. Do not proceed with work if conditions are unsatisfactory.

3.2 PLANNING

- A. Plan work beforehand.
- B. Communicate work plan to other contractors performing work in the area
- C. Coordinate all work as listed in the Coordination Section of this specification.

3.3 INSTALLATION

- A. A. Install mechanical items in accordance with the contract documents and manufacturer's published installation instructions.

3.4 CONCRETE BASES

- A. Anchor equipment to concrete base according to equipment manufacturer's published installation instructions and in accordance with seismic requirements, if present.
- B. Construct concrete bases of dimensions indicated, but not less than 6 inches larger than supported unit in all directions.
- C. Install dowel rods 18 inches on center to connect concrete base to concrete floor.
- D. Install epoxy-coated anchor bolts for supported equipment that extends through the concrete base and anchor to structural floor.
- E. Place and secure anchorage devices using supported equipment manufacturer's published documentation, including setting drawings, diagrams, templates, instructions furnished with equipment to be supported.
- F. Use 3000 PSI 28-day compressive strength concrete and reinforcements as specified in Division 03.
- G. Ensure anchor bolts have proper exposed elevation to properly secure equipment to base.

3.5 GROUTING

- A. Mix and install grout for HVAC equipment base bearing surface, pump, and other equipment base plates, and anchors.
- B. Clean all surfaces to be grouted prior to installing grout.
- C. Provide forms as needed to properly install grout.
- D. Place grout, completely filling bases and forms.
- E. Avoid entrapment of air within the grout during installation.
- F. Place grout on concrete bases and provide smooth and level bearing surfaces for equipment to be supported
- G. Place grout around anchors.
- H. Cure placed grout.

3.6 METAL SUPPORTS AND ANCHORAGES

- A. Refer to Division 05 for structural steel requirements.
- B. Metal Channel (“strut”) products in accordance with the Metal Framing Manufacturer’s Association standards may be used for metal framings, supports, and anchorages.
- C. Cut, fit, and place miscellaneous metal supports accurately in locations as needed, with proper alignment and elevation required to support and anchor HVAC materials and equipment as intended in the contract documents.
- D. Field Welding shall comply with AWS D1.1

3.7 WOOD SUPPORTS AND ANCHORAGES

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages as needed to support and anchor HVAC equipment and materials.
- B. Select fasteners that will not penetrate wood members through a finished or exposed side. Tighten connections between members. Do not install fasteners resulting in split or weakened wood members.
- C. Attach to substrates as required to support the sum of the dead load and applied working load of supported equipment.

3.8 EQUIPMENT INSTALLATION – COMMON REQUIREMENTS

- A. Contractor shall confirm proper fit of equipment.
- B. Install equipment level and plumb.
- C. To the extent possible, install equipment and products perpendicular and parallel to exterior walls unless otherwise indicated.
- D. Install equipment perpendicular and parallel to other building systems and components unless otherwise indicated.
- E. Install all HVAC products and equipment:
 - 1. To maximize headroom if specific mounting height is not specified.
 - 2. To facilitate maintenance and service.
 - 3. To maintain manufacturer’s recommended minimum clearances.
 - 4. To meet NFPA 70 required clearances to electrical components.
 - 5. To allow space for installation of necessarily sloped items at intended slope.
- F. Connect equipment for ease of disconnecting and removing, with minimum interference to other installations
- G. Extend grease fittings to accessible locations outside of motor compartments and equipment casings.

3.9 CLEANING AND RESTORATION

- A. Contractor shall repair damage resulting from the contractor’s work.

- B. Leave the work area broom clean at the end of each work shift.
- C. Thoroughly clean the work area at the completion of construction. At a minimum, Contractor shall:
 - 1. Remove all excess grout, paint, plaster, caulk, firestopping, or other products used during installation of HVAC systems from finished surfaces.
 - 2. Clean duct systems clear of construction debris and dust.
 - 3. Clean the blowers, fan housings, discharge plenums, scrolls, blades, vanes, shafts, baffles, dampers, and drive assemblies of all air handling units and fans free of construction debris and dust.
 - 4. Clean all coils dust free and render Coil Visibly Clean and within 10% of design coil pressure drop.
 - 5. Clean all drain pans free of debris and dust.
 - 6. Clean all dust from diffusers, registers, and grilles.
 - 7. Clean, empty, and replace all strainer baskets.
 - 8. Clean debris from all insect and bird screens.
 - 9. Install new, clean air filters.
 - 10. Remove all trash from mechanical equipment rooms.
 - 11. Sweep clean all mechanical rooms.
 - 12. Remove dust from exposed equipment casings.
 - 13. Ensure all equipment tags and labels are clean and legible.

3.10 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to start up, test, and inspect mechanical equipment components, assemblies, connections, and installations as indicated.
- B. Non-Conforming Work: Items shall be deemed defective if they do not pass tests and inspections, including commissioning functional testing.

3.11 FIELD PAINTING

- A. When field applied coatings are specified, painting of HVAC Systems, equipment, and components is specified in Division 09.
- B. Damage and Touchup: Marred, scratched, dinged, or otherwise damaged factory finishes shall be repaired with materials to match original factory finish using the manufacturer's approved methods.

3.12 OWNER TRAINING

- A. Contractor shall provide training to the Owner's maintenance personnel on the systems and equipment installed. Training shall include, at a minimum:
 - 1. Means of turning equipment on and off safely.
 - 2. Review of Equipment Sequences and Operation.
 - 3. Review of Equipment Capacities and Capabilities.
 - 4. Means of making minor adjustments to setpoints.
 - 5. Review of Building Automation Systems.
 - 6. Basic Maintenance requirements.
 - a) Filter Change Parameters and procedures.

- b) Fan Belt Change Procedures.
- c) Bearing Grease extension locations.
- d) Greasing Intervals.
- e) Strainer cleaning procedures and intervals.
- f) Turnover of Substantial Completion Hard Copy.

END OF SECTION

SECTION 23 05 13
COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes single- and three-phase motors for application on equipment provided under other sections and for motors furnished loose to Project.
- B. Related Sections:
 - 1. Section 260526 - Grounding and Bonding for Electrical Systems.
 - 2. Section 260553 - Identification for Electrical Systems.

1.2 REFERENCES

- A. American Bearing Manufacturers Association:
 - 1. ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
- B. National Electrical Manufacturers Association:
 - 1. NEMA MG 1 - Motors and Generators.
- C. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Submittal procedures.
- B. Action Submittals:
 - 1. Product Data:
 - a. Submit catalog data for each motor furnished loose. Indicate nameplate data, standard compliance, electrical ratings and characteristics, and physical dimensions, weights, mechanical performance data, maintenance procedures and intervals, and support points.
 - b. Submit data for each motor furnished as a package with the package submittal. Indicate nameplate and performance data, standard compliance, electrical ratings and characteristics and maintenance procedures and intervals.
 - 2. Test Reports: Indicate procedures and results for specified factory and field testing and inspection.
- C. Information Submittals:
 - 1. Motor Manufacturer's published Operation and Maintenance Data, to be included in close out submittals.

1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' experience.
- B. Testing Agency: Company specializing in testing products specified in this section with minimum three <3> years' documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Product storage and handling requirements.
- B. Lift only with lugs provided. Handle carefully to avoid damage to components, enclosure, and finish.
- C. Protect products from weather and moisture by covering with plastic or canvas and by maintaining heating within enclosure.
- D. For extended outdoor storage, remove motors from equipment and store separately.

1.6 COORDINATION

- A. Coordinate all features of motors, installed units, and accessory devices to be compatible with:
 - 1. Means of Motor Starting.
 - 2. Torque, speed, and mechanical power requirements of the application.
 - 3. Ratings and characteristics of the electrical supply circuit.
 - 4. Means of speed control.
 - 5. Ambient and environmental conditions, both during storage and in the final installed location.
- B. Coordinate all motor installation requirements with Division 26 contractor.

PART 2 PRODUCTS

2.1 PRODUCT REQUIREMENTS FOR MOTORS FURNISHED WITH EQUIPMENT

- A. Motors 1/2 hp and Larger: Three-phase motor as specified below.
- B. Motors Smaller Than 1/2 hp: Single-phase motor may be supplied as specified below, except motors less than 250 watts or 1/4 hp may be equipment manufacturer's standard.
- C. Three-Phase Motors: NEMA MG 1, Design B, premium-efficient squirrel-cage induction motor, with windings to accomplish starting methods and number of speeds as indicated on Drawings.
 - 1. Voltage: As indicated on Drawings
 - 2. Service Factor: 1.15
 - 3. Enclosure: Meet conditions of installation unless specific enclosure is indicated on Drawings.
 - 4. Design for continuous operation in 40 degrees C environment, with temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.

5. Design Code: Design B
 6. Insulation System: NEMA Class F.
 7. Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.
 8. Thermistor System (Motor Frame Sizes 254T and Larger): Three PTC thermistors embedded in motor windings and epoxy encapsulated solid state control relay with wiring to terminal box.
 9. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum ABMA 9, L-10 life of 200,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.
 10. Sound Power Levels: Conform to NEMA MG 1.
- D. Single Phase Motors:
1. Permanent split-capacitor type where available, otherwise use split-phase start/capacitor run or capacitor start/capacitor run motor.
 2. Voltage: as indicated on the drawings, single phase, 60 Hz.
- E. Wiring Terminations: Furnish terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated.

2.2 THREE-PHASE MOTORS FURNISHED LOOSE

- A. Acceptable Manufacturers: Acceptable Manufacturer's are listed below. Other manufacturers of equivalent products may be submitted for review.
1. General Electric
 2. Siemens
 3. Baldor
 4. Marathon Electric Company
- B. Product Description: NEMA MG 1, Design B, premium-efficient squirrel-cage induction motor, with windings to accomplish starting methods and number of speeds indicated.
- C. Voltage: as indicated on the drawings, three phase, 60 Hz.
- D. Service Factor: 1.15
- E. Enclosure: Meet conditions of installation unless specific enclosure is specified or indicated.
- F. Design for continuous operation in 40 degrees C environment, with temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
- G. Insulation System: NEMA Class F.
- H. Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.
- I. Thermistor System (Motor Frame Sizes 254T and Larger): Three PTC thermistors embedded in motor windings and epoxy encapsulated solid state control relay with wiring to terminal box.
- J. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum ABMA 9, L-10 life of 200,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA

standard shaft extension. Stamp bearing sizes on nameplate.

- K. Sound Power Levels: Conform to NEMA MG 1.
- L. Wiring Terminations: Furnish terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated.

2.3 SOURCE QUALITY CONTROL

- A. Test motors in accordance with NEMA MG 1, including winding resistance, no-load speed and current, locked rotor current, insulation high-potential test, and mechanical alignment tests.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install securely on firm foundation. Mount ball bearing motors in accordance with motor manufacturer's requirements.
- B. Install engraved plastic nameplates in accordance with Section 260553 for all motors.
- C. Electrical Installer shall provide and install all necessary materials and labor to ground and bond motors in accordance with Section 260526.

3.2 FIELD QUALITY CONTROL

- A. Perform inspections listed in NETA ATS, Section 7.15 for Rotating Machinery.
- B. Perform Insulation Resistance Testing on all motor installations for the nominal voltage rating of the equipment. Motors that do not meet the minimum insulation resistance value tabulated in ANSI/NETA ATS-2009, summarized below, shall be reworked or replaced until the motor passes testing.

NOMINAL RATING OF EQUIPMENT (VOLTS)	MINIMUM TEST VOLTAGE, DC	MINIMUM INSULATION RESISTANCE IN MEGOHMS
<250	500	25
250 < RATED VOLTS < 600	1,000	100

END OF SECTION

SECTION 23 05 53
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Equipment labels.
 2. Warning signs and labels.
 3. Pipe labels.
 4. Duct labels.
 5. Valve tags.
 6. Warning tags.

1.2 SUBMITTALS

- A. Action Submittals:
1. Product Data: For each type of product.
 2. Samples: For color, letter style, and graphic representation required for each identification material and device.
 3. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
 4. Valve numbering scheme.
- B. Closeout Submittals:
1. Valve Schedules: For each piping system to include in operation and maintenance data.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

- A. Metal Labels for Equipment:
1. Material and Thickness: Brass: 0.032-inch, stainless steel: 0.025-inch, aluminum: 0.032-inch, or anodized aluminum: 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
 2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
 3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
 4. Fasteners: Stainless-steel rivets or self-tapping screws.
 5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Plastic Labels for Equipment:
1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8-inch-thick, and having predrilled holes for attachment hardware.

2. Letter Color: White.
 3. Background Color: Black.
 4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
 5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
 6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
 7. Fasteners: Stainless-steel rivets or self-tapping screws.
 8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- C. Label Content: Include equipment's Drawing designation or unique equipment number, drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number where equipment is specified.
- D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number, and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8-inch-thick, and having predrilled holes for attachment hardware.
- B. Letter Color: Black.
- C. Background Color: Yellow.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
- G. Fasteners: Stainless-steel rivets or self-tapping screws.
- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. Label Content: Include caution and warning information plus emergency notification instructions.

2.3 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction according to ASME A13.1.

- B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
- C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include pipe size and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
 - 2. Lettering Size: Size letters according to ASME A13.1 for piping.

2.4 DUCT LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8-inch-thick, and having predrilled holes for attachment hardware.
- B. Letter Color: White.
- C. Background Color: Black.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
- G. Fasteners: Stainless-steel rivets or self-tapping screws.
- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings; also include duct size and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions or as separate unit on each duct label to indicate flow direction.

2.5 VALVE TAGS

- A. Description: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
 - 1. Tag Material: Brass: 0.032-inch, stainless steel: 0.025-inch, aluminum: 0.032-inch, or anodized aluminum: 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
 - 2. Fasteners: Brass wire-link chain or beaded chain or S-hook.
- B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

2.6 WARNING TAGS

- A. Description: Preprinted or partially preprinted accident-prevention tags of plasticized card stock with matte finish suitable for writing.
 1. Size: 3 by 5-1/4 inches minimum.
 2. Fasteners: Brass grommet and wire.
 3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
 4. Color: Safety-yellow background with black lettering.

PART 3 EXECUTION

3.1 preparation

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

3.3 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.4 PIPE LABEL INSTALLATION

- A. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
 1. Near each valve or control device.
 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 3. Near penetrations and on both sides of through walls, floors, ceilings, and inaccessible enclosures.
 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 5. Near major equipment items and other points of origination and termination.
 6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
 7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

- B. Directional Flow Arrows: Arrows shall be used to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.
- C. Pipe Label Color Schedule:
 - 1. Condenser-Water Piping:
 - a. Background Color: Green.
 - b. Letter Color: White.
 - 2. Refrigerant Piping:
 - a. Background Color: Green.
 - b. Letter Color: White.

3.5 DUCT LABEL INSTALLATION

- A. Install plastic-laminated duct labels with permanent adhesive on air ducts in the following color codes:
 - 1. Blue: For cold-air supply ducts.
 - 2. Yellow: For hot-air and variable temperature supply ducts.
 - 3. Green: For exhaust-, outside-, relief-, return-, and mixed-air ducts.
- B. Locate labels near points where ducts enter into and exit from concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

3.6 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, shutoff valves, faucets, convenience and lawn-watering hose connections, and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
 - 1. Valve-Tag Size and Shape: 1-1/2 inches, round.
 - 2. Valve-Tag Colors: Natural.
 - 3. Letter Color: Black.

3.7 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION

SECTION 23 05 93
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Balancing air systems.

1.2 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TAB Specialist: An entity engaged to perform TAB Work.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Certified TAB reports.
- B. Informational Submittals:
 - 1. Qualification Data: Within 30 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
 - 2. Contract Documents Examination Report: Within 45 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.
 - 3. Strategies and Procedures Plan: Within 60 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.

1.4 QUALITY ASSURANCE

- A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC or NEBB.
 - 1. TAB Field Supervisor: Employee of the TAB contractor and certified by AABC or NEBB.
 - 2. TAB Technician: Employee of the TAB contractor and certified by AABC or NEBB as a TAB technician.
- B. Certify TAB field data reports and perform the following:
 - 1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
 - 2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.
- C. TAB Report Forms: Use standard AABC or NEBB TAB forms.

- D. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

1.5 COORDINATION

- A. Notice: Provide at least seven days' notice before each test. Include scheduled test dates and times.
- B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

1.6 HVAC CONTRACTOR RESPONSIBILITIES

- A. Provide TAB agency one complete set of contract documents, change orders, and approved submittals in digital pdf format.
- B. Control contractor shall provide required BAS hardware, software, personnel, and assistance to TAB agency as required for TAB agency to balance the systems. Control contractor shall also provide trending reports as needed to demonstrate that systems are complete.
- C. Coordinate meetings and assistance from suppliers and contractors as required by TAB agency.
- D. Provide additional valves, dampers, sheaves and belts as required by TAB agency.
- E. Flag all manual volume dampers with high-visibility tape.
- F. Provide access to all dampers, valves, test ports, nameplates, and other appurtenances as required by TAB agency.
- G. Remove and replace or repair insulation as needed to provide access for the TAB work.
- H. Have the HVAC systems at complete operational readiness before TAB begins.
- I. Promptly correct deficiencies identified during TAB.
- J. Maintain a construction schedule that allows the TAB agency to complete work prior to occupancy.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
- B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that these balancing devices are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.

- D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC systems and equipment controls.
- E. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they are properly separated from adjacent areas. Verify that penetrations in plenums are sealed (and fire-stopped if required).
- F. Examine equipment performance data including fan and pump curves.
 - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that might cause reduced capacities.
 - 2. Calculate system-effect factors to reduce performance ratings of HVAC equipment under actual installed conditions. Use tables and charts in AMCA 201, "Fans and Systems" or in SMACNA "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.
- G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- H. Examine test reports specified in individual system and equipment Sections.
- I. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, clean filters are installed, and equipment with functioning controls is ready for operation.
- J. Examine terminal units, verifying that they are accessible and that their controls are connected, configured by the control contractor, and functioning.
- K. Examine two-way control valves for proper installation and function.
- L. Examine three-way valves for proper installation for their intended uses of diverting or mixing fluid flows and for proper function.
- M. Examine all equipment items to verify correct piping arrangements.
- N. Examine heat-transfer coils for correct piping connections and for clean and properly-spaced fins.
- O. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

- A. Prepare a TAB plan that includes:
 - 1. Equipment and systems to be tested.
 - 2. Strategies and step-by-step procedures for balancing the systems.
 - 3. Instrumentation to be used.
 - 4. Sample forms with specific identification for each equipment item.
- B. Complete system-readiness checks and prepare reports. Verify the following:
 - 1. General:
 - a. Electrical power wiring is complete.
 - b. Control systems are operational.

- c. Access is provided to balancing and control devices.
- d. Variable frequency drive start-up procedures are complete.
- e. Safety devices are operational and indicating normal status.
- 2. Air Side:
 - a. Ductwork is complete with air terminals installed.
 - b. Balance, fire, and smoke dampers are open and operational.
 - c. Control dampers are in their normal (fail) positions.
 - d. Equipment and duct access doors are securely closed.
 - e. Clean filters are installed.
 - f. Fans are operating and rotating in correct directions.
 - g. Fan vibration levels are within tolerance limits.
 - h. Building envelope is complete, and exterior windows and doors are closed.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC "National Standards for Total System Balance" or NEBB "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and in this Section.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
 - 1. After testing and balancing, install test ports and duct access doors that comply with requirements in Division 23 Section "Air Duct Accessories."
 - 2. Install new insulation where insulation is removed for TAB to match removed materials. Restore insulation, coverings, vapor barrier, and finish.
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control devices, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of system "as-built" duct layouts with all components identified.
- C. For variable-air-volume systems, develop a plan to simulate diversity.
- D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- F. Verify that motor starters are equipped with properly sized thermal protection.
- G. Check condensate drains for proper connections and function.
- H. Check for proper sealing of air-handling-unit components.

3.5 PROCEDURES FOR CONSTANT-VOLUME AND VARIABLE-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 - 1. Measure total airflow as follows:
 - a. Set outdoor air, return air, and relief air dampers for proper positions that simulate minimum outdoor air conditions.
 - b. Where conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
 - c. Where conditions are not suitable for duct Pitot-tube traverse measurements, a coil traverse may be acceptable.
 - 2. Where sufficient space is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow. Measure fan static pressures as follows:
 - a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the discharge flexible connection.
 - c. Measure inlet static pressure of single-inlet fan at the fan inlet or through the inlet flexible connection.
 - d. Measure inlet static pressure of double-inlet fan through the wall of the plenum that houses the fan or through the inlet flexible connections.
 - 3. Measure static pressure across each component that makes up the air-handling unit, rooftop unit, or other air-handling equipment. Report the cleanliness status of filters and the time static pressures are measured. Measure static pressures entering and leaving other devices, such as sound traps, heat-recovery equipment, and air washers, under final balanced conditions.
 - 4. Adjust fan speed higher or lower than indicated speed as needed to achieve indicated air-handling-unit performance.
 - 5. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
- B. Adjust volume dampers for ducts to indicated airflows within specified tolerances.
 - 1. Measure airflows of branch ducts.
 - 2. Adjust branch duct balance dampers for specified airflows.
 - 3. Re-measure each branch duct after all have been adjusted.
- C. Adjust air outlets and inlets for each space to indicated airflows.
 - 1. Adjust each outlet in same room or space to indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
 - 2. Adjust patterns of adjustable outlets for proper distribution without drafts.
 - 3. Measure airflows at all inlets and outlets.
 - 4. Adjust each inlet and outlet for specified airflow.
 - 5. Re-measure each inlet and outlet after all have been adjusted.
- D. Verify final system conditions.
 - 1. Re-measure and confirm minimum outdoor air, return air, and relief air flow rates are within design tolerances. Readjust as necessary.

2. Re-measure and confirm total airflow is within design tolerance.
3. Re-measure all final fan operating data. Include fan speeds, motor voltages, motor amperages, and static profiles.
4. Mark all final settings.
5. Test system in economizer mode. Verify proper operation; adjust if necessary. Measure and record all operating data.
6. Record final performance data.

3.6 ADDITIONAL PROCEDURES FOR VARIABLE- VOLUME AIR SYSTEMS

- A. Variable-Air-Volume Systems: Adjust the variable-air-volume systems as follows:
 1. Set outdoor-air dampers at minimum, and set return- and exhaust-air dampers at a position that simulates full-cooling load.
 2. Verify that the duct static pressure sensors are installed and controlling the system.
 3. Select the terminal unit that is most critical to the supply-fan airflow and static pressure. Measure inlet static pressure. Adjust system static pressure so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.
 4. Calibrate and balance each terminal unit for maximum and minimum design airflow as follows:
 - a. Adjust controls so terminal unit is calling for maximum airflow. Measure airflow and adjust calibration factor as required for design maximum airflow. Record calibration factor. When maximum airflow is correct, balance the air outlets downstream from the terminal unit.
 - b. Adjust controls so terminal is calling for minimum airflow. Measure airflow and adjust calibration factor as required for design minimum airflow. Record calibration factor. Note any deviation from design airflow.
 5. After all terminal units have been calibrated and balanced, test and adjust system for total airflow. Adjust fans to deliver total design airflows within the maximum allowable fan speed listed by the fan manufacturer.
 - a. Set outdoor air, return air, and relief air dampers for proper position that simulates minimum outdoor air conditions.
 - b. Set terminals for maximum airflow. If system design includes diversity, adjust terminals for maximum and minimum airflows so connected total matches fan selection and simulates actual load in the building.
 6. Measure fan static pressure. Report any artificial loading of filters at the time static pressures are measured.
 7. Set final return and outdoor airflow rates to the fan while operating at maximum return airflow and minimum outdoor airflow.
 - a. Balance the return air ducts and inlets as described for constant-volume air systems.
 - b. Verify all terminal units are meeting design airflow rates under system maximum airflow conditions.
 8. Re-measure the inlet static pressure at the most critical air terminal unit and adjust the system static pressure setpoint to the most energy-efficient setpoint to maintain optimum system static pressure. Record setpoint.
 9. Re-measure the final system conditions as follows:
 - a. Re-measure and confirm minimum outdoor air, return air, and relief air flow rates are within design parameters. Readjust to design if necessary.
 - b. Re-measure and confirm total airflow rates are within design parameters.

- c. Re-measure all final fan operating data.
- d. Mark all final settings.
- e. Test system in economizer mode. Verify proper operation and adjust, if necessary. Measure and record all operating data.
- f. Verify tracking between supply and return fans.
- g. Record final performance data.

3.7 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into a separate section for each tested and balanced system. Provide a final report that is a complete record of the HVAC system performance, including conditions of operation, any outstanding items, and any deviations found during the testing and balancing process. The final report is to provide a reference of actual operating conditions for the owner and operations personnel. All measurements and test results that appear in the report must be made on site and dated by the responsible technician or test and balance engineer.
- B. As a minimum the report shall include the following information:
 - 1. Title page, including:
 - a. TAB company name, address, and telephone number.
 - b. Project name, client, identification number, and location.
 - c. Project architectural firm, address, and telephone number.
 - d. Project HVAC engineering firm, address, and telephone number.
 - e. Project HVAC contracting firm, address, and telephone number.
 - f. TAB certification statement.
 - g. Test and balance engineer name, signature, and certification number.
 - h. Report date.
 - 2. Table of contents.
 - 3. TAB national performance guarantee.
 - 4. Report summary, including:
 - a. List of items that do not meet specified tolerances.
 - b. Information that may be considered in resolving deficiencies.
 - 5. Instrument list, including:
 - a. Type.
 - b. Manufacturer.
 - c. Model.
 - d. Serial number.
 - e. Calibration date.
- C. TAB test data for all systems included in the Work. Include the INSPECTIONS article below only for large projects or for projects with critical airflow requirements.

3.8 INSPECTIONS

- A. Initial Inspection:
 - 1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
 - 2. Check the following for each system:
 - a. Measure airflow of at least 10 percent of air outlets.
 - b. Measure water flow of at least 5 percent of terminals.

- c. Measure room temperature at each thermostat or temperature sensor. Compare the reading to the set point.
 - d. Verify that balancing devices are marked with final balance positions.
 - e. Note deviations from the Contract Documents in the final report.
 - B. Final Inspection:
 - 1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Owner's Representative.
 - 2. The TAB contractor's test and balance engineer shall conduct the inspection in the presence of Owner's Representative.
 - 3. Owner's Representative shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to 10 percent of the total measurements recorded.
 - 4. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
 - 5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
 - C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:
 - 1. Recheck all measurements and adjust. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
 - 2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's payment.
 - D. Prepare test and inspection reports.
- 3.9 SCHEDULE Edit the list below to include all equipment items to be included in the balance work.
- A. Provide air balancing for each of the following equipment items as part of this work. Note that listing an item of equipment includes any motors, valves, dampers, and filters associated with that equipment:
 - 1. Control valves
 - 2. Control dampers
 - 3. Air terminal units
 - a. Fans
 - b. Coils
 - c. Control Dampers and Valves
 - 4. Air outlets and inlets
 - 5. Power and Gravity ventilators
 - a. Exhaust fans
 - 6. Refrigerant condensing units
 - 7. Packaged HVAC units
 - 8. Ductless Split Systems
 - 9. Electric Unit heaters

10. Gas-fired radiant heaters

END OF SECTION

SECTION 23 07 13
HVAC DUCT INSULATION

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes duct insulation and appurtenances.

1.2 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).

1.3 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.
- B. Protection: Do not permit mineral fiber insulation to get wet. Mineral fiber insulation that is or has been wet shall be removed from the project site.

1.5 COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields.
- B. Coordinate clearance requirements with duct Installer for duct insulation application. Establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.6 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

PART 2 PRODUCTS

2.1 INSULATION MATERIALS

- A. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- B. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- C. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- D. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- E. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type II for sheet materials.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following. Where a specific manufacturer is listed in the Drawings, this shall be considered the Basis-of-Design.
 - a. Aeroflex USA, Inc.
 - b. Armacell LLC.
 - c. K-Flex USA.
 - 2. Properties:
 - a. Maximum Operating Temperature: 180 deg F.
 - b. Minimum Operating Temperature: -70 deg F.
 - c. Maximum Thermal Conductivity at 75 deg F Mean Temperature: Thickness 1 Inch or Less: 0.245 Btu-in/hr-ft2-deg F.
 - d. Maximum Water Vapor Permeability Thickness 1 Inch or Less: 0.05 perm-inches.
 - e. Maximum Water Absorption by Volume: 0.2%.
- F. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin in a flexible blanket. Comply with ASTM C 553, Type II and ASTM C 1290, Type III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following. Where a specific manufacturer is listed in the Drawings, this shall be considered the Basis-of-Design.
 - a. CertainTeed Corp.; SoftTouch Duct Wrap.
 - b. Johns Manville; Microlite.
 - c. Knauf Insulation; Atmosphere Duct Wrap.
 - d. Manson Insulation Inc.; Alley Wrap.
 - e. Owens Corning; SOFTR Duct Wrap FRK.
 - 2. Properties:
 - a. Maximum Operating Temperature: 250 deg F.
 - b. Maximum Compressed Thermal Conductivity at 75 deg F Mean Temperature:
 - 1) Density 0.75 PCF: 0.29 Btu-in/hr-ft2-deg F.
 - 2) Density 1.0 PCF: 0.27 Btu-in/hr-ft2-deg F.
 - 3) Density 1.5 PCF: 0.24 Btu-in/hr-ft2-deg F.

- G. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin in a semi-rigid board. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory-applied ASJ or with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following. Where a specific manufacturer is listed in the Drawings, this shall be considered the Basis-of-Design.
 - a. CertainTeed Corp.; CertaPro Commercial Board.
 - b. Johns Manville; 800 Series Spin-Glas.
 - c. Knauf Insulation; Earthwool Insulation Board.
 - d. Manson Insulation Inc.; AK Board.
 - e. Owens Corning; Fiberglas 700 Series.
 2. Properties:
 - a. Maximum Operating Temperature: 450 deg F.
 - b. Minimum Operating Temperature: 0 deg F.
 - c. Maximum Thermal Conductivity at 75 deg F Mean Temperature:
 - 1) Density 3.0 PCF: 0.23 Btu-in/hr-ft²-deg F.
 - 2) Density 6.0 PCF: 0.23 Btu-in/hr-ft²-deg F.
 - d. Minimum Compressive Strength at 10% Deformation:
 - 1) Density 3.0 PCF: 25 lb/ft².
 - 2) Density 6.0 PCF: 200 lb/ft².

2.2 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.
- B. For indoor applications, adhesives shall have VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
- D. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
- E. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
- F. PVC Jacket Adhesive: Compatible with PVC jacket.

2.3 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
- B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below ambient services.
 1. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
 2. Service Temperature Range: Minus 20 to plus 180 deg F.
 3. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
 4. Color: White.
- C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below ambient services.

1. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 35-mil dry film thickness.
 2. Service Temperature Range: 0 to 180 deg F.
 3. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
 4. Color: White.
- D. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below ambient services.
1. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
 2. Service Temperature Range: Minus 50 to plus 220 deg F.
 3. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
 4. Color: White.
- E. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
1. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
 2. Service Temperature Range: Minus 20 to plus 180 deg F.
 3. Solids Content: 60 percent by volume and 66 percent by weight.
 4. Color: White.

2.4 LAGGING ADHESIVES

- A. Description: Comply with MIL-A-3316C, Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.
1. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over duct insulation.
 2. Service Temperature Range: 0 to plus 180 deg F.
 3. Color: White.

2.5 SEALANTS

- A. FSK and Metal Jacket Flashing Sealants:
1. Materials shall be compatible with insulation materials, jackets, and substrates.
 2. Fire- and water-resistant, flexible, elastomeric sealant.
 3. Service Temperature Range: Minus 40 to plus 250 deg F.
 4. Color: Aluminum.
- B. ASJ Flashing Sealants, and PVC Jacket Flashing Sealants:
1. Materials shall be compatible with insulation materials, jackets, and substrates.
 2. Fire- and water-resistant, flexible, elastomeric sealant.
 3. Service Temperature Range: Minus 40 to plus 250 deg F.
 4. Color: White.

2.6 FACTORY-APPLIED JACKETS

- A. Insulation system specifications indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
1. All-Service Jacket (ASJ): White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I. Maximum water vapor permeance 0.02 perms.
 2. All-Service Jacket – Self-Sealing Lap (ASJ-SSL): ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I. Maximum water vapor permeance 0.02 perms.

3. Foil-Scrim Kraft (FSK) Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II. Maximum water vapor permeance 0.02 perms.

2.7 FIELD-APPLIED FABRIC-REINFORCING MESH

- A. Woven Glass-Fiber Fabric: Approximately 6 oz./sq. yd. with a thread count of 5 strands by 5 strands/sq. in. for covering ducts.
- B. Woven Polyester Fabric: Approximately 1 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in., in a Leno weave, for ducts.

2.8 FIELD-APPLIED CLOTHS

- A. Woven Glass-Fiber Fabric: Comply with MIL-C-20079H, Type I, plain weave, and presized a minimum of 8 oz./sq. yd.

2.9 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
 1. Color: White unless indicated otherwise.
- B. Metal Jacket:
 1. Aluminum Jacket: Comply with ASTM B 209, Alloy 3003, 3005, 3105, or 5005, Temper H-14.
 - a. Moisture Barrier for Indoor Applications: 1-mil-thick, heat-bonded polyethylene and kraft paper or 2.5-mil-thick polysurlyn.
 - b. Moisture Barrier for Outdoor Applications: 3-mil-thick, heat-bonded polyethylene and kraft paper or 2.5-mil-thick polysurlyn].
 2. Stainless-Steel Jacket: ASTM A 167 or ASTM A 240/A 240M.
 - a. Moisture Barrier for Indoor Applications: 1-mil-thick, heat-bonded polyethylene and kraft paper or 2.5-mil-thick polysurlyn.
 - b. Moisture Barrier for Outdoor Applications: 3-mil-thick, heat-bonded polyethylene and kraft paper or 2.5-mil-thick polysurlyn.
- C. Self-Adhesive Indoor or Outdoor Jacket: Multiple-ply laminated vapor barrier and waterproofing membrane for installation over insulation; consisting of aluminum, Tedlar, or laminate sheet with integral acrylic peel-and-stick adhesive with white, silver, or black facing as indicated.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following. Where a specific manufacturer is listed in the Drawings, this shall be considered the Basis-of-Design.
 - a. 3M; VentureClad.
 - b. Polyguard Products, Inc.; Alumaguard 60.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation in accordance with manufacturers' instructions.
- B. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.
- C. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system.
- D. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- E. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- F. Install multiple layers of insulation with longitudinal and end seams staggered.
- G. Keep insulation materials dry during application and finishing. Mineral fiber insulation that is or has been wet shall be removed from the job site.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
1. Install insulation continuously through hangers and around anchor attachments.
 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 4. Cover inserts with jacket material matching adjacent insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
1. Draw jacket tight and smooth.
 2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of

- strip, spaced 4 inches on center
- 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches on center
 - a. For below ambient services, apply vapor-barrier mastic over staples.
- 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
- 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation to less than 75 percent of its nominal thickness.
- N. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.4 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
 - 1. Seal penetrations with flashing sealant.
 - 2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - 3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
 - 4. Seal jacket to roof flashing with flashing sealant.
- B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
 - 1. Seal penetrations with flashing sealant.
 - 2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
 - 4. Seal jacket to wall flashing with flashing sealant.
- C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.
- E. Insulation Installation at Floor Penetrations:
 - 1. Duct: For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct

- insulation. Overlap damper sleeve and duct insulation at least 2 inches.
2. Seal penetrations through fire-rated assemblies.

3.5 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

- A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation.

3.6 INSTALLATION OF MINERAL-FIBER INSULATION

- A. Blanket or Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
 1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 50 percent coverage of duct and plenum surfaces.
 2. Apply adhesive to all surfaces of ducts, fittings, and transitions.
 3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches on center
 - b. On duct sides with dimensions larger than 18 inches, place pins 16 inches on center each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
 - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - d. Do not over compress insulation during installation.
 - e. Impale insulation over pins and attach speed washers.
 - f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
 4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with outward-clinching staples, 1 inch on center. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
 - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
 - b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.
 5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches on center.
 6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. For board insulation, groove and score insulation to fit to outside and inside radii of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
 7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of

stiffener, hanger, and flange with pins spaced 6 inches on center.

3.7 FIELD-APPLIED JACKET INSTALLATION

- A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.
 - 1. Draw jacket smooth and tight to surface with 2-inch overlap at seams and joints.
 - 2. Embed glass cloth between two 0.062-inch-thick coats of lagging adhesive.
 - 3. Completely encapsulate insulation with coating, leaving no exposed insulation.
- B. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches on center and at end joints.

3.8 FIRE-RATED INSULATION SYSTEM INSTALLATION

- A. Where fire-rated insulation system is indicated, secure system to ducts and duct hangers and supports to maintain a continuous fire rating.
- B. Insulate duct access panels and doors to achieve same fire rating as duct.
- C. Install firestopping at penetrations through fire-rated assemblies.

3.9 FINISHES

- A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in painting specifications.
 - 1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
 - a. Finish Coat Material: Interior, flat, latex-emulsion size.
- B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.
- C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
- D. Do not field paint aluminum or stainless-steel jackets.

3.10 INDOOR DUCT INSULATION SCHEDULE

- A. Supply air, concealed from view, round or oval, duct insulation:
 - 1. Flexible Elastomeric: 2 inches thick.
 - 2. Mineral-Fiber Blanket: 2 inches thick and 0.75-lb/cu. ft. nominal density.
 - 3. Mineral-Fiber Board: 2 inches thick and 2-lb/cu. ft. nominal density.
- B. Supply air, exposed to view in unfinished space, round or oval, duct insulation:
 - 1. Flexible Elastomeric: 2 inches thick.
 - 2. Mineral-Fiber Blanket: 2 inches thick and 0.75-lb/cu. ft. nominal density.
 - 3. Mineral-Fiber Board: 2 inches thick and 2-lb/cu. ft. nominal density.
- C. Supply air, exposed to view in finished space, round or oval, duct insulation:

1. Flexible Elastomeric: 2 inches thick with 20 mil PVC jacket.
 2. Mineral-Fiber Blanket: 2 inches thick and 0.75-lb/cu. ft. nominal density with 20 mil PVC jacket.
 3. Mineral-Fiber Board: 2 inches thick and 2-lb/cu. ft. nominal density with 20 mil PVC jacket.
- D. Supply air, concealed from view, rectangular, duct insulation:
1. Flexible Elastomeric: 2 inches thick.
 2. Mineral-Fiber Blanket: 2 inches thick and 0.75-lb/cu. ft. nominal density.
 3. Mineral-Fiber Board: 2 inches thick and 2-lb/cu. ft. nominal density.
- E. Supply air, exposed to view in unfinished space, rectangular, duct insulation:
1. Flexible Elastomeric: 2 inches thick.
 2. Mineral-Fiber Blanket: 2 inches thick and 1.5-lb/cu. ft. nominal density.
 3. Mineral-Fiber Board: 2 inches thick and 3-lb/cu. ft. nominal density.
- F. Supply air, exposed to view in finished space, rectangular, duct insulation:
1. Flexible Elastomeric: 2 inches thick with 20 mil PVC jacket.
 2. Mineral-Fiber Blanket: 2 inches thick and 1.5-lb/cu. ft. nominal density with 20 mil PVC jacket.
 3. Mineral-Fiber Board: 2 inches thick and 3-lb/cu. ft. nominal density with 20 mil PVC jacket or finish-painted ASJ.
- G. Return air or exhaust air, concealed from view, round or oval, duct insulation:
1. Flexible Elastomeric: 2 inches thick.
 2. Mineral-Fiber Blanket: 2 inches thick and 0.75-lb/cu. ft. nominal density.
 3. Mineral-Fiber Board: 2 inches thick and 2-lb/cu. ft. nominal density.
- H. Return air or exhaust air, exposed to view in unfinished space, round or oval, duct insulation:
1. Flexible Elastomeric: 2 inches thick.
 2. Mineral-Fiber Blanket: 2 inches thick and 0.75-lb/cu. ft. nominal density.
 3. Mineral-Fiber Board: 2 inches thick and 2-lb/cu. ft. nominal density.
- I. Return air or exhaust air, concealed from view, rectangular, duct insulation:
1. Flexible Elastomeric: 2 inches thick.
 2. Mineral-Fiber Blanket: 2 inches thick and 0.75-lb/cu. ft. nominal density.
 3. Mineral-Fiber Board: 2 inches thick and 2-lb/cu. ft. nominal density.
- J. Return air or exhaust air, exposed to view in unfinished space, rectangular, duct insulation:
1. Flexible Elastomeric: 2 inches thick.
 2. Mineral-Fiber Blanket: 2 inches thick and 1.5-lb/cu. ft. nominal density.
 3. Mineral-Fiber Board: 2 inches thick and 3-lb/cu. ft. nominal density.
- K. Return air or exhaust air to ERV, exposed to view in finished space, rectangular, duct insulation:
1. Flexible Elastomeric: 2 inch thick with 20 mil PVC jacket.
 2. Mineral-Fiber Board: 2 inch thick and 3-lb/cu. ft. nominal density with 20 mil PVC jacket or finish-painted ASJ.
- L. Relief air or transfer air, any indoor location, duct insulation: None unless lined for acoustics.
- M. Outdoor air or combustion air, concealed from view, round or oval, duct insulation:
1. Flexible Elastomeric: 2 inches thick.

2. Mineral-Fiber Blanket: 2 inches thick and 0.75-lb/cu. ft. nominal density.
 3. Mineral-Fiber Board: 2 inches thick and 2-lb/cu. ft. nominal density.
- N. Outdoor air or combustion air, exposed to view in unfinished space, round or oval, duct insulation:
1. Flexible Elastomeric: 2 inches thick.
 2. Mineral-Fiber Blanket: 2 inches thick and 0.75-lb/cu. ft. nominal density.
 3. Mineral-Fiber Board: 2 inches thick and 2-lb/cu. ft. nominal density.
- O. Outdoor air or combustion air, exposed to view in finished space, round or oval, duct insulation:
1. Flexible Elastomeric: 2 inches thick with 20 mil PVC jacket.
 2. Mineral-Fiber Blanket: 2 inches thick and 0.75-lb/cu. ft. nominal density with 20 mil PVC jacket.
 3. Mineral-Fiber Board: 2 inches thick and 2-lb/cu. ft. nominal density with 20 mil PVC jacket.
- P. Outdoor air or combustion air, concealed from view, rectangular, duct insulation:
1. Flexible Elastomeric: 2 inches thick.
 2. Mineral-Fiber Blanket: 2 inches thick and 0.75-lb/cu. ft. nominal density.
 3. Mineral-Fiber Board: 2 inches thick and 2-lb/cu. ft. nominal density.
- Q. Outdoor air or combustion air, exposed to view in unfinished space, rectangular, duct insulation:
1. Flexible Elastomeric: 2 inches thick.
 2. Mineral-Fiber Blanket: 2 inches thick and 1.5-lb/cu. ft. nominal density.
 3. Mineral-Fiber Board: 2 inches thick and 3-lb/cu. ft. nominal density.
- R. Outdoor air or combustion air, exposed to view in finished space, rectangular, duct insulation:
1. Flexible Elastomeric: 2 inches thick with 20 mil PVC jacket.
 2. Mineral-Fiber Blanket: 2 inches thick and 1.5-lb/cu. ft. nominal density with 20 mil PVC jacket.
 3. Mineral-Fiber Board: 2 inches thick and 3-lb/cu. ft. nominal density with 20 mil PVC jacket or finish-painted ASJ.

END OF SECTION

SECTION 23 31 13
METAL DUCTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Sheet metal ducts and fittings.
 - 2. Sheet metal materials.
 - 3. Duct liner.
 - 4. Rectangular duct connection systems.
 - 5. Sealants and gaskets.
 - 6. Hangers and supports.
- B. Related Requirements
 - 1. ANSI/SMACNA 006-2006 (SMACNA 006) HVAC Duct Construction Standards – Metal and Flexible Third Edition. All ductwork shall be in conformance with this standard.
 - 2. Structural Performance: Duct hangers, supports, and seismic restraints (where applicable) shall withstand the effects of gravity, wind, and seismic loads and stresses within limits and under conditions described in SMACNA 006, ASCE/SEI 7, and local requirements.
 - 3. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

1.2 SYSTEM DESCRIPTION

- A. Duct system design, as indicated, has been used to select size and type of air-moving and distribution equipment and other air system components. Changes to layout or configuration of duct system must be specifically approved in writing by the Architect/Engineer. Accompany requests for layout modifications with calculations showing the proposed layout will provide original design results without increasing system total pressure.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data: For each type of the following products:
 - a. Prefabricated ductwork and fittings.
 - b. Liners and adhesives.
 - c. Rectangular duct connection systems.
 - d. Sealants and gaskets.
 - 2. Shop Drawings:
 - a. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
 - b. Fittings, including details of construction.
 - c. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.

- d. Elevations of top and bottom of ducts along with applicable elevations of structural elements.
 - e. Dimensions of main duct runs from building grid lines.
 - f. Reinforcement and spacing.
 - g. Duct material and gauge thickness by pressure class.
 - h. Seam and joint construction.
 - i. Penetration details through fire-rated, smoke barriers and other rated partitions.
 - j. Equipment installation based on equipment being utilized on this project.
 - k. Duct accessories, including dampers, turning vanes, and duct access doors.
 - l. Length of application of acoustic duct liner where it will be applied.
 - m. Hangers and supports, including methods for duct and building attachment, seismic restraints, and vibration isolation.
 - n. Other systems installed in the same space as ducts where order of installation affects access.
 - o. Ceiling and wall mounted access doors and panels required to provide access to dampers, controls and other operating devices.
 - p. Ceiling mounted items, including light fixtures, diffusers, grilles, speakers, smoke detectors, sprinklers, other electrical devices, equipment and building structural members.
 - q. On each drawing, include a tabular list of each fan system's ductwork represented on that drawing and the total square foot surface area of each fan's duct system illustrated on the drawing.
 - r. Shop drawings shall be submitted prior to the fabrication or installation of the ductwork and serve as the foundation for coordination between various trades to maintain required ceiling heights.
3. Field Test Reports: Written reports of tests specified in Part 3 of this Section. Include the following:
- a. Test procedures used.
 - b. Test results that comply with requirements.
 - c. Failed test results and corrective action taken to achieve requirements.
- B. Leakage Testing Documentation: Contractor shall submit a written report to the authority having jurisdiction in which ducts designed at static pressures more than 3" wg pressure class have been leak tested and that the air leakage class is less than 6.0 per the Energy Code. Provide duplicate submittal to the Owner and the Engineer.

1.4 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for steel hangers and supports.
 - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum hangers and supports.
 - 3. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
- B. NFPA Compliance: Applicable requirements in:
 - 1. NFPA 90A.
 - 2. NFPA 90B.
 - 3. NFPA 96.
- C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1.
- D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Damage: Handle, transport, and store ducts to avoid damage. Damaged ductwork is not acceptable.
- B. Protection: Protect ducts from mechanical damage, weather, and exposure to chemicals (including road salt). Do not permit insulation materials to get wet under any circumstances. Remove insulation that is or has been wet from the project site, and replace the insulation with undamaged new materials.
- C. Ductwork and associated components shall be stored on blocking in a clean dry area to prevent damage and to prevent the entrance of dirt, debris, foreign matter and moisture.
- D. Ductwork shall be adequately supported during storage to prevent sagging or bending.
- E. Provide temporary storage, delivery and handling in accordance with SMACNA Duct Cleanliness for New Construction Guidelines, Intermediate Level.

PART 2 PRODUCTS

2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA 006 based on indicated static-pressure class. The figure numbers below reference that standard.
 - 1. Transverse Joint: Figure 2-1.
 - 2. Longitudinal Seam: Figure 2-2.
 - 3. Pressure Class Gage and Reinforcement: Table 2-1 through Table 2-52 and Figure 2-3 through Figure 2-18.
 - 4. Elbow: Figure 4-2 (Use the following types only unless specifically approved by the Engineer.):
 - a. Type RE 1 (radius elbow).
 - b. Type RE 2 (square throat elbow with turning vanes).
 - c. Type RE 3 (radius elbow with vanes).
 - d. Type RE 5 (dual radius elbow).
 - e. Type RE 6 (mitered elbow without turning vanes) only for angles not greater than 45 degrees.
 - 5. Turning Vanes: Figures 4-3 and 4-4. Figure 4-9 short radius vanes in accordance with Chart 4-1 are acceptable.
 - 6. Branch Connection:
 - a. Diverging Flow: Figure 4-5 (all types). Figure 4-6 (following types only):
 - 1) 45-degree entry to rectangular branch.
 - 2) 45-degree lead-in to round branch.
 - 3) Conical connection.
 - 4) Bellmouth connection.
 - 5) Conical or bellmouth spin-in fitting only for pressure class 2" WG or less.
 - b. Converging Flow: Figure 4-5 (all types) and Figure 4-6 (all types). Conical or bellmouth spin-in fitting is acceptable only for pressure class 2" WG or less.
 - 7. Offset, Transition, or Obstruction: Figure 4-7 (all types) and Figure 4-8 (Figure B and C). Do not use Figure 4-8 Figure A (pipe through duct), Figure D (mitered offsets around obstruction, or Figure E (split duct around obstruction) unless specifically approved by the Engineer.

2.2 SINGLE-WALL ROUND OR FLAT-OVAL DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA 006 Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following. Where a specific manufacturer is listed in the Drawings, this shall be considered the Basis-of-Design.
 - a. Eastern Sheet Metal.
 - b. FlaktGroup SEMCO.
 - c. Lindab Inc.
 - d. McGill AirFlow LLC.
 - e. Sheet Metal Connectors, Inc.
 - 2. Transverse Joint: Figure 3-1 (all types).
 - 3. Longitudinal Seam: Figure 3-2 (all types). Do not use type RL-5 (grooved seam pipe lock or flat lock), RL-6 (snaplock), RL-7 (snaplock), or RL-8 (snaplock) seam for duct over 1" WG pressure class. Fabricate round duct larger than 90-inch diameter with butt-welded longitudinal seam.
 - 4. Pressure Class Gage and Reinforcement: Table 3-2 through Table 3-15 and Figure 3-3.
 - 5. Elbow: Figure 3-4. Use centerline radius of 1.5 diameters for each elbow unless space constraints prevent a radius that large; in that event, the radius may be reduced to that indicated in Table 3-1 with mitered segments. If space constraints prevent a radius as large as indicated in Table 3-1, a mitered elbow with turning vanes similar to Figure 4-3 and Figure 4-4 may be used. Do not use an adjustable elbow for duct over 1" WG pressure class.
 - 6. Branch Connection with Diverging or Converging Flow: Figure 3-5 and Figure 3-6. All types are acceptable for pressure class 2" WG or less duct. For pressure class 3" WG or more duct, use 90-degree tee fitting with oval-to-round tap, 45-degree lateral fitting, conical fitting, or wye fitting. Reducers may be incorporated into the fitting. Use only factory-fabricated fittings, not saddles or field-fabricated taps, for pressure class 3" WG or more duct.
 - 7. Offset, Transition, or Obstruction: Figure 4-7 and Figure 4-8 modified for round or flat oval duct. Do not use Figure 4-8 Figure A (pipe through duct), Figure D (mitered offsets around obstruction), or Figure E (split duct around obstruction) unless specifically approved by the Engineer.
 - 8. Flat Oval: Figure 3-7 and applicable figures for equivalent round duct.

2.3 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA 006 for material thicknesses and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G90 unless otherwise indicated.
 - 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. Aluminum Sheets: Comply with ASTM B 209 Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.
- D. Reinforcement Shapes and Plates:
 - 1. Steel Duct: ASTM A 36/A 36M, steel plates, shapes, and bars; black or galvanized.

2. Aluminum Duct: ASTM B209 alloy 6061-T6 members or steel members isolated from the aluminum with butyl rubber, neoprene, or EPDM gasket materials.
 3. Other Duct Materials: Reinforcement materials compatible with the duct materials at contact points.
- E. Tie Rods: Materials compatible with duct materials. Galvanized steel or stainless steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.4 DUCT LINER

- A. Fibrous-Glass Duct Liner: Comply with ASTM C 1071, NFPA 90A, and NAIMA AH124.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following. Where a specific manufacturer is listed in the Drawings, this shall be considered the Basis-of-Design.
 - a. Owens Corning.
 - b. CertainTeed Corporation: Insulation Group.
 - c. Johns Manville.
 - d. Knauf Insulation.
 2. Maximum Thermal Conductivity:
 - a. Type I, Flexible: 0.27 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
 - b. Type II, Rigid: 0.23 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
 3. Antimicrobial Erosion-Resistant Coating: Apply to the surface of the liner that will form the interior surface of the duct to act as a moisture repellent and erosion-resistant coating. Antimicrobial compound shall be tested for efficacy and registered by the EPA for use in HVAC systems.
 4. Surface-Burning Characteristics: Flame-spread index no greater than 25 and smoke-developed index no greater than 50 when tested according to UL 723; certified by a nationally recognized testing laboratory.
 5. Water-Based Liner Adhesive: Comply with NFPA 90A and with ASTM C 916.
 - a. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Flexible Elastomeric Duct Liner: Preformed, cellular, closed-cell, sheet materials complying with ASTM C 534, Type II, Grade 1; and with NFPA 90A.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following. Where a specific manufacturer is listed in the Drawings, this shall be considered the Basis-of-Design.
 - a. Aeroflex USA Inc.
 - b. Armacell LLC.
 - c. Rubatex International, LLC.
 2. Maximum Thermal Conductivity: 0.27 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
 3. Surface-Burning Characteristics: Flame-spread index no greater than 25 and smoke-developed index no greater than 50 when tested according to UL 723; certified by a nationally recognized testing laboratory.
 4. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A. For indoor applications, adhesive with a VOC content of 50 g/L or less when

calculated according to 40 CFR 59, Subpart D (EPA Method 24). complying with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

- C. Insulation Pins and Washers:
 - 1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- or 0.135-inch diameter shank, length to suit depth of insulation indicated with integral galvanized carbon-steel washer.
 - 2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick galvanized steel, aluminum, or stainless steel (as appropriate); with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
- D. Shop Application of Duct Liner: Comply with SMACNA 006 Figure 7-11, "Flexible Duct Liner Installation."
 - 1. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
 - 2. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
 - 3. Butt transverse joints without gaps, and coat joint with adhesive.
 - 4. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
 - 5. Do not install liner in rectangular ducts with longitudinal liner joints at locations other than corners of ducts, unless duct size and dimensions of standard liner make longitudinal joints necessary.
 - 6. Apply adhesive coating on longitudinal seams.
 - 7. Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 inches transversely; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.
 - 8. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:
 - a. Fan discharges.
 - b. Lined duct following unlined duct.
 - c. Upstream edges of transverse joints in ducts where air velocities are 2500 fpm or more.
 - d. Other locations as indicated.
 - 9. Terminate liner with buildouts (metal hat sections) at dampers, turning vane assemblies, or other devices. Secure buildouts to duct walls with bolts, screws, rivets, or welds.

2.5 RECTANGULAR DUCT CONNECTION SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following. Where a specific manufacturer is listed in the Drawings, this shall be considered the Basis-of-Design.
 - 1. Ductmate Industries, Inc.
 - 2. Hart & Cooley, Inc. Ward Industries.
 - 3. McGill Airflow LLC.
- B. Connection System: Rectangular duct transverse joint connection, reinforcement, and sealing system with roll-formed metal flanges, metal corner pieces, sealants, gaskets, and cleats.

2.6 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a flame-spread index no greater than 25 and a smoke-developed index no greater than 50 when tested according to UL 723; certified by a nationally recognized testing laboratory.
- B. Two-Part Tape Sealing System:
 - 1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
 - 2. Sealant: Modified styrene acrylic.
 - 3. Water resistant.
 - 4. Mold and mildew resistant.
 - 5. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
 - 6. Service: Indoor and outdoor.
 - 7. Service Temperature: Minus 40 to plus 200 deg F.
 - 8. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
 - 9. For indoor applications, sealant with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24). For school projects, sealant complying with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Water-Based Joint and Seam Sealant:
 - 1. Application Method: Brush on.
 - 2. Solids Content: Minimum 65 percent.
 - 3. Shore A Hardness: Minimum 20.
 - 4. Water resistant.
 - 5. Mold and mildew resistant.
 - 6. VOC: Maximum 75 g/L (less water).
 - 7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
 - 8. Service: Indoor or outdoor.
 - 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
- D. Flanged Joint Sealant: Comply with ASTM C 920.
 - 1. General: Single-component, acid-curing, silicone, elastomeric.
 - 2. Type: S.
 - 3. Grade: NS.
 - 4. Class: 25.
 - 5. Use: O.
 - 6. For indoor applications, sealant with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24). For school projects, sealant complying with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

- F. Round Duct Joint O-Ring Seals:
 - 1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg static-pressure class, positive or negative.
 - 2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
 - 3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.7 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts or other materials compatible with duct materials.
- B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods; galvanized rods with threads painted with zinc-chromate primer after installation; or stainless steel all-thread rods and nuts.
- C. Strap and Rod Sizes: Comply with SMACNA 006 Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
- D. Cables:
 - 1. Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.
 - 2. Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.
 - 3. End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- E. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- F. Trapeze and Riser Supports: Structural shapes and plates of materials compatible with duct materials and environmental conditions. Support material shall match duct construction material.

PART 3 EXECUTION

3.1 DUCT INSTALLATION GENERAL REQUIREMENTS

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction losses for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings or Coordination Drawings.
- B. Install ducts according to SMACNA 006 unless otherwise indicated.
- C. Unless otherwise indicated, install ducts vertically plumb or horizontally level, and parallel and perpendicular to building lines. Avoid diagonal runs to maximum extent possible.
- D. Install ducts with a minimum clearance of 2 inch plus allowances for insulation thickness and access requirements.
- E. Cable hangers may only be used on low pressure (2" wg construction and lower) round spiral ductwork which is not insulated and has a diameter 10" or less. Utilize the double lock method such that the lower loop is clinched tight to the ductwork and the cable is vertical. Utilize

manufacturer's top attachment device.

- F. Provide duct offsets needed to avoid interferences with structure, finishes, piping, other ducts, conduit, etc. Coordinate the work with all trades to minimize such offsets. Install ducts with fewest joints possible.
- G. Do not penetrate ducts with conduit or piping.
- H. Seal all joints and seams. Apply sealant to male end connectors before insertion, and afterward to cover entire joint and sheet metal screws.
- I. Secure couplings with sheet metal screws. Install screws at maximum intervals of 12", with a minimum of 3 screws in each round metallic duct coupling.
- J. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections. Do not field-cut taps for branch connections in ducts with SMACNA pressure class magnitude more than 2 in wg.
- K. Install round or flat-oval ducts in maximum practical lengths to minimize joints.
- L. Do not install any duct in an electrical equipment room unless that duct serves that room.
- M. Do not install any duct in an elevator equipment room unless that duct serves that room.
- N. Do not install any duct over an electrical transformer, electrical switchgear, or an electrical panel unless approved in writing by the Engineer.
- O. Maintain clearances required in the National Electric Code for electrically-powered items.
- P. Where ducts pass through interior partitions or exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal type and thickness as the duct. Overlap openings on all sides by at least 1-1/2 inches.
- Q. Where ducts pass through fire-rated partitions, install fire dampers unless otherwise indicated. Comply with requirements in other Division 23 Sections for fire dampers.
- R. Where ducts pass through smoke partitions, install smoke dampers unless otherwise indicated. Comply with requirements in other Division 23 Sections for smoke dampers.
- S. Install ductwork takeoffs at smoke dampers such that there is a minimum of 24" between the damper and the start of the first takeoff.
- T. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

3.2 INSTALLATION OF EXPOSED DUCTWORK

- A. Protect ducts that are to be exposed in finished spaces from damage including dents, surface scratches, and markings. Exposed ducts must be undamaged and present a clean, neat appearance in materials and workmanship.
- B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system in finished spaces.

- C. Grind welds to provide smooth surfaces free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.
- D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets and inlets.
- E. Repair or replace ducts that do not comply with these requirements.

3.3 ADDITIONAL INSTALLATION REQUIREMENTS FOR TYPE 1 COMMERCIAL KITCHEN HOOD EXHAUST DUCT

- A. Install commercial kitchen hood exhaust ducts without dips and traps that may hold grease, and sloped a minimum of 2 percent to drain grease back to the hoods.
- B. Install fire-rated access panel assemblies at each change in direction, at maximum intervals of 12 feet in horizontal ducts, at every floor penetration in vertical ducts, and elsewhere as indicated on Drawings. Locate access panel on top or side of duct a minimum of 1-1/2 inches from bottom of duct.
- C. Do not penetrate fire-rated assemblies except as allowed by applicable building codes and authorities having jurisdiction.

3.4 DUCT SEALING

- A. In accordance with ASHRAE 90.1, seal all ducts to SMACNA 006 seal class A with all transverse joints, longitudinal seams, and duct wall penetrations sealed. Seal openings for rotating shafts (including dampers) with bushings or other devices. However, do not seal an opening if sealing the opening would void a manufacturer's listing. Spiral lock seams in round or flat oval ducts do not require sealing unless leakage is detected.

3.5 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA 006 Chapter 5, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - 1. Where practical, install concrete inserts before placing concrete.
 - 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 - 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
 - 4. Do not use powder-actuated concrete fasteners for seismic restraints.
- C. Hanger Spacing: Comply with SMACNA 006 Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports. Other types of hangers may be used if so indicated or if approved by Engineer.
- E. Vertical Ducts: Support vertical ducts with steel angles or channel secured to the sides of the ducts with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at

maximum intervals of 16 feet.

- F. Upper Attachments: Install upper attachments secured to structural members. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials. Do not attach duct supports to roof decks.

3.6 CONNECTIONS

- A. Make connections to motorized equipment with flexible connectors complying with other Division 23 Sections. Comply with SMACNA 006 for branch, outlet, inlet, and terminal unit connections.

3.7 PAINTING

- A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a primer compatible with the duct material.

3.8 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Leakage Tests:
 - 1. Comply with SMACNA "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
 - 2. Test ductwork sections that have a design static pressure class magnitude of 4-inch wg or more regardless of duct locations. Test representative duct sections totaling no less than 25 percent of total installed duct area. Obtain Engineer's approval of specific sections to be tested beforehand.
 - 3. Test all ductwork located outdoors.
 - 4. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
 - 5. Test for leaks before applying external insulation.
 - 6. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
 - 7. Give at least seven days notice for testing.
 - 8. Tests must demonstrate that tested ducts meet SMACNA leakage class 4 or less. If any tested section of ductwork fails to meet this requirement, perform the following at no additional cost to the Owner:
 - a. Leak test 100 percent of the ductwork in every duct system with any failed section.
 - b. Provide additional sealing of ductwork to eliminate excessive leakage in failed sections. If necessary, replace duct sections.
 - c. Retest 100 percent of the ductwork in every duct system with any failed section.
 - d. Continue sealing and retesting until the entire system is proven to meet the leakage requirement. Note that once a section is proven to meet the leakage requirement that section does not need to be tested again unless it is damaged later.
- C. Duct System Cleanliness Tests:
 - 1. Visually inspect duct system to ensure that no visible contaminants are present.
- D. Duct system will be considered defective if it does not pass tests and inspections.

- E. Prepare test and inspection reports.

3.9 DUCT CLEANING

- A. Clean duct system(s) before testing, adjusting, and balancing in accordance with other Division 23 Sections.

3.10 DUCT CONSTRUCTION REQUIREMENTS

- A. Fabricate ducts with materials, pressure classes, and insulations indicated on Drawings.

END OF SECTION

SECTION 23 33 00
AIR DUCT ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Manual volume dampers.
 - 2. Ceiling radiation dampers.
 - 3. Flange connectors.
 - 4. Turning vanes.
 - 5. Duct-mounted access doors.
 - 6. Duct access panel assemblies.
 - 7. Flexible connectors.
 - 8. Duct accessory hardware.

1.2 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data: For each type of product.
 - a. For ceiling dampers include installation instructions.
- B. Closeout Submittals:
 - 1. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.
- C. Maintenance Material Submittals:
 - 1. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 2. Fusible Links: Furnish quantity equal to at least 10 percent of amount installed.

PART 2 PRODUCTS

2.1 ASSEMBLY DESCRIPTION

- A. Comply with NFPA 90A and NFPA 90B.
- B. Comply with SMACNA 006 for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.2 MATERIALS

- A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G90.
 - 2. Exposed-Surface Finish: Mill phosphatized.

- B. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304 or Type 316 as indicated. Unless indicated otherwise, No. 2 finish for concealed ducts and No. 4 finish for exposed ducts.
- C. Aluminum Sheets: Comply with ASTM B 209, Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.
- D. Extruded Aluminum: Comply with ASTM B 221, Alloy 6063, Temper T6.
- E. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- F. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 MANUAL VOLUME DAMPERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following. Where a specific manufacturer is listed in the Drawings, this shall be considered the Basis-of-Design.
 - 1. Ruskin Company.
 - 2. American Warming and Ventilating.
 - 3. Greenheck Fan Corporation.
 - 4. McGill Airflow LLC.
 - 5. Nailor Industries Inc.
 - 6. Pottorff.
 - 7. Safe Air – Dowco Products.
 - 8. Vent Products Co., Inc.
- B. Round Manual Volume Damper: Diameter 20 inches or less, air velocity 1500 fpm or less, and duct static pressure class 2-inch or less. Galvanized steel sleeve with reinforcing beads. Single galvanized steel blade on axle with molded synthetic bearing at each end of axle and locking quadrant on standoff bracket. Basis of design Ruskin MDRS25.
- C. Round or Oval Manual Volume Damper: Diameter 48 inches or less, air velocity 4000 fpm or less, and duct static pressure class 10-inch or less. Galvanized steel construction for galvanized steel duct. Type 304 stainless steel construction for type 304 stainless steel or aluminum duct. Type 316 stainless steel construction for type 316 stainless steel duct. Rolled hat channel frame arranged for slip-in mounting. Single blade (or dual blades with center mullion for oval duct over 36 inches wide). Neoprene blade edge seals. Class II leakage rating. Blade mounted on axle with stainless steel sleeve bearing at each end of axle and locking quadrant on standoff bracket. Basis of design Ruskin CDR25 or CDO25.
- D. Rectangular Manual Volume Damper: Height 12 inches or less, air velocity 1500 fpm or less, and duct static pressure class 1-inch or less. Galvanized steel sleeve with blade stop. Single galvanized steel blade on axle with molded synthetic bearings and locking quadrant on standoff bracket. Basis of design Ruskin MD25.
- E. Rectangular Manual Volume Dampers: Height 5 inches or more, air velocity 1500 fpm or less., and duct static pressure class 3-inch or less. Galvanized steel hat channel frame with mitered and welded corners and blade stop. Flanged for attaching to wall and flangeless for installing in duct. Multiple single-thickness formed galvanized steel blades with opposed blade linkage enclosed in frame. Blades mounted on axles with molded synthetic bearings. Control shaft extended beyond frame with locking quadrant on standoff bracket. Basis of design Ruskin

MD35.

2.4 CEILING RADIATION DAMPERS

1. Ruskin Company CFD series.
 2. American Warming and Ventilating.
 3. Nailor Industries Inc.
 4. Pottorff.
 5. Safe Air – Dowco Products.
- B. General Requirements:
1. Labeled according to UL 555C.
 2. Comply with construction details for tested floor- and roof-ceiling assemblies as indicated in UL's "Fire Resistance Directory."
- C. Frame: Galvanized sheet steel, round or rectangular, style to suit ceiling construction.
- D. Blades: Galvanized sheet steel with refractory insulation.
- E. Heat-Responsive Device: Replaceable, 165 deg F or 212 deg F rated, fusible links.
- F. Fire Rating: 1, 2, or 3 hours as indicated.

2.5 FLANGE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following. Where a specific manufacturer is listed in the Drawings, this shall be considered the Basis-of-Design.
1. Ductmate Industries, Inc.
 2. Ward Industries; a brand of Hart & Cooley, Inc.
- B. Description: Add-on, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.
- C. Material: Galvanized steel.
- D. Gage and Shape: Match connecting ductwork.

2.6 TURNING VANES

- A. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.
- B. Manufactured Turning Vanes for Nonmetal Ducts: Fabricate curved blades of resin-bonded fiberglass with acrylic polymer coating; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
- C. General Requirements: Comply with SMACNA 006.
- D. Vane Construction: Single wall for vanes up to 48 inches wide and double wall for larger dimensions.

2.7 DUCT-MOUNTED ACCESS DOORS

- A. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA 006. Double wall, rectangular door. Galvanized sheet steel with insulation fill and thickness as indicated for duct pressure class. Butt or piano hinges and cam locks, quantities as indicated in SMACNA 006. Doors airtight and suitable for duct pressure class. Galvanized sheet steel frame with bend-over tabs and foam gaskets. Vision panel where indicated.
- B. Pressure Relief Access Door: Door and frame of galvanized sheet steel. Double wall door with insulation fill and metal thickness applicable for duct pressure class. Open outward for positive-pressure duct and inward for negative-pressure duct. Factory set at 3.0-inch to 8.0-inch wg positive or negative. Door retaining device. Neoprene or foam rubber seal.

2.8 DUCT ACCESS PANEL ASSEMBLIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following. Where a specific manufacturer is listed in the Drawings, this shall be considered the Basis-of-Design.
 - 1. Ductmate Industries, Inc.
 - 2. Approved equal.
- B. Labeled according to UL 1978. Double-wall panel with two layers of steel, minimum 11 gage (0.12-inch thick) carbon or 11 gage (0.13-inch) stainless, steel type to match duct material. Carbon or stainless steel panel fasteners welded to inner wall and attached by threaded fasteners to outer wall. Fasteners shall not penetrate duct wall. Gasket complying with NFPA 96; grease-tight and airtight, high-temperature ceramic fiber, rated for minimum 2000 deg F. Minimum pressure rating 10-inch wg, positive or negative.

2.9 FLEXIBLE CONNECTORS

- A. Materials: Flame-retardant or noncombustible fabrics.
- B. Coatings and Adhesives: Comply with UL 181, Class 1.
- C. Metal-Edged Connectors: Fabricated with a fabric strip 5-3/4 inches wide attached to two strips of 2-3/4-inch-wide, 0.028-inch-thick, galvanized sheet steel or 0.032-inch-thick aluminum sheets. Provide metal compatible with connected ducts.
- D. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene. Minimum weight 26 oz./sq. yd. Minimum tensile strength 480 lbf/inch in the warp and 360 lbf/inch in the filling. Service temperature range minus 40 to plus 200 deg F.
- E. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone. Minimum weight 24 oz./sq. yd. Tensile strength 530 lbf/inch in the warp and 440 lbf/inch in the filling. Service temperature range minus 50 to plus 250 deg F.

2.10 DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.

- B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install duct accessories in accordance with manufacturers' instructions.
- B. Install duct accessories according to applicable details in SMACNA 006 for metal ducts and in NAIMA AH116 for fibrous-glass ducts.
- C. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
- D. Compliance with ASHRAE/IESNA 90.1 restricts the use of backdraft dampers, and requires control dampers for certain applications. Install backdraft or control damper (as indicated) at inlet of exhaust fan or in exhaust duct close to exhaust fan unless otherwise indicated.
- E. Install volume dampers only in ducts constructed to magnitude 2" pressure class or less. Provide at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
- F. Set each damper fully open position before testing, adjusting, and balancing.
- G. Install test holes at fan inlets and outlets and elsewhere as indicated.
- H. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
 - 1. On both sides of duct coil.
 - 2. Upstream and downstream from duct filter.
 - 3. At outdoor-air intake and mixed-air plenum.
 - 4. At drain pan.
 - 5. Downstream from manual volume damper, control damper, backdraft damper, and equipment.
 - 6. Upstream and downstream from duct silencer.
 - 7. At each control device requiring inspection.
 - 8. Elsewhere as indicated.
- I. Install access door with swing against duct static pressure.
- J. Access Door Sizes:
 - 1. One-Hand or Two-Hand Access: 12 by 12 inches.
 - 2. Head and Hand Access: 18 by 12 inches.
 - 3. Head and Shoulders Access: 24 by 18 inches.
 - 4. Body Access: 30 by 18 inches.
 - 5. Body plus Ladder Access: 30 by 30 inches.
 - 6. Where duct width does not permit door size specified above, one dimension of door size may be reduced to 2 inches less than duct width.

- K. Label access door as specified in another Division 23 Section to indicate the purpose of the access door.
- L. Install flexible connectors to connect ducts to equipment. If vibrating equipment is internally isolated from casing, provide rigid duct connections.
- M. For fan developing static pressure of 5-inch wg or more, cover flexible connector with loaded vinyl sheet held in place with metal straps.
- N. Connect terminal unit to supply ductwork directly or with maximum 12-inch length of flexible duct. Do not use flexible duct to change directions or to correct misalignment of duct and terminal unit inlet.
- O. Connect diffuser or register to duct directly or with maximum 60-inch length of flexible duct clamped or strapped in place.
- P. Connect flexible duct to metal duct with liquid adhesive plus tape.
- Q. Install duct test hole where required for testing and balancing purposes.

3.2 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Operate each damper to verify full range of movement.
 - 2. Inspect locations of access doors and verify that purpose of access door can be performed and that door can open fully.
 - 3. Inspect turning vanes for proper and secure installation.
 - 4. Operate remote damper operator to verify full range of movement of operator and damper.

END OF SECTION

SECTION 23 33 46
FLEXIBLE DUCTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Insulated flexible ducts.

1.2 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data: For each type of product.
 - 2. Shop Drawings: For flexible ducts. Include plans showing locations and mounting and attachment details.

PART 2 PRODUCTS

2.1 ASSEMBLY DESCRIPTION

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with SMACNA 006 "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- C. Comply with Air Diffusion Council "ADC Flexible Air Duct Test Code FD 72-R1."
- D. Comply with ASTM E 96/E 96M, "Test Methods for Water Vapor Transmission of Materials."

2.2 INSULATED FLEXIBLE DUCTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following. Where a specific manufacturer is listed in the Drawings, this shall be considered the Basis-of-Design.
 - 1. Flexmaster U.S.A., Inc.
 - 2. McGill Airflow LLC.
 - 3. Thermaflex; a Flex-Tek Group.
 - 4. Ward Industries; a brand of Hart & Cooley, Inc.
- B. Insulated, Flexible Duct: UL 181, Class 1, two-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; aluminized vapor-barrier film.
 - 1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
 - 2. Maximum Air Velocity: 4000 fpm.
 - 3. Temperature Range: Minus 10 to plus 160 deg F.
 - 4. Insulation R-Value: R6.

- C. Insulated, Flexible Duct: UL 181, Class 1, aluminum laminate and polyester film with latex adhesive supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene aluminized vapor-barrier film.
 - 1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
 - 2. Maximum Air Velocity: 4000 fpm.
 - 3. Temperature Range: Minus 20 to plus 210 deg F.
 - 4. Insulation R-Value: R6.

2.3 FLEXIBLE DUCT CONNECTORS

- A. Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action in sizes 3 through 18 inches, to suit duct size.
- B. Non-Clamp Connectors: Liquid adhesive plus tape.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install flexible ducts according to applicable details in SMACNA006 for metal ducts and in NAIMA AH116 for fibrous-glass ducts.
- B. Install in indoor applications only. Flexible ductwork should not be exposed to UV lighting.
- C. Connect terminal units to supply ducts directly or with maximum 12-inch lengths of flexible duct. Do not use flexible ducts to change directions or correct misalignments.
- D. Connect diffusers or light troffer boots to ducts directly or with maximum 60-inch lengths of flexible duct clamped or strapped in place.
- E. Connect flexible ducts to metal ducts with liquid adhesive plus tape or draw bands.
- F. Installation:
 - 1. Install ducts fully extended.
 - 2. Do not bend ducts across sharp corners.
 - 3. Centerline radius of bends of flexible ducting shall not be less than one duct diameter.
 - 4. Avoid contact with metal fixtures, water lines, pipes, or conduits.
 - 5. Install flexible ducts in a direct line, without sags, twists, or turns except as noted elsewhere.
- G. Supporting Flexible Ducts:
 - 1. Suspend flexible ducts with bands 1-1/2 inches wide or wider and spaced a maximum of 48 inches apart. Maximum centerline sag between supports shall not exceed 1/2 inch per 12 inches.
 - 2. Install extra supports at bends approximately one duct diameter from center line of the bend.
 - 3. Ducts may rest on ceiling joists or truss supports. Spacing between supports shall not exceed the maximum spacing per manufacturer's written installation instructions.

4. Vertically installed ducts shall be stabilized by support straps at a maximum of 72 inches on center.

END OF SECTION

SECTION 23 37 13
DIFFUSERS, REGISTERS, AND GRILLES

PART 1 GENERAL

1.1 SUMMARY

- A. This Section includes ceiling- and wall-mounted diffusers, registers, and grilles.

1.2 SUBMITTALS

- A. Action Submittal:
1. Product Data: For each product indicated, include the following:
 - a. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
 - b. Diffuser, Register, and Grille Schedule: Indicate Drawing designation, room location, quantity, model number, size, and accessories furnished.
 2. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - a. Ceiling suspension assembly members.
 - b. Method of attaching hangers to building structure.
 - c. Size and location of initial access module for acoustical tile.
 - d. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
 - e. Duct access panels.
 3. Color Samples for Initial Selection: For each product with factory-applied color finishes.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following. Where a specific manufacturer is listed in the Drawings, this shall be considered the Basis-of-Design.
1. Titus.
 2. Price.
 3. Krueger.
 4. Hart & Cooley.
 5. Metalaire.
 6. Tuttle & Bailey.
 7. AJ Manufacturing.
 8. Gordon INC.
- B. See drawing schedules, plans, and details for required materials, finishes, style, sizes, patterns, performance, and accessories.

2.2 DIFFUSERS, REGISTERS, AND GRILLES

- A. Refer to Grille and Diffuser Schedule on the drawing for sizes, types, and basis of design. For all ceiling mounted devices, provide mounting clips to secure diffuser to ceiling grid. Provide options for each grille/diffuser as listed on the schedule

2.3 SOURCE QUALITY CONTROL

- A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practicable. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.
- D. Provide sponge rubber gasket, mounting frame, and concealed fastener mounting on all surface mounted grilles and registers.
- E. Paint inside portion on all ductwork and plenums visible behind air device non-specular flat black enamel.
- F. Provide additional support for grilles, registers, and diffusers mounted in lay-in ceiling.
- G. Provide non-specular flat black steel blank-offs behind all unused portions of linear air devices.
- H. Coordinate exact location of Diffusers, Grilles and Registers with area smoke detectors, lights, and electrical devices. Air devices shall not be closer than 3 feet from area smoke detector.
- I. Final location of diffusers, registers and grilles shall be from architectural reflected ceiling plans.

3.3 ADJUSTING

- A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION

SECTION 23 72 23
PACKAGED AIR-TO-AIR ENERGY RECOVERY UNITS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Energy recovery units.
- B. Fans.
- C. Total energy recovery core.
- D. Filters.
- E. Vibration isolation.
- F. Power and controls.
- G. Accessories.

1.2 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's installation instruction, product data, and engineering calculations.
- C. Shop Drawings: Show design and assembly of energy recovery unit and installation and connection details.
- D. Closeout Submittals: Submit manufacturer's operation and maintenance instructions.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Firm regularly engaged in manufacturing energy recovery units.
 - 2. Products in satisfactory use in similar service for not less than five years.
 - 3. Manufactured and assembled in the United States of America.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store in manufacturer's unopened packaging.
- B. Store products to be installed indoors in dry, heated area.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Energy Recovery Ventilators:

1. Berner International
2. Fantech
3. Panasonic Corporation of North America
4. RenewAire
5. Ruskin Company
6. Systemair AB
7. Greenheck

2.2 ENERGY RECOVERY DESIGN CRITERIA

- A. See schedules for design performance data.

2.3 ENERGY RECOVERY UNITS

- A. Energy Recovery Units: Provide stationary core air-to-air exchanger; prefabricated packaged system designed by manufacturer.
 1. Provide unit with a AHRI 1060 (I-P) compliant air-to-air exchanger.
 2. Access: Hinged and/or screwed access panels on front.
 3. Lifting holes at the unit base.
 4. Framing: Welded extruded aluminum tubular frame capable of supporting components and casings.
 5. Permanent name plate listing manufacturer mounted inside door near electrical panel.

2.4 FANS

- A. Provide separate fans for exhaust and supply blowers.
- B. Fans:
 1. Individually driven with a dedicated motor.
 2. Forwarded inclined.
 3. Single width, single inlet.
 4. Class 1 aluminum wheels.
 5. AMCA-rated.
- C. Housings: 12 gauge, 0.1046 inch (2.66 mm) aluminized steel with plenums integral to general housing and constructed to Class 1 fan standards.
- D. Motors:
 1. Motors: Open drip proof.
 2. Efficiency: High.
 3. Speed: Single.
 4. Control: Constant Speed.
 5. Fan Motor: UL listed and labeled.

2.5 TOTAL ENERGY CORE

- A. Core: Transfer heat and humidity from one air stream to the other with minimum carryover of the exhaust air into the supply air stream.
- B. Energy Core Media: Cleanable with low temperature steam, hot water or light detergent, without degrading the latent recovery.

- C. Sensible Recovery Efficiency: See Schedule.
- D. Latent Recovery Efficiency: See Schedule.
- E. Effectiveness: Rated in accordance with ASHRAE Std 84 and AHRI 1060 (I-P).
- F. Flame Spread Index (FSI): 25 or less, when tested in accordance with ASTM E84 or UL 723.
- G. Smoke Developed Index (SDI): 50 or less, when tested in accordance with ASTM E84 or UL 723.
- H. Energy Recovery Media Face:
 - 1. Comply with NFPA 90A.
- I. Desiccant:
 - 1. Type: 3A.

2.6 FILTERS

- A. Exhaust and Fresh Air Streams: MERV 8 filters constructed to meet ASHRAE Std 52.2.

2.7 VIBRATION ISOLATION

- A. Vibration Isolation: Provide whole unit vibration isolation with the energy recovery unit assembly.
- B. Construct with appropriately-sized, seismic-rated, corrosion-resistant captive-spring isolators.

2.8 POWER AND CONTROLS

- A. Motor Control Panels: UL listed.
- B. Include necessary motor starters, fuses, transformers and overload protection according to NFPA 70.
- C. Provide single-point field connection to power supply.
- D. Provide non fused main disconnect integral to control panel.
- E. Install wiring in accordance with NFPA 70.

2.9 ACCESSORIES

- A. Electric Preheat Coil:
 - 1. Resistance coil type with elements enclosed in a steel sheath with fins and painted with a baked-on aluminum paint for long life in a 100 percent outdoor air stream.
 - 2. Coil: UL listed and constructed in accordance with NFPA 70 requirements.
- B. Freeze Protection Thermostat:
 - 1. Equip unit with thermostat such that unit can be stopped when temperature drops to 23 degrees F (minus 5 degrees C).
- C. Dampers
 - 1. Provide dampers as scheduled on drawings

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that structure is ready for installation of unit, that openings in deck for ductwork, if required, are correctly sized and located, and that mechanical and electrical utilities supplying unit are of correct capacities and are accessible.

3.2 INSTALLATION

- A. Provide openings for suitable ductwork connection.

3.3 SYSTEM STARTUP

- A. Provide services of manufacturer's authorized representative to provide start up of unit.

3.4 CLEANING

- A. Clean filters, air plenums, interior and exposed-to-view surfaces prior to Substantial Completion.

END OF SECTION

SECTION 26 05 00
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Electrical equipment coordination and installation.
 - 2. Sleeves for raceways and cables.
 - 3. Sleeve seals.
 - 4. Grout.
 - 5. Common electrical installation requirements.
 - 6. Typical mounting heights
 - 7. Cutting and patching
- B. The work under the contract includes furnishing all materials and components shown on the drawings and listed in the specifications for the installation and operation of a complete electrical system.
- C. Electrical Contractor to include a \$3000.00 allowance (listed as a separate line item) for local Utility to provide a new 400A CT/Meter cabinet and new lateral run from existing pole mounted transformer to new Contractor provided meter base. See contract drawings for details. Coordinate with Utility immediately after signed awarded contract to initiate getting this portion of the installation started. Any remaining allowance funds shall be returned to the owner by deducting amount from contracted price. New service shall be in place prior to new construction of building expansion. Existing main panelboard may stay in place with temporary wiring from new meter base until new mechanical room is ready for new main panelboard.

1.03 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate arrangement, mounting, and support of electrical equipment:

- a. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 - b. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 - c. To allow right of way for piping and conduit installed at required slope.
 - d. So, connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
- 2. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
 - 3. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."
 - 4. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for sleeve seals.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.
- C. All work associated with the Project must be performed in accordance with all Federal, State, and Local Laws, Ordinances, Codes, Rules, and Regulations, including all requirements set forth by the Authority Having Jurisdiction, pertaining to the Project which are hereby made a part of the Contract Documents by reference, the same as if repeated herein in their entirety. Where the Contract Documents exceed the aforementioned requirements, the Contract Documents shall govern. In no case shall work be installed contrary to or below the minimum applicable legal standards.

PART 2 PRODUCTS

2.01 GENERAL

- A. All materials and components shall be tested and listed according to Underwriters Laboratories Standards when such standards have been established for the particular materials to be furnished under the contract.

2.02 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 sheet steel.
 - 1. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and no side more than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
 - b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches (1270 mm) and one or more sides equal to, or more than 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.03 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

2.04 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

3.01 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.

3.02 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. 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.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both surfaces of walls.
- F. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level.
- G. Size pipe sleeves to provide 1/4 inch (6.4 mm) annular clear space between sleeve and raceway or cable, unless indicated otherwise.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
 - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
- I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
- J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."
- K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- M. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.03 SLEEVE-SEAL INSTALLATION

- A. Install to seal exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve

seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.04 TYPICAL MOUNTING HEIGHTS

- A. Devices shall be installed at the mounting heights indicated below unless otherwise noted in the Contract Documents or within the Project Manual, or as required to accommodate equipment or casework, or where in conflict with wall treatments at the installation location. Notify the Architect of any devices that will be in conflict with wall components (i.e. white boards, flat panels, screens, monitors, etc.) prior to rough-in for clarification of device location. Refer to the Architectural elevations and details for additional information regarding device placement. All heights shall be measured from finished floor unless otherwise noted.
1. Electrical Receptacles, General: 18 inches to center of device box.
 2. Electrical Receptacles, Installed Over Counters: 4 inches from top of backsplash to center of device box.
 3. Controls for Screens, Window Shades, Etc.: 46 inches to center of device box, and not exceeding 48 inches to top of any operable controls.
 4. Lighting Controls, Including Switches, Control Stations, Dimmers, Etc.: 46 inches to center of device box, and not exceeding 48 inches to top of any operable controls.
 5. Enclosed Switches and Motor Controllers: 72 inches to top of equipment, depending on size of equipment. The center of the operating handle grip for the switch or circuit breaker, when in it's highest position, shall not exceed 79 inches above the floor or working platform.
 6. Electrical Panelboards, Switchboards, and Switchgear: 72 inches to top of equipment, depending on size of equipment. The center of the operating handle grip for the switch or circuit breaker, when in it's highest position, shall not exceed 79 inches above the floor or working platform.

3.05 CUTTING AND PATCHING

- A. Cut, channel, chase, and drill floors, walls, partitions, and other surfaces and materials as required to permit electrical installations. Perform work using skilled mechanics of trades involved.
- B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing fireproofing has been disturbed. Repair and refinish materials and other surfaces using skilled mechanics of trades involved.

3.06 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

3.07 COMMISSIONING

- A. See Section 01 91 13 - General Commissioning Requirements for commissioning requirements.

- B. Commissioning of components, equipment, and/or systems specified in this Division is part of the construction process. Project closeout is dependent on successful completion of all commissioning procedures, documentation, and resolution of any issues.

3.08 CLEANING

- A. Inspect exposed finishes. Remove burrs, dirt, paint, and debris from all electrical system equipment and systems.
- B. Protect electrical equipment and installations and maintain required conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION 26 05 00

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SECTION 26 05 05
SELECTIVE DEMOLITION FOR ELECTRICAL

PART 1 GENERAL

PART 3 EXECUTION

2.01 EXAMINATION

- A. Verify that abandoned wiring and equipment serve only abandoned facilities.
- B. Demolition drawings are based on casual field observation and existing record documents.
- C. Report discrepancies to Architect before disturbing existing installation.
- D. Beginning of demolition means installer accepts existing conditions.

2.02 PREPARATION

- A. Disconnect electrical systems in walls, floors, and ceilings to be removed.
- B. Coordinate utility service outages with utility company.
- C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

2.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Remove, relocate, and extend existing installations to accommodate new construction.
- B. Remove abandoned wiring to source of supply.
- C. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- D. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.
- E. Disconnect and remove abandoned panelboards and distribution equipment.
- F. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
- G. Repair adjacent construction and finishes damaged during demolition and extension work.

- H. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.

END OF SECTION 26 05 05

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SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single conductor building wire.
- B. Metal-clad cable.
- C. Variable-frequency drive cable.
- D. Wiring connectors.
- E. Electrical tape.
- F. Heat shrink tubing.
- G. Oxide inhibiting compound.
- H. Wire pulling lubricant.
- I. Cable ties.
- J. Firestop sleeves.

1.02 RELATED REQUIREMENTS

- A. Section 07 84 00 - Firestopping.
- B. Section 26 05 26 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
- C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 28 46 00 - Fire Detection and Alarm: Fire alarm system conductors and cables.

1.03 REFERENCE STANDARDS

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire 2013 (Reapproved 2018).
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft 2011 (Reapproved 2017).
- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes 2010, with Editorial Revision (2020).

- D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation 2004 (Reapproved 2020).
- E. ASTM B800 - Standard Specification for 8000 Series Aluminum Alloy Wire for Electrical Purposes - Annealed and Intermediate Tempers 2005 (Reapproved 2021).
- F. ASTM B801 - Standard Specification for Concentric-Lay-Stranded Conductors of 8000 Series Aluminum Alloy for Subsequent Covering or Insulation 2018.
- G. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape 2017.
- H. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes 2020.
- I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023a.
- J. FM 3971 - Fire Protective Coatings and Wraps for Grouped Cables 2019.
- K. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- L. NECA 104 - Standard for Installing Aluminum Building Wire and Cable 2012.
- M. NECA 120 - Standard for Installing Armored Cable (AC) and Type Metal-Clad (MC) Cable 2018.
- N. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy 2021.
- O. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.
- P. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- Q. NFPA 79 - Electrical Standard for Industrial Machinery 2021.
- R. UL 44 - Thermoset-Insulated Wires and Cables Current Edition, Including All Revisions.
- S. UL 83 - Thermoplastic-Insulated Wires and Cables Current Edition, Including All Revisions.
- T. UL 267 - Outline of Investigation for Wire-Pulling Compounds Current Edition, Including All Revisions.
- U. UL 486A-486B - Wire Connectors Current Edition, Including All Revisions.
- V. UL 486C - Splicing Wire Connectors Current Edition, Including All Revisions.
- W. UL 486D - Sealed Wire Connector Systems Current Edition, Including All Revisions.
- X. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape Current Edition, Including All Revisions.

- Y. UL 1569 - Metal-Clad Cables Current Edition, Including All Revisions.
- Z. UL 2277 - Outline of Investigation for Flexible Motor Supply Cable and Wind Turbine Tray Cable Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
 - 3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.
- C. Field Quality Control Test Reports.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F (-10 degrees C), unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
 - 1. Exceptions:
 - a. Use variable-frequency drive cable for connection between variable-frequency motor controllers and associated motors.
- C. Nonmetallic-sheathed cable is not permitted.
- D. Underground feeder and branch-circuit cable is not permitted.
- E. Service entrance cable is not permitted.
- F. Armored cable is not permitted.
- G. Metal-clad cable is permitted only as follows:
 - 1. Where not otherwise restricted, may be used:
 - a. Where concealed in hollow stud walls and above accessible ceilings for branch circuits.
 - 2. In addition to other applicable restrictions, may not be used:
 - a. Unless approved by Owner.
 - b. Where not approved for use by the authority having jurisdiction.
 - c. Where exposed to view.
 - d. Where exposed to damage.
 - e. For damp, wet, or corrosive locations, unless provided with a PVC jacket listed as suitable for those locations.
 - f. For emergency systems as defined in NFPA 70, Article 700.
 - g. For feeders.
 - h. For branch circuits larger than #6 AWG or greater than 60 A overcurrent protection device.
- H. Manufactured wiring systems are not permitted.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Provide new conductors and cables manufactured not more than one year prior to installation.
- D. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

- E. Comply with NEMA WC 70.
- F. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- G. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- H. Conductors for Grounding and Bonding: Also comply with Section 26 05 26.
- I. Conductors and Cables Installed Exposed in Spaces Used for Environmental Air (only where specifically permitted): Plenum rated, listed and labeled as suitable for use in return air plenums.
- J. Conductor Material:
 - 1. Provide copper conductors except where aluminum conductors are specifically indicated. Substitution of aluminum conductors for copper is not permitted. Conductor sizes indicated are based on copper unless specifically indicated as aluminum. Conductors designated with the abbreviation "AL" indicate aluminum.
 - 2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
 - 3. Tinned Copper Conductors: Comply with ASTM B33.
 - 4. Aluminum Conductors (only where specifically indicated or permitted for substitution): AA-8000 series aluminum alloy conductors recognized by ASTM B800 and compact stranded in accordance with ASTM B801 unless otherwise indicated.
- K. Minimum Conductor Size:
 - 1. Branch Circuits: 12 AWG, up to 100 feet (30 m) for 20 A, 120 V circuits and 200 feet (61 m) for 20 A, 277 V circuits.
 - a. Exceptions:
 - 1) 20 A, 120 V circuits from 100 feet (30 m) to 150 feet (46 m) in length: 10 AWG, for voltage drop.
 - 2) 20 A, 120 V circuits from 150 feet (46 m) to 240 feet (73 m) in length: 8 AWG, for voltage drop.
 - 3) 20 A, 120 V circuits from 240 feet (73 m) to 385 feet (117 m) in length: 6 AWG, for voltage drop.
 - 4) 20 A, 277 V circuits from 200 feet (61 m) to 360 feet (110 m) in length: 10 AWG, for voltage drop.
 - 5) 20 A, 277 V circuits from 360 feet (110 m) to 550 feet (168 m) in length: 8 AWG, for voltage drop.
 - 6) 20 A, 277 V circuits from 550 feet (168 m) to 885 feet (270 m) in length: 6 AWG, for voltage drop.
 - 2. Control Circuits: 14 AWG.
- L. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- M. Conductor Color Coding:
 - 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
 - 2. Color Coding Method: Integrally colored insulation.

3. Color Code:
 - a. 480Y/277 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - 4) Neutral/Grounded: Gray.
 - b. 208Y/120 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - 4) Neutral/Grounded: White.
 - c. Equipment Ground, All Systems: Green.
 - d. For modifications or additions to existing wiring systems, comply with existing color code when existing code complies with NFPA 70 and is approved by the authority having jurisdiction.
 - e. For control circuits, comply with manufacturer's recommended color code.

2.03 SINGLE CONDUCTOR BUILDING WIRE

- A. Manufacturers:
 1. Copper Building Wire:
 - a. Cerro Wire LLC: www.cerrowire.com/#sle.
 - b. Encore Wire Corporation: www.encorewire.com/#sle.
 - c. Service Wire Co: www.servicewire.com/#sle.
 - d. Southwire Company: www.southwire.com/#sle.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
 2. Aluminum Building Wire (only where specifically indicated or permitted for substitution):
 - a. Encore Wire Corporation: www.encorewire.com/#sle.
 - b. Southwire Company: www.southwire.com/#sle.
 - c. Stabiloy, a brand of General Cable Technologies Corporation : www.stabiloy.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Description: Single conductor insulated wire.
- C. Conductor Stranding:
 1. Feeders and Branch Circuits:
 - a. Size 10 AWG and Smaller: Solid or stranded.
 - b. Size 8 AWG and Larger: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation:
 1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
 - a. Size 4 AWG and Larger, Installed Underground: Type XHHW-2.
 - b. Installed Underground: Type XHHW-2, THHN/THWN, or THHN/THWN-2.

- c. Installed in Environments Designed for 14 degrees F (-10 degrees C) Operating Temperatures or Lower: Type XHHW-2 or RHH/RHW-2.
- 2. Aluminum Building Wire (only where specifically indicated or permitted for substitution): Type THHN/THWN-2, except as indicated below.
 - a. Installed Underground: Type XHHW-2 or THHN/THWN-2.
 - b. Installed in Environments Designed for 14 degrees F (-10 degrees C) Operating Temperatures or Lower: Type XHHW-2 or RHH/RHW-2.

2.04 METAL-CLAD CABLE

- A. Manufacturers:
 - 1. AFC Cable Systems Inc: www.afcweb.com/#sle.
 - 2. Encore Wire Corporation: www.encorewire.com/#sle.
 - 3. Service Wire Co: www.servicewire.com/#sle.
 - 4. Southwire Company: www.southwire.com/#sle.
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.
- C. Conductor Stranding:
 - 1. Size 10 AWG and Smaller: Solid or stranded.
 - 2. Size 8 AWG and Larger: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation: Type THHN, THHN/THWN, THHN/THWN-2, or XHHW-2.
- F. Provide dedicated neutral conductor for each phase conductor where indicated or required.
- G. Grounding: Full-size integral equipment grounding conductor.
- H. Armor: Aluminum or steel, interlocked tape.
- I. Provide PVC jacket applied over cable armor where indicated or required for environment of installed location.

2.05 VARIABLE-FREQUENCY DRIVE CABLE

- A. Manufacturers:
 - 1. Service Wire Co; ServiceDrive: www.servicewire.com/#sle.
 - 2. Southwire Company: www.southwire.com/#sle.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Description: Flexible motor supply cable listed and labeled as complying with UL 2277 in accordance with NFPA 79; specifically designed for use with variable frequency drives and associated nonlinear power distortions.
- C. Conductor Stranding: Stranded.

- D. Insulation Voltage Rating: 1000 V.
- E. Insulation: Use only thermoset insulation types; thermoplastic insulation types are not permitted.
- F. Grounding: Full-size integral equipment grounding conductor or symmetrical arrangement of multiple conductors of equivalent size.
- G. Provide metallic shielding.
- H. Jacket: PVC.

2.06 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Connectors for Grounding and Bonding: Comply with Section 26 05 26.
- C. Wiring Connectors for Splices and Taps:
 - 1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors, mechanical connectors, or compression connectors.
 - 2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
 - 3. Connectors for Aluminum Conductors: Use compression connectors.
- D. Wiring Connectors for Terminations:
 - 1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
 - 2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
 - 3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
 - 4. Provide compression connectors with lug holes for all motor lead connections. Do not remove factory installed motor lead terminal rings.
 - 5. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
 - 6. Aluminum Conductors: Use compression connectors or mechanical connectors for all connections.
 - 7. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.
- E. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
- F. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.

- G. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F (105 degrees C) for standard applications and 302 degrees F (150 degrees C) for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
 - 1. Manufacturers:
 - a. 3M: www.3m.com/#sle.
 - b. Ideal Industries, Inc: www.idealindustries.com/#sle.
 - c. NSI Industries LLC: www.nsiindustries.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- H. Mechanical Connectors: Provide bolted type or set-screw type.
 - 1. Manufacturers:
 - a. Burndy LLC: www.burndy.com/#sle.
 - b. IlSCO: www.ilsco.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- I. Compression Connectors: Provide circumferential type or hex type crimp configuration.
 - 1. Manufacturers:
 - a. Burndy LLC: www.burndy.com/#sle.
 - b. IlSCO: www.ilsco.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- J. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.
 - 1. Manufacturers:
 - a. Burndy LLC: www.burndy.com/#sle.
 - b. IlSCO: www.ilsco.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

2.07 ACCESSORIES

- A. Electrical Tape:
 - 1. Manufacturers:
 - a. 3M: www.3m.com/#sle.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
 - 3. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F (-18 degrees C) and suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
 - 4. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil (0.76 mm); suitable for continuous

- temperature environment up to 194 degrees F (90 degrees C) and short-term 266 degrees F (130 degrees C) overload service.
5. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil (3.2 mm); suitable for continuous temperature environment up to 176 degrees F (80 degrees C).
 6. Varnished Cambric Electrical Tape: Cotton cambric fabric tape, with or without adhesive, oil-primed and coated with high-grade insulating varnish; minimum thickness of 7 mil (0.18 mm); suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
 7. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil (2.3 mm).
- B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
1. Manufacturers:
 - a. 3M: www.3m.com/#sle.
 - b. Burndy LLC: www.burndy.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.
1. Manufacturers:
 - a. Burndy LLC: www.burndy.com/#sle.
 - b. Ideal Industries, Inc: www.idealindustries.com/#sle.
 - c. Ilsco: www.ilsco.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Wire Pulling Lubricant:
1. Manufacturers:
 - a. 3M: www.3m.com/#sle.
 - b. American Polywater Corporation: www.polywater.com/#sle.
 - c. Ideal Industries, Inc: www.idealindustries.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
 2. Listed and labeled as complying with UL 267.
 3. Suitable for use with conductors/cables and associated insulation/jackets to be installed.
 4. Suitable for use at installation temperature.
- E. Cable Ties: Material and tensile strength rating suitable for application.
1. Manufacturers:
 - a. Burndy LLC: www.burndy.com/#sle.
 - b. Ideal Industries, Inc: www.idealindustries.com/#sle.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.
1. Products:

- a. HoldRite, a brand of Reliance Worldwide Corporation; HydroFlame Pro Series/HydroFlame Custom Built: www.holdrite.com/#sle.
 - b. Hilti; www.hilti.com
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- G. Fire-Protective Coating for Electrical Conductors and Cables: Field-applied, intumescent or ablative coating designed to prevent ignition and propagation of fire along thermoplastic-insulated conductors and cables.
 - 1. Pass flammability tests of one of the following:
 - a. ASTM E84, Class A; maximum flame spread index of 25.
 - b. FM 3971.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that work likely to damage wire and cable has been completed.
- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- D. Verify that field measurements are as indicated.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Circuiting Requirements:
 - 1. Unless dimensioned, circuit routing indicated is diagrammatic.
 - 2. When circuit destination is indicated without specific routing, determine exact routing required.
 - 3. Arrange circuiting to minimize splices.
 - 4. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
 - 5. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
 - 6. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is permitted, under the following conditions:
 - a. Provide no more than six current-carrying conductors in a single raceway. Dedicated neutral conductors are considered current-carrying conductors.
 - b. Increase size of conductors as required to account for ampacity derating.
 - c. Size raceways, boxes, etc. to accommodate conductors.
 - 7. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.

- B. Install products in accordance with manufacturer's instructions.
- C. Perform work in accordance with NECA 1 (general workmanship).
- D. Install aluminum conductors in accordance with NECA 104.
- E. Install metal-clad cable (Type MC) in accordance with NECA 120.
- F. Installation in Raceway:
 - 1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
 - 2. Pull all conductors and cables together into raceway at same time.
 - 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
 - 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- G. Exposed Cable Installation (only where specifically permitted):
 - 1. Route cables parallel or perpendicular to building structural members and surfaces.
 - 2. Protect cables from physical damage.
- H. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- I. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
 - 1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.
- J. Terminate cables using suitable fittings.
 - 1. Metal-Clad Cable (Type MC):
 - a. Use listed fittings and anti-short, insulating bushings.
 - b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
 - c. Do not use direct-bearing set-screw type fittings for cables with aluminum armor.
- K. Variable-Frequency Drive Cable: Terminate shielding at both variable-frequency motor controller and associated motor using glands or termination kits recommended by manufacturer.
- L. Install conductors with a minimum of 6 inches (150 mm) of slack at each outlet.
- M. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- N. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- O. Make wiring connections using specified wiring connectors.
 - 1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.

2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
 3. Do not remove conductor strands to facilitate insertion into connector.
 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminants. Do not use wire brush on plated connector surfaces.
 5. Connections for Aluminum Conductors: Fill connectors with oxide inhibiting compound where not pre-filled by manufacturer, following all manufacturer instructions and recommendations.
 6. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 7. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
 8. Motor Leads: Use Grade 5 hardware consisting of bolt, flat washer, Belleville lock washer, and nut. Bolts shall not be longer than necessary to allow connection to be torqued per manufacturer's recommendation. Arrange all motor lead terminal rings and circuit compression connectors so that all pads are flat against each other.
- P. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
 - a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
 - b. For taped connections likely to require re-entering, including motor leads, first apply varnished cambric electrical tape, followed by adequate amount of rubber splicing electrical tape, followed by outer covering of vinyl insulating electrical tape.
 2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
 - a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
 - b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
 3. Wet Locations: Use heat shrink tubing.
- Q. Insulate ends of spare conductors using vinyl insulating electrical tape.
- R. Identify conductors and cables in accordance with Section 26 05 53.
- S. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
- T. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is only required for services and feeders. The resistance test for parallel conductors listed as optional is not required.
- D. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION 26 05 19

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SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.
- D. Ground bars.
- E. Ground rod electrodes.
- F. Ground plate electrodes.
- G. Ground access wells.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
- B. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- C. Section 26 56 00 - Exterior Lighting: Additional grounding and bonding requirements for pole-mounted luminaires.

1.03 REFERENCE STANDARDS

- A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System 2012.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings 2022.
- D. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.
- E. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 467 - Grounding and Bonding Equipment Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Verify exact locations of underground metal water service pipe entrances to building.
 - 2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
 - 3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.
- C. Field quality control test reports.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

- A. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- D. Grounding System Resistance:
 - 1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.

2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
 3. Between Grounding Electrode System and Major Electrical Equipment Frames, System Neutral, and Derived Neutral Points: Not greater than 0.5 ohms, when tested using "point-to-point" methods.
- E. Grounding Electrode System:
1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
 - a. Provide continuous grounding electrode conductors without splice or joint.
 - b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
 2. Metal Underground Water Pipe(s):
 - a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet (3.0 m) at an accessible location not more than 5 feet (1.5 m) from the point of entrance to the building.
 - b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
 - c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
 3. Metal In-Ground Support Structure:
 - a. Provide connection to metal in-ground support structure that is in direct contact with earth in accordance with NFPA 70.
 4. Concrete-Encased Electrode:
 - a. Provide connection to concrete-encased electrode consisting of not less than 20 feet (6.0 m) of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
 5. Ground Rod Electrode(s):
 - a. Provide three electrodes in an equilateral triangle configuration unless otherwise indicated or required.
 - b. Space electrodes not less than 10 feet (3.0 m) from each other and any other ground electrode.
 - c. Where location is not indicated, locate electrode(s) at least 5 feet (1.5 m) outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
 - d. Provide ground access well for first connected electrode.
 6. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
 7. Ground Bar: Provide ground bar, separate from service equipment enclosure, for common connection point of grounding electrode system bonding jumpers as permitted in NFPA 70. Connect grounding electrode conductor provided for service-supplied system grounding to this ground bar.
 - a. Ground Bar Size: 1/4 by 2 by 12 inches (6 by 50 by 300 mm) unless otherwise indicated or required.

- b. Where ground bar location is not indicated, locate in accessible location as near as possible to service disconnect enclosure.
 - c. Ground Bar Mounting Height: 18 inches (450 mm) above finished floor unless otherwise indicated.
- F. Service-Supplied System Grounding:
 - 1. For each service disconnect, provide grounding electrode conductor to connect neutral (grounded) service conductor to grounding electrode system. Unless otherwise indicated, make connection at neutral (grounded) bus in service disconnect enclosure.
 - 2. For each service disconnect, provide main bonding jumper to connect neutral (grounded) bus to equipment ground bus where not factory-installed. Do not make any other connections between neutral (grounded) conductors and ground on load side of service disconnect.
- G. Grounding for Separate Building or Structure Supplied by Feeder(s) or Branch Circuits:
 - 1. Provide grounding electrode system for each separate building or structure, including, but not limited to:
 - a. Generator enclosures.
 - 2. Provide equipment grounding conductor routed with supply conductors.
 - 3. For each disconnecting means, provide grounding electrode conductor to connect equipment ground bus to grounding electrode system.
 - 4. Do not make any connections and remove any factory-installed jumpers between neutral (grounded) conductors and ground.
- H. Separately Derived System Grounding:
 - 1. Separately derived systems include, but are not limited to:
 - a. Transformers (except autotransformers such as buck-boost transformers).
 - b. Generators, when neutral is switched in the transfer switch.
 - 2. Provide grounding electrode conductor to connect derived system grounded conductor to nearest effectively grounded metal building frame. Unless otherwise indicated, make connection at neutral (grounded) bus in source enclosure.
 - 3. Provide bonding jumper to connect derived system grounded conductor to nearest metal building frame and nearest metal water piping in the area served by the derived system, where not already used as a grounding electrode for the derived system. Make connection at same location as grounding electrode conductor connection.
 - 4. Outdoor Source: Where the source of the separately derived system is located outside the building or structure supplied, provide connection to grounding electrode at source in accordance with NFPA 70.
 - 5. Provide system bonding jumper to connect system grounded conductor to equipment ground bus. Make connection at same location as grounding electrode conductor connection. Do not make any other connections between neutral (grounded) conductors and ground on load side of separately derived system disconnect.
 - 6. Where the source and first disconnecting means are in separate enclosures, provide supply-side bonding jumper between source and first disconnecting means.
- I. Bonding and Equipment Grounding:
 - 1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and

other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.

2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
 - a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
 - b. Metal gas piping.
 - c. Metal process piping.

J. Communications Systems Grounding and Bonding:

1. Provide intersystem bonding termination at service equipment or metering equipment enclosure and at disconnecting means for any additional buildings or structures in accordance with NFPA 70.
2. Provide bonding jumper in raceway from intersystem bonding termination to each communications room or backboard and provide ground bar for termination.
 - a. Bonding Jumper Size: 6 AWG, unless otherwise indicated or required.
 - b. Raceway Size: 3/4 inch (21 mm) trade size unless otherwise indicated or required.
 - c. Ground Bar Size: 1/4 by 2 by 12 inches (6 by 50 by 300 mm) unless otherwise indicated or required.
 - d. Ground Bar Mounting Height: 18 inches (450 mm) above finished floor unless otherwise indicated.

K. Pole-Mounted Luminaires: Also comply with Section 26 56 00.

2.02 GROUNDING AND BONDING COMPONENTS

A. General Requirements:

1. Provide products listed, classified, and labeled as suitable for the purpose intended.
2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 05 26:

1. Use insulated copper conductors unless otherwise indicated.
 - a. Exceptions:
 - 1) Use bare copper conductors where installed underground in direct contact with earth.

- 2) Use bare copper conductors where directly encased in concrete (not in raceway).

C. Connectors for Grounding and Bonding:

1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
2. Unless otherwise indicated, use exothermic welded connections or compression connectors for underground, concealed and other inaccessible connections.
 - a. Exceptions:
 - 1) Use mechanical connectors for connections to electrodes at ground access wells.
3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
4. Manufacturers - Mechanical and Compression Connectors:
 - a. allG Fabrication: www.allgfab.com/#sle.
 - b. Burndy LLC: www.burndy.com/#sle.
 - c. Harger Lightning & Grounding: www.harger.com/#sle.
 - d. nVent ERICO: www.nvent.com/#sle.
 - e. Thomas & Betts Corporation: www.tnb.com/#sle.
 - f. Substitutions: See Section 01 60 00 - Product Requirements.
5. Manufacturers - Exothermic Welded Connections:
 - a. Burndy LLC: www.burndy.com/#sle.
 - b. nVent ERICO; Cadweld: www.nvent.com/#sle.
 - c. thermOweld, subsidiary of Continental Industries; division of Burndy LLC : www.thermoweld.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

D. Ground Bars:

1. Description: Copper rectangular ground bars with mounting brackets and insulators.
2. Size: As indicated.
3. Holes for Connections: As indicated or as required for connections to be made.
4. Manufacturers:
 - a. allG Fabrication: www.allgfab.com/#sle.
 - b. Harger Lightning & Grounding: www.harger.com/#sle.
 - c. nVent ERICO: www.nvent.com/#sle.
 - d. thermOweld, subsidiary of Continental Industries; division of Burndy LLC : www.thermoweld.com/#sle.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.

E. Ground Rod Electrodes:

1. Comply with NEMA GR 1.
2. Material: Copper-bonded (copper-clad) steel.
3. Size: 3/4 inch (19 mm) diameter by 10 feet (3.0 m) length, unless otherwise indicated.
4. Manufacturers:
 - a. allG Fabrication: www.allgfab.com/#sle.
 - b. Galvan Industries, Inc: www.galvanelectrical.com/#sle.
 - c. Harger Lightning & Grounding: www.harger.com/#sle.

- d. nVent ERICO: www.nvent.com/#sle.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Ground Plate Electrodes:
 - 1. Material: Copper.
 - 2. Size: 24 by 24 by 1/4 inches (610 by 610 by 6 mm), unless otherwise indicated.
 - 3. Manufacturers:
 - a. allG Fabrication: www.allgfab.com/#sle.
 - b. Harger Lightning & Grounding: www.harger.com/#sle.
 - c. nVent ERICO: www.nvent.com/#sle.
 - d. thermOweld, subsidiary of Continental Industries; division of Burndy LLC : www.thermoweld.com/#sle.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
- G. Ground Access Wells:
 - 1. Description: Open bottom round or rectangular well with access cover for testing and inspection; suitable for the expected load at the installed location.
 - 2. Size: As required to provide adequate access for testing and inspection, but not less than minimum size requirements specified.
 - a. Round Wells: Not less than 8 inches (200 mm) in diameter.
 - b. Rectangular Wells: Not less than 12 by 12 inches (300 by 300 mm).
 - 3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 10 inches (250 mm).
 - 4. Cover: Factory-identified by permanent means with word "GROUND".
 - 5. Manufacturers:
 - a. allG Fabrication: www.allgfab.com/#sle.
 - b. Harger Lightning & Grounding: www.harger.com/#sle.
 - c. nVent ERICO: www.nvent.com/#sle.
 - d. thermOweld, subsidiary of Continental Industries; division of Burndy LLC : www.thermoweld.com/#sle.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that work likely to damage grounding and bonding system components has been completed.
- B. Verify that field measurements are as indicated.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).

- C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
 - 1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches (150 mm) below finished grade.
- D. Ground Plate Electrodes: Unless otherwise indicated, install ground plate electrodes at a depth of not less than 30 inches (750 mm).
- E. Make grounding and bonding connections using specified connectors.
 - 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
 - 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
 - 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
 - 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- F. Identify grounding and bonding system components in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.13.
- D. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- E. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.
- F. Submit detailed reports indicating inspection and testing results and corrective actions taken.

END OF SECTION 26 05 26

SECTION 26 05 29
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 26 05 33.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.
- C. Section 26 05 36 - Cable Trays for Electrical Systems: Additional support and attachment requirements for cable tray.
- D. Section 26 05 33.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.
- E. Section 26 05 48 - Vibration and Seismic Controls for Electrical Systems.
- F. Section 26 51 00 - Interior Lighting: Additional support and attachment requirements for interior luminaires.
- G. Section 26 56 00 - Exterior Lighting: Additional support and attachment requirements for exterior luminaires.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2023.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2023.
- D. MFMA-4 - Metal Framing Standards Publication 2004.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with actual equipment and components to be installed.
 - 2. Coordinate work to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at installed locations.
 - 4. Coordinate arrangement of supports with ductwork, piping, equipment and other potential conflicts.
 - 5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has cured; see Section 03 30 00.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel/strut framing systems, nonpenetrating rooftop supports, and post-installed concrete/masonry anchors.

1.06 QUALITY ASSURANCE

- A. Product Listing Organization Qualifications: Organization recognized by OSHA as Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 - 1. Comply with the following. Where requirements differ, comply with most stringent.
 - a. NFPA 70.
 - b. Applicable building code.
 - c. Requirements of authorities having jurisdiction.
 - 2. Provide required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for complete installation of electrical work.
 - 3. For existing areas that require surface mounted equipment, all wiring shall be enclosed within wire molding and chases that match current area paint. All vertical runs shall be in corners where possible.
 - 4. Provide products listed, classified, and labeled as suitable for purpose intended, where applicable.
 - 5. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for load to be supported

plus 200 pounds (90 Kg) or with a minimum safety factor of four , whichever is greater. Include consideration for vibration, equipment operation, and shock loads where applicable.

6. Do not use products for applications other than as permitted by NFPA 70 and product listing.
 7. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
 - a. Exceptions:
 - 1) Listed cable hanger assembly with steel braided cable and steel fittings.
 - 2) Manufacturers:
 - a) Gripple, Inc: www.gripple.com/#sle
 - b) Substitutions: See Section 01 60 00 - Product Requirements.
 8. Steel Components: Use corrosion-resistant materials suitable for environment where installed.
 - a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
 - c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Components for Vibration Isolation and/or Seismic Controls: See Section 26 05 48.
- C. Conduit and Cable Supports: Straps and clamps suitable for conduit or cable to be supported.
1. Manufacturers:
 - a. ABB: www.electrification.us.abb.com/#sle.
 - b. Eaton Corporation: www.eaton.com/#sle.
 - c. Emerson Electric Co; O-Z/Gedney: www.emerson.com/#sle.
 - d. HoldRite, a brand of Reliance Worldwide Corporation: www.holdrite.com/#sle.
 - e. nVent; Caddy: www.nvent.com/#sle.
 - f. Substitutions: See Section 01 60 00 - Product Requirements.
 2. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
 3. Conduit Clamps: Bolted type unless otherwise indicated.
 4. Products:
 - a. Gripple, Inc; Universal Bracket: www.gripple.com/#sle.
 - b. Gripple, Inc; Fast Trak: www.gripple.com/#sle.
 - c. Gripple, Inc; Universal Clamp (Threaded): www.gripple.com/#sle.
 - d. Gripple, Inc; Low Profile Bracket Kits: www.gripple.com/#sle.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Outlet Box Supports: Hangers and brackets suitable for boxes to be supported.
1. Manufacturers:
 - a. ABB: www.electrification.us.abb.com/#sle.
 - b. Eaton Corporation: www.eaton.com/#sle.
 - c. Emerson Electric Co; O-Z/Gedney: www.emerson.com/#sle.
 - d. HoldRite, a brand of Reliance Worldwide Corporation: www.holdrite.com/#sle.

- e. nVent; Caddy: www.nvent.com/#sle.
 - f. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Metal Channel/Strut Framing Systems:
 - 1. Manufacturers:
 - a. ABB: www.electrification.us.abb.com/#sle.
 - b. Atkore International Inc; Unistrut: www.unistrut.us/#sle.
 - c. Eaton Corporation: www.eaton.com/#sle.
 - d. Elgen Manufacturing Company, Inc: www.elgenmfg.com/#sle.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
 - f. Source Limitations: Furnish channel/strut and associated fittings, accessories, and hardware produced by single manufacturer.
 - 2. Description: Factory-fabricated, continuous-slot, metal channel/strut and associated fittings, accessories, and hardware required for field assembly of supports.
 - 3. Comply with MFMA-4.
- F. Hanger Rods: Threaded, zinc-plated steel unless otherwise indicated.
 - 1. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Equipment Supports: 1/2-inch (13 mm) diameter.
 - b. Single Conduit up to 1-inch (27 mm) Trade Size: 1/4-inch (6 mm) diameter.
 - c. Single Conduit Larger than 1-inch (27 mm) Trade Size: 3/8-inch (10 mm) diameter.
 - d. Trapeze Support for Multiple Conduits: 3/8-inch (10 mm) diameter.
 - e. Outlet Boxes: 1/4-inch (6 mm) diameter.
 - f. Luminaires: 1/4-inch (6 mm) diameter.
- G. Anchors and Fasteners:
 - 1. Manufacturers - Mechanical Anchors:
 - a. Dewalt: anchors.dewalt.com/#sle.
 - b. Hilti, Inc: www.hilti.com/#sle.
 - c. ITW Red Head, a division of Illinois Tool Works, Inc: www.itwredhead.com/#sle.
 - d. Simpson Strong-Tie Company Inc: www.strongtie.com/#sle.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. Unless otherwise indicated and where not otherwise restricted, use anchor and fastener types indicated for specified applications.
 - 3. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
 - 4. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
 - 5. Hollow Masonry: Use toggle bolts.
 - 6. Hollow Stud Walls: Use toggle bolts.
 - 7. Steel: Use beam clamps or machine bolts.
 - 8. Sheet Metal: Use sheet metal screws.
 - 9. Wood: Use wood screws.
 - 10. Plastic and lead anchors are not permitted.
 - 11. Powder-actuated fasteners are not permitted.
 - 12. Hammer-driven anchors and fasteners are not permitted.
 - 13. Preset Concrete Inserts: Continuous metal channel/strut and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.

- a. Manufacturer: Same as manufacturer of metal channel/strut framing system.
 - b. Comply with MFMA-4.
 - c. Channel Material: Use galvanized steel.
 - d. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch (2.66 mm) minimum base metal thickness.
14. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install hangers and supports in accordance with NECA 1.
- C. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- D. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- E. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- F. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- G. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- H. Do not install anchors in concrete structural members, including columns or beams, without approval of Structural Engineer and in coordination with structural drawings and details.
- I. Provide required vibration isolation and/or seismic controls; see Section 26 05 48.
- J. Equipment Support and Attachment:
 - 1. Use metal, fabricated supports or supports assembled from metal channel/strut to support equipment as required.
 - 2. Use metal channel/strut secured to studs to support equipment surface mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 - 3. Use metal channel/strut to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.

- 4. Unless otherwise indicated, mount floor-mounted equipment on properly sized concrete pad 4 inches (100 mm) in height, extending a minimum of 4 inches (100 mm) on all accessible sides and with 3/4 inch (20 mm) chamfered edge; see Section 03 30 00.
- 5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- K. Conduit Support and Attachment: See Section 26 05 33.13 for additional requirements.
- L. Cable Tray Support and Attachment: See Section 26 05 36 for additional requirements.
- M. Box Support and Attachment: See Section 26 05 33.16 for additional requirements.
- N. Interior Luminaire Support and Attachment: See Section 26 51 00 for additional requirements.
- O. Exterior Luminaire Support and Attachment: See Section 26 56 00 for additional requirements.
- P. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.
- Q. Secure fasteners in accordance with manufacturer's recommended torque settings.
- R. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements for additional requirements.
- B. Inspect support and attachment components for damage and defects.
- C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- D. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION 26 05 29

SECTION 26 05 33.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Galvanized steel rigid metal conduit (RMC).
- B. Stainless steel rigid metal conduit (RMC).
- C. Aluminum rigid metal conduit (RMC).
- D. Galvanized steel intermediate metal conduit (IMC).
- E. Stainless steel intermediate metal conduit (IMC).
- F. PVC-coated galvanized steel rigid metal conduit (RMC).
- G. Flexible metal conduit (FMC).
- H. Liquidtight flexible metal conduit (LFMC).
- I. Galvanized steel electrical metallic tubing (EMT).
- J. Stainless steel electrical metallic tubing (EMT).
- K. Rigid polyvinyl chloride (PVC) conduit.
- L. High-density polyethylene (HDPE) conduit.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete encasement of conduits.
- B. Section 07 84 00 - Firestopping.
- C. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
 - 1. Includes additional requirements for fittings for grounding and bonding.
- D. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- E. Section 26 05 48 - Vibration and Seismic Controls for Electrical Systems.
- F. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- G. Section 26 21 00 - Low-Voltage Electrical Service Entrance: Additional requirements for electrical service conduits.

- H. Section 31 23 16 - Excavation.
- I. Section 31 23 23 - Fill: Bedding and backfilling.

1.03 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC) 2020.
- B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S) 2020.
- C. ANSI C80.5 - American National Standard for Electrical Rigid Metal Conduit -- Aluminum (ERMC-A) 2020.
- D. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit 2018.
- E. ASTM D2683 - Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing 2020.
- F. ASTM F1055 - Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene (PEX) Pipe and Tubing 2016a (Reapproved 2022).
- G. ASTM F2160 - Standard Specification for Solid Wall High Density Polyethylene (HDPE) Conduit Based on Controlled Outside Diameter (OD) 2016.
- H. ASTM F2176 - Standard Specification for Mechanical Couplings Used on Polyethylene Conduit, Duct and Innerduct 2017.
- I. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- J. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT) 2020.
- K. NECA 102 - Standard for Installing Aluminum Rigid Metal Conduit 2004.
- L. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC) 2017.
- M. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.
- N. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Metal Conduit and Intermediate Metal Conduit 2018.
- O. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit 2020.
- P. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing 2021.
- Q. NEMA TC 7 - Solid-Wall Coilable and Straight Electrical Polyethylene Conduit 2021.
- R. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

- S. UL 1 - Flexible Metal Conduit Current Edition, Including All Revisions.
- T. UL 6 - Electrical Rigid Metal Conduit-Steel Current Edition, Including All Revisions.
- U. UL 6A - Electrical Rigid Metal Conduit-Aluminum, Red Brass, and Stainless Steel Current Edition, Including All Revisions.
- V. UL 360 - Liquid-Tight Flexible Metal Conduit Current Edition, Including All Revisions.
- W. UL 514A - Metallic Outlet Boxes Current Edition, Including All Revisions.
- X. UL 514B - Conduit, Tubing, and Cable Fittings Current Edition, Including All Revisions.
- Y. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings Current Edition, Including All Revisions.
- Z. UL 651A - Schedule 40 and 80 High Density Polyethylene (HDPE) Conduit Current Edition, Including All Revisions.
- AA. UL 746C - Polymeric Materials – Use in Electrical Equipment Evaluations Current Edition, Including All Revisions.
- BB. UL 797 - Electrical Metallic Tubing-Steel Current Edition, Including All Revisions.
- CC. UL 797A - Electrical Metallic Tubing - Aluminum and Stainless Steel Current Edition, Including All Revisions.
- DD. UL 1242 - Electrical Intermediate Metal Conduit-Steel Current Edition, Including All Revisions.
- EE. UL 2419 - Outline of Investigation for Electrically Conductive Corrosion Resistant Compounds Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate minimum sizes of conduits with actual type and quantity of conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate arrangement of conduits with structural members, ductwork, piping, equipment, and other potential conflicts.
 - 3. Verify exact conduit termination locations required for boxes, enclosures, and equipment.
 - 4. Coordinate work to provide roof penetrations that preserve integrity of roofing system and do not void roof warranty.
 - 5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not begin installation of conductors and cables until installation of conduit between termination points is complete.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.
- C. Shop Drawings:
 - 1. Indicate proposed conduit routing for all areas identified by Construction Manager and as required in the Contract.

1.06 QUALITY ASSURANCE

- A. Product Listing Organization Qualifications: Organization recognized by OSHA as Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70, manufacturer's instructions, and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use conduit types indicated for specified applications. Where more than one listed application applies, comply with most restrictive requirements. Where conduit type for a particular application is not specified, submit an RFI to the Architect for clarification.
 - 1. Exception:
 - a. Comply with all utility regulations for materials and methods, regardless of conduit types specified within this section.
- C. Underground:
 - 1. Under Slab on Grade: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or rigid PVC conduit.
 - 2. Exterior, Direct-Buried: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), rigid PVC conduit, or high-density polyethylene (HDPE) conduit.
 - 3. Exterior, Embedded Within Concrete: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or rigid PVC conduit.
 - 4. Where rigid polyvinyl chloride (PVC) conduit is provided, transition to galvanized steel intermediate metal conduit (IMC) or PVC-coated galvanized steel rigid metal conduit (RMC) where emerging from underground.
 - 5. Where rigid polyvinyl (PVC) conduit larger than 2-inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit (RMC) elbows, galvanized steel intermediate metal conduit (IMC) elbows, or PVC-coated galvanized steel rigid metal conduit (RMC) elbows for bends.
 - 6. Where galvanized steel rigid metal conduit (RMC) or galvanized steel intermediate metal conduit (IMC) is installed in direct contact with earth where soil has resistivity of less

than 2000 ohm-centimeters or is characterized as severely corrosive based on soils report or local experience, use corrosion protection tape, factory-applied corrosion protection coating, or field-applied corrosion protection compound acceptable to authorities having jurisdiction to provide supplementary corrosion protection.

7. Where galvanized rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or galvanized steel electrical metallic tubing (EMT) emerges from concrete into soil, use corrosion protection tape, factory-applied corrosion protection coating, or field-applied corrosion protection compound acceptable to authorities having jurisdiction to provide supplementary corrosion protection for minimum of 4 inches (100 mm) on either side of where conduit emerges.
- D. Embedded Within Concrete:
1. Within Slab on Grade: Not permitted.
 2. Within Slab Above Ground: Not permitted.
 3. Within Concrete Walls Above Ground: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), galvanized steel electrical metallic tubing (EMT), or rigid PVC conduit.
 4. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or galvanized steel electrical metallic tubing (EMT) where emerging from concrete.
- E. Concealed Within Masonry Walls: Use galvanized steel intermediate metal conduit (IMC) or galvanized steel electrical metallic tubing (EMT).
- F. Concealed Within Hollow Stud Walls: Use galvanized steel intermediate metal conduit (IMC) or galvanized steel electrical metallic tubing (EMT).
- G. Concealed Above Accessible Ceilings: Use galvanized steel intermediate metal conduit (IMC) or galvanized steel electrical metallic tubing (EMT).
- H. Interior, Damp or Wet Locations: Use aluminum rigid metal conduit (RMC), stainless steel intermediate metal conduit (IMC), or stainless steel electrical metallic tubing (EMT).
- I. Exposed, Interior, Not Subject to Physical Damage: Use aluminum rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or galvanized steel electrical metallic tubing (EMT).
- J. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit (RMC), aluminum rigid metal conduit (RMC), or galvanized steel intermediate metal conduit (IMC).
- K. Exposed, Exterior, Not Subject to Severe Physical Damage: Use galvanized steel rigid metal conduit (RMC), aluminum rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or PVC-coated galvanized steel rigid metal conduit (RMC).
- L. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit (RMC) or galvanized steel intermediate metal conduit (IMC).
- M. Flexible Connections to Vibrating Equipment:
1. Dry Locations: Use flexible metal conduit (FMC).
 2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit (LFMC).

3. Maximum Length: 6 feet (1.8 m) unless otherwise indicated.
4. Vibrating equipment includes, but is not limited to:
 - a. Transformers.
 - b. Motors.

2.02 CONDUIT - GENERAL REQUIREMENTS

- A. Comply with NFPA 70.
- B. Electrical Service Conduits: See Section 26 21 00 for additional requirements.
- C. Fittings for Grounding and Bonding: See Section 26 05 26 for additional requirements.
- D. Provide conduit, fittings, supports, and accessories required for complete raceway system.
- E. Provide products listed, classified, and labeled as suitable for purpose intended.
- F. Minimum Conduit Size, Unless Otherwise Indicated:
 1. Branch Circuits: 3/4-inch (21 mm) trade size.
 2. Branch Circuit Homeruns: 3/4-inch (21 mm) trade size.
 3. Control Circuits: 3/4-inch (21 mm) trade size.
 4. Underground, Interior: 3/4-inch (21 mm) trade size.
 5. Underground, Exterior: 1-inch (27 mm) trade size.
- G. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Manufacturers:
 1. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com/#sle.
 2. Nucor Tubular Products: www.nucortubular.com/#sle.
 3. Western Tube, a division of Zekelman Industries: www.westerntube.com/#sle.
 4. Wheatland Tube, a division of Zekelman Industries: www.wheatland.com/#sle.
 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- C. Fittings:
 1. Manufacturers:
 - a. ABB; T&B: www.electrification.us.abb.com/#sle.
 - b. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.us/#sle.
 - c. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - d. Emerson Electric Co; O-Z/Gedney: www.emerson.com/#sle.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
 2. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6.
 3. Material: Use steel or malleable iron.

- a. Do not use die cast zinc fittings.
4. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.04 STAINLESS STEEL RIGID METAL CONDUIT (RMC)

- A. Manufacturers:
 1. Calbrite, a division of Atkore International: www.calbrite.com/#sle.
 2. Gibson Stainless & Specialty Inc: www.gibsonstainless.com/#sle.
 3. Patriot Industries, a division of Patriot Aluminum Products LLC: www.patriotsas.com/#sle.
 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Description: NFPA 70, Type RMC stainless steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6A.
 1. Material: Type 304 or 316 stainless steel.
- C. Fittings:
 1. Manufacturers:
 - a. Calbrite, a division of Atkore International: www.calbrite.com/#sle.
 - b. Eaton: www.eaton.com/#sle.
 - c. Gibson Stainless & Specialty Inc: www.gibsonstainless.com/#sle.
 - d. Patriot Industries, a division of Patriot Aluminum Products LLC: www.patriotsas.com/#sle.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
 2. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6A.
 3. Material: Use stainless steel with corrosion resistance equivalent to conduit.
 4. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.05 ALUMINUM RIGID METAL CONDUIT (RMC)

- A. Manufacturers:
 1. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com/#sle.
 2. Nucor Tubular Products: www.nucortubular.com/#sle.
 3. Western Tube, a division of Zekelman Industries: www.westerntube.com/#sle.
 4. Wheatland Tube, a division of Zekelman Industries: www.wheatland.com/#sle.
 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Description: NFPA 70, Type RMC aluminum rigid metal conduit complying with ANSI C80.5 and listed and labeled as complying with UL 6A.
- C. Fittings:
 1. Manufacturers:
 - a. ABB; T&B: www.electrification.us.abb.com/#sle.
 - b. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.us/#sle.
 - c. Bridgeport Fittings, LLC: www.bptfittings.com/#sle.

- d. Emerson Electric Co; O-Z/Gedney: www.emerson.com/#sle.
- e. Substitutions: See Section 01 60 00 - Product Requirements.
- 2. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6A.
- 3. Material: Use aluminum.
- 4. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.06 GALVANIZED STEEL INTERMEDIATE METAL CONDUIT (IMC)

- A. Manufacturers:
 - 1. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com/#sle.
 - 2. Nucor Tubular Products: www.nucortubular.com/#sle.
 - 3. Western Tube, a division of Zekelman Industries: www.westerntube.com/#sle.
 - 4. Wheatland Tube, a division of Zekelman Industries: www.wheatland.com/#sle.
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- C. Fittings:
 - 1. Manufacturers:
 - a. ABB; T&B: www.electrification.us.abb.com/#sle.
 - b. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.us/#sle.
 - c. Bridgeport Fittings, LLC: www.bptfittings.com/#sle.
 - d. Emerson Electric Co; O-Z/Gedney: www.emerson.com/#sle.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 1242.
 - 3. Material: Use steel or malleable iron.
 - a. Do not use die cast zinc fittings.
 - 4. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.07 STAINLESS STEEL INTERMEDIATE METAL CONDUIT (IMC)

- A. Manufacturers:
 - 1. Calbrite, a division of Atkore International: www.calbrite.com/#sle.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
 - 1. Material: Type 304 or 316 stainless steel.
- C. Fittings:
 - 1. Manufacturers:
 - a. Calbrite, a division of Atkore International: www.calbrite.com/#sle.
 - b. Eaton: www.eaton.com/#sle.

- c. Substitutions: See Section 01 60 00 - Product Requirements.
- 2. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 1242.
- 3. Material: Use stainless steel with corrosion resistance equivalent to conduit.
- 4. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.08 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Manufacturers:
 - 1. ABB; Ocal: www.electrification.us.abb.com/#sle.
 - 2. Calbond, a division of Atkore International www.calbond.com/#sle
 - 3. Perma-Cote, a division of Robroy Industries: www.robroy.com/#sle.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.
- C. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil, 0.040 inch (1.02 mm).
- D. Interior Coating: Urethane, minimum thickness of 2 mil, 0.002 inch (0.05 mm).
- E. PVC-Coated Boxes and Fittings:
 - 1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
 - 2. Nonhazardous Locations: Use boxes and fittings listed and labeled as complying with UL 514A, UL 514B, or UL 6.
 - 3. Material: Use steel or malleable iron.
 - 4. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil, 0.040 inch (1.02 mm).
- F. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil, 0.015 inch (0.38 mm).

2.09 FLEXIBLE METAL CONDUIT (FMC)

- A. Manufacturers:
 - 1. AFC Cable Systems, a division of Atkore International: www.afcweb.com/#sle.
 - 2. Electri-Flex Company: www.electriflex.com/#sle.
 - 3. International Metal Hose: www.metalhose.com/#sle.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Description: NFPA 70, Type FMC standard-wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems.
- C. Fittings:
 - 1. Manufacturers:
 - a. ABB; T&B: www.electrification.us.abb.com/#sle.

- b. Bridgeport Fittings, LLC: www.bptfittings.com/#sle.
 - c. Emerson Electric Co; O-Z/Gedney: www.emerson.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
- 3. Material: Use steel or malleable iron.
 - a. Do not use die cast zinc fittings.
 - b. Do not use set screw or screw in type fittings.

2.10 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- A. Manufacturers:
 - 1. AFC Cable Systems, a division of Atkore International: www.afcweb.com/#sle.
 - 2. Electri-Flex Company: www.electriflex.com/#sle.
 - 3. International Metal Hose: www.metalhose.com/#sle.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- C. Fittings:
 - 1. Manufacturers:
 - a. ABB; T&B: www.electrification.us.abb.com/#sle.
 - b. Bridgeport Fittings, LLC: www.bptfittings.com/#sle.
 - c. Emerson Electric Co; O-Z/Gedney: www.emerson.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 3. Material: Use steel or malleable iron.
 - a. Do not use die cast zinc fittings.

2.11 GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT)

- A. Manufacturers:
 - 1. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com/#sle.
 - 2. Nucor Tubular Products: www.nucortubular/#sle.
 - 3. Western Tube, a division of Zekelman Industries: www.westerntube.com/#sle.
 - 4. Wheatland Tube, a division of Zekelman Industries: www.wheatland.com/#sle.
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Description: NFPA 70, Type EMT galvanized steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- C. Fittings:
 - 1. Manufacturers:
 - a. ABB; T&B: www.electrification.us.abb.com/#sle.
 - b. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.us/#sle.
 - c. Bridgeport Fittings, LLC: www.bptfittings.com/#sle.

- d. Emerson Electric Co; O-Z/Gedney: www.emerson.com/#sle.
- e. Substitutions: See Section 01 60 00 - Product Requirements.
- 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
- 3. Material: Use steel or malleable iron.
 - a. Do not use die cast zinc fittings.
- 4. Connectors and Couplings: Use compression/gland or set-screw type.
 - a. Do not use indenter type connectors and couplings.
- 5. Embedded Within Concrete, Where Permitted: Use fittings listed as concrete-tight. Fittings that require taping to be concrete-tight are acceptable.

2.12 STAINLESS STEEL ELECTRICAL METALLIC TUBING (EMT)

- A. Manufacturers:
 - 1. Calbrite, a division of Atkore International: www.calbrite.com/#sle.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Description: NFPA 70, Type EMT stainless steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797A.
 - 1. Material: Type 304 or 316 stainless steel.
- C. Fittings:
 - 1. Manufacturers:
 - a. Calbrite, a division of Atkore International: www.calbrite.com/#sle.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 3. Material: Use stainless steel with corrosion resistance equivalent to conduit.
 - 4. Connectors and Couplings: Use compression/gland or set-screw type.
 - 5. Damp or Wet Locations, Where Permitted: Use fittings listed for use in wet locations.

2.13 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

- A. Manufacturers:
 - 1. ABB; Carlon: www.carlon.com/#sle.
 - 2. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com/#sle.
 - 3. Cantex Inc: www.cantexinc.com/#sle.
 - 4. Heritage Plastics, a division of Atkore International: www.heritageplastics.com/#sle.
 - 5. JM Eagle: www.jmeagle.com/#sle.
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.
- C. Fittings:
 - 1. Manufacturer: Same as manufacturer of conduit to be connected.

2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.14 HIGH-DENSITY POLYETHYLENE (HDPE) CONDUIT

- A. Manufacturers:
 1. ABB; Carlon: www.electrification.us.abb.com/#sle.
 2. Blue Diamond Industries, LLC: www.bdiky.com/#sle.
 3. Eastern Wire + Conduit, a division of Atkore International: www.easternwire.com/#sle.
 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Description: NFPA 70, Type HDPE high-density polyethylene solid-wall conduit complying with ASTM F2160 and NEMA TC 7; list and label as complying with UL 651A; Schedule 40 unless otherwise indicated.
- C. Joining Methods: Approved by HDPE conduit manufacturer.
- D. Mechanical Fittings: Comply with ASTM F2176; list and label as complying with UL 651A.
- E. Socket Fusion Fittings: Comply with ASTM D2683.
- F. Electrofusion Fittings: Comply with ASTM F1055.

2.15 ACCESSORIES

- A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil, 0.020 inch (0.51 mm).
- B. Conduit Joint Compound: Corrosion-resistant, electrically conductive compound listed as complying with UL 2419; suitable for use with conduit to be installed.
- C. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
- D. Adhesive for HDPE and RTRC Conduit:
 1. Specifically designed for bonding dissimilar materials in lieu of transition fittings, including but not limited to polyethylene, fiberglass, PVC, aluminum, and steel; UL 746C recognized.
 2. Approved by adhesive manufacturer for use with materials to be joined.
- E. Pull Strings: Use nylon or polyester tape with average breaking strength of not less than 1,250 lbf (5.6 kN).
- F. Foam Conduit Sealant:
 1. Removable, two-part, closed-cell foam, specifically designed for sealing conduit openings against water, moisture, gases, and dust.
 2. Suitable for use with conductors/cables and associated insulation/jackets to be installed.
 3. Rated to hold minimum of 10 ft (3.0 m) water head pressure.
 4. Products:
 - a. American Polywater Corporation; Polywater AFT Foam Duct Sealant: www.polywater.com/#sle.

- b. American Polywater Corporation; Polywater FST Foam Duct Sealant: www.polywater.com/#sle.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- G. Sealing Systems for Concrete Penetrations:
 - 1. Sleeves: Provide water stop ring or cement coating that bonds to concrete to prevent water infiltration.
 - 2. Rate for minimum of 40 psig; suitable for sealing around conduits to be installed.
 - 3. Products:
 - a. American Polywater Corporation; PZVR Cement-Coated Concrete Wall Sleeves: www.polywater-haufftechnik.com/#sle.
 - b. American Polywater Corporation; PHSD Mechanical Seals: www.polywater-haufftechnik.com/#sle.
 - c. American Polywater Corporation; PHSI 150 Varia Double Wall Inserts: www.polywater-haufftechnik.com/#sle.
 - d. American Polywater Corporation; PGKD Modular Seals: www.polywater-haufftechnik.com/#sle.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
- H. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.
 - 1. Products:
 - a. HoldRite, a brand of Reliance Worldwide Corporation; HydroFlame Pro Series/HydroFlame Custom Built: www.holdrite.com/#sle.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- I. Duct Bank Spacers: Nonmetallic; designed for maintaining conduit/duct spacing for concrete encasement in open trench installation; suitable for conduit/duct arrangement to be installed.
 - 1. Products:
 - a. Advance Products & Systems, LLC; Duct Bank Spacers: www.apsonline.com/#sle.
 - b. Allied Tube & Conduit, a division of Atkore; Duct Bank Spacers: www.alliedeg.us/#sle.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.

- B. Install conduit in accordance with NECA 1.
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install aluminum rigid metal conduit (RMC) in accordance with NECA 102.
- E. Install intermediate metal conduit (IMC) in accordance with NECA 101.
- F. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by manufacturer.
- G. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
- H. Conduit Routing:
 - 1. Unless dimensioned, conduit routing indicated is diagrammatic.
 - 2. When conduit destination is indicated without specific routing, determine exact routing required.
 - 3. Conduits in the following areas may be exposed, unless otherwise indicated:
 - a. Electrical rooms.
 - b. Mechanical equipment rooms.
 - c. Within joists in areas with no ceiling.
 - 4. Unless otherwise approved, do not route exposed conduits:
 - a. Across floors.
 - b. Across roofs.
 - c. Across top of parapet walls.
 - d. Across building exterior surfaces.
 - 5. Conduits installed underground or embedded in concrete may be routed in shortest possible manner unless otherwise indicated. Route other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
 - 6. Arrange conduit to maintain adequate headroom, clearances, and access.
 - 7. Arrange conduit to provide no more than equivalent of four 90-degree bends between pull points.
 - 8. Arrange conduit to provide no more than 150 feet (46 m) between pull points.
 - 9. Route conduits above water and drain piping where possible.
 - 10. Maintain minimum clearance of 6 inches (150 mm) between conduits and piping for other systems.
 - 11. Maintain minimum clearance of 12 inches (300 mm) between conduits and hot surfaces. This includes, but is not limited to:
 - a. Heaters.
 - b. Hot water piping.
 - c. Flues.
 - 12. Group parallel conduits in same area on common rack.
- I. Conduit Support:
 - 1. Secure and support conduits in accordance with NFPA 70 using suitable supports and methods approved by authorities having jurisdiction; see Section 26 05 29.
 - 2. Provide required vibration isolation and/or seismic controls; see Section 26 05 48.

3. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
4. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
5. Use conduit strap to support single surface-mounted conduit.
 - a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
6. Use metal channel/strut with accessory conduit clamps to support multiple parallel surface-mounted conduits.
7. Use conduit clamp to support single conduit from beam clamp or threaded rod.
8. Use trapeze hangers assembled from threaded rods and metal channel/strut with accessory conduit clamps to support multiple parallel suspended conduits.
9. Use of spring steel conduit clips for support of conduits is permitted only as follows:
 - a. Support of electrical metallic tubing (EMT) up to 1-inch (27 mm) trade size concealed above accessible ceilings and within hollow stud walls.
10. Use of wire for support of conduits is not permitted.

J. Connections and Terminations:

1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
3. Use suitable adapters where required to transition from one type of conduit to another.
4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
6. Where spare conduits stub up through concrete floors and are not terminated in box or enclosure, provide threaded couplings equipped with threaded plugs set flush with finished floor.
7. Provide insulating bushings, insulated throats, or listed metal fittings with smooth, rounded edges at conduit terminations to protect conductors.
8. Secure joints and connections to provide mechanical strength and electrical continuity.

K. Penetrations:

1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
2. Make penetrations perpendicular to surfaces unless otherwise indicated.
3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
4. Conceal bends for conduit risers emerging above ground.
5. Provide suitable sealing system where conduits penetrate exterior wall below grade, when permitted by the Structural Engineer.
6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations

- are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty.
8. Install firestopping to preserve fire resistance rating of partitions and other elements; see Section 07 84 00.
- L. Underground Installation:
1. Provide trenching and backfilling; see Section 31 23 16 and Section 31 23 23.
 2. Minimum Cover, Unless Otherwise Indicated or Required:
 - a. Underground, Exterior: 24 inches (610 mm).
 - b. Under Slab on Grade: 12 inches (300 mm) to bottom of slab.
 3. Provide underground warning tape along entire conduit length for service entrance where not concrete-encased; see Section 26 05 53.
- M. Concrete Encasement: Where conduits not otherwise embedded within concrete are indicated to be concrete-encased, provide minimum concrete cover of 3 inches (76 mm) on all sides unless otherwise indicated; see Section 03 30 00.
1. This includes, but is not limited to the following:
 - a. Engine generator output raceways.
 - b. Fire pump service entrance raceways.
- N. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
 2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
 3. Where conduits are subject to earth movement by settlement or frost.
- O. Conduit Sealing:
1. Use foam conduit sealant to prevent entry of moisture and gases. This includes, but is not limited to:
 - a. Where conduits enter building from outside.
 - b. Where service conduits enter building from underground distribution system.
 - c. Where conduits enter building from underground.
 - d. Where conduits may transport moisture to contact live parts.
 2. Where conduits cross barriers between areas of potential substantial temperature differential, use foam conduit sealant at accessible point near penetration to prevent condensation. This includes, but is not limited to:
 - a. Where conduits pass from outdoors into conditioned interior spaces.
 - b. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
 - c. Where conduits penetrate coolers or freezers.
- P. Provide pull string in each empty conduit and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches (300 mm) at each end.
- Q. Provide grounding and bonding; see Section 26 05 26.
- R. Identify conduits; see Section 26 05 53.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements for additional requirements.
- B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- C. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer's instructions.
- D. Correct deficiencies and replace damaged or defective conduits.

END OF SECTION 26 05 33.13

SECTION 26 05 33.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Outlet and device boxes up to 100 cubic inches (1,650 cu cm), including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches (1,650 cu cm).
- C. Boxes and enclosures for integrated power, data, and audio/video.
- D. Floor boxes.
- E. Underground boxes/enclosures.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete.
- B. Section 08 31 00 - Access Doors and Panels: Panels for maintaining access to concealed boxes.
- C. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- D. Section 26 05 33.13 - Conduit for Electrical Systems:
 - 1. Conduit bodies and other fittings.
 - 2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.
- E. Section 26 05 48 - Vibration and Seismic Controls for Electrical Systems.
- F. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- G. Section 26 27 26 - Wiring Devices:
 - 1. Wall plates.
 - 2. Floor box service fittings.
 - 3. Additional requirements for locating boxes for wiring devices.
- H. Section 27 10 00 - Structured Cabling: Additional requirements for communications systems outlet boxes.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2016.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- D. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.
- E. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports 2013 (Reaffirmed 2020).
- F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. SCTE 77 - Specifications for Underground Enclosure Integrity 2017.
- H. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- I. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- J. UL 508A - Industrial Control Panels Current Edition, Including All Revisions.
- K. UL 514A - Metallic Outlet Boxes Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
 - 4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
 - 5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
 - 6. Coordinate the work with other trades to preserve insulation integrity.
 - 7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
 - 8. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for floor boxes and underground boxes/enclosures.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 BOXES

- A. General Requirements:
 - 1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
 - 2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
 - 3. Provide products listed, classified, and labeled as suitable for the purpose intended.
 - 4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
 - 5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches (1,650 cu cm), Including Those Used as Junction and Pull Boxes:
 - 1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
 - 2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
 - 3. Use cast iron boxes or cast aluminum boxes where exposed galvanized steel rigid metal conduit or exposed intermediate metal conduit (IMC) is used.
 - 4. Use cast aluminum boxes where aluminum rigid metal conduit is used.
 - 5. Use suitable concrete type boxes where flush-mounted in concrete.
 - 6. Use suitable masonry type boxes where flush-mounted in masonry walls.
 - 7. Use raised covers suitable for the type of wall construction and device configuration where required.
 - 8. Use shallow boxes where required by the type of wall construction.
 - 9. Do not use "through-wall" boxes designed for access from both sides of wall.
 - 10. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
 - 11. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
 - 12. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.

13. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
 14. Minimum Box Size, Unless Otherwise Indicated:
 - a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 2-1/8 inch deep (100 by 54 mm) trade size.
 - b. Communications Systems Outlets: Comply with Section 27 10 00.
 - c. Ceiling Outlets: 4 inch octagonal or square by 1-1/2 inch deep (100 by 38 mm) trade size.
 15. Wall Plates: Comply with Section 26 27 26.
 16. Manufacturers:
 - a. Cooper Crouse-Hinds, a division of Eaton Corporation
: www.cooperindustries.com/#sle.
 - b. Hubbell Incorporated; Bell Products: www.hubbell-rtb.com/#sle.
 - c. Hubbell Incorporated; RACO Products: www.hubbell-rtb.com/#sle.
 - d. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
 - e. Thomas & Betts Corporation: www.tnb.com/#sle.
 - f. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
 2. NEMA 250 Environment Type, Unless Otherwise Indicated:
 - a. Indoor Clean, Dry Locations: Type 1, painted steel.
 - b. Outdoor Locations: Type 3R, painted steel.
 3. Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
 - a. Provide hinged-cover enclosures unless otherwise indicated.
 4. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
 5. Manufacturers:
 - a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com/#sle.
 - b. Hoffman, a brand of Pentair Technical Products: www.hoffmanonline.com/#sle.
 - c. Hubbell Incorporated; Wiegmann Products: www.hubbell-wiegmann.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Boxes and Enclosures for Integrated Power, Data, and Audio/Video: Size and configuration as indicated or as required with partitions to separate services; field-connected gangable boxes may not be used.
1. Manufacturers:
 - a. Hubbell Incorporated: www.hubbell.com/#sle.
 - b. FSR Incorporated: www.fsrinc.com/#sle.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Floor Boxes:
1. Description: Floor boxes compatible with floor box service fittings provided in accordance with Section 26 27 26; with partitions to separate multiple services; furnished with all components, adapters, and trims required for complete installation.

2. Use cast iron or sheet-steel floor boxes within slab on grade.
 3. Metallic Floor Boxes: Fully adjustable (with integral means for leveling adjustment prior to and after concrete pour).
 4. Manufacturer: Same as manufacturer of floor box service fittings.
- F. Underground Boxes/Enclosures:
1. Description: In-ground, open bottom boxes furnished with flush, non-skid covers with legend indicating type of service and stainless steel tamper resistant cover bolts.
 2. Size: As indicated on drawings.
 3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 12 inches (300 mm).
 4. Provide logo on cover to indicate type of service.
 5. Applications:
 - a. Sidewalks and Landscaped Areas Subject Only to Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77 Tier 5 load rating.
 - b. Parking Lots, in Areas Subject Only To Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77 Tier 15 load rating.
 - c. Do not use polymer concrete enclosures in areas subject to deliberate vehicular traffic.
 6. Polymer Concrete Underground Boxes/Enclosures: Comply with SCTE 77.
 - a. Manufacturers:
 - 1) Hubbell Incorporated; Quazite Products
: www.hubbellpowersystems.com/#sle.
 - 2) MacLean Highline: www.macleanhighline.com/#sle.
 - 3) Oldcastle Precast, Inc: www.oldcastleprecast.com/#sle.
 - 4) Substitutions: See Section 01 60 00 - Product Requirements.
 - b. Combination fiberglass/polymer concrete boxes/enclosures are not acceptable. Use all-polymer concrete boxes/enclosures.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive boxes.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, except for mounting heights specified in those standards.

- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide separate boxes for emergency power and normal power systems.
- E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
- F. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.
- G. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.
- H. Box Locations:
 - 1. Locate boxes to be accessible. Provide access panels in accordance with Section 08 31 00 as required where approved by the Architect.
 - 2. Unless dimensioned, box locations indicated are approximate.
 - 3. Locate boxes as required for devices installed under other sections or by others.
 - a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 26 27 26.
 - b. Communications Systems Outlets: Comply with Section 27 10 00.
 - 4. Locate boxes so that wall plates do not span different building finishes.
 - 5. Locate boxes so that wall plates do not cross masonry joints.
 - 6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
 - 7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches (150 mm) horizontal separation unless otherwise indicated.
 - 8. Acoustic-Rated Walls: Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches (610 mm) horizontal separation.
 - 9. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
 - a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches (610 mm) separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.
 - b. Do not install flush-mounted boxes with area larger than 16 square inches (0.0103 sq m) or such that the total aggregate area of openings exceeds 100 square inches (0.0645 sq m) for any 100 square feet (9.29 sq m) of wall area.
 - 10. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 26 05 33.13.
 - 11. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:
 - a. Concealed above accessible suspended ceilings.
 - b. Within joists in areas with no ceiling.
 - c. Electrical rooms.
 - d. Mechanical equipment rooms.
- I. Box Supports:
 - 1. Secure and support boxes in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.

2. Provide required seismic controls in accordance with Section 26 05 48.
 3. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
 4. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
 5. Use far-side support to secure flush-mounted boxes supported from single stud in hollow stud walls. Repair or replace supports for boxes that permit excessive movement.
- J. Install boxes plumb and level.
- K. Flush-Mounted Boxes:
1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch (6 mm) or does not project beyond finished surface.
 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch (3 mm) at the edge of the box.
- L. Install boxes as required to preserve insulation integrity.
- M. Metallic Floor Boxes: Install box level at the proper elevation to be flush with finished floor.
- N. Underground Boxes/Enclosures:
1. Install enclosure on gravel base, minimum 6 inches (150 mm) deep.
 2. Flush-mount enclosures located in concrete or paved areas.
 3. Mount enclosures located in landscaped areas with top at 1 inch (25 mm) above finished grade.
 4. Provide cast-in-place concrete collar constructed in accordance with Section 03 30 00, minimum 10 inches wide by 12 inches deep (250 mm wide by 300 mm deep), around enclosures that are not located in concrete areas.
 5. Install additional bracing inside enclosures in accordance with manufacturer's instructions to minimize box sidewall deflections during backfilling. Backfill with cover bolted in place.
- O. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- P. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
- Q. Close unused box openings.
- R. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- S. Provide grounding and bonding in accordance with Section 26 05 26.

T. Identify boxes in accordance with Section 26 05 53.

3.03 CLEANING

A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

END OF SECTION 26 05 33.16

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SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Wire and cable markers.
- D. Voltage markers.
- E. Underground warning tape.
- F. Warning signs and labels.

1.02 RELATED REQUIREMENTS

- A. Section 09 91 13 - Exterior Painting.
- B. Section 09 91 23 - Interior Painting.
- C. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.
- D. Section 26 05 73 - Power System Studies: Arc flash hazard warning labels.
- E. Section 26 27 26 - Wiring Devices - Lutron: Device and wallplate finishes; factory pre-marked wallplates.
- F. Section 27 10 00 - Structured Cabling: Identification for communications cabling and devices.

1.03 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- B. UL 969 - Marking and Labeling Systems Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

1.06 FIELD CONDITIONS

- A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

- A. Identification for Equipment:
 - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
 - a. Panelboards:
 - 1) Identify power source and circuit number. Include location when not within sight of equipment.
 - 2) Identify main overcurrent protective device. Use identification label for panelboards with a door. For power distribution panelboards without a door, use identification nameplate.
 - 3) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces.
 - 4) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
 - b. Transformers:
 - 1) Identify power source and circuit number. Include location when not within sight of equipment.
 - c. Enclosed switches, circuit breakers, and motor controllers:
 - 1) Identify power source and circuit number. Include location when not within sight of equipment.
 - 2) Identify load(s) served. Include location when not within sight of equipment.
 - d. Time Switches:
 - 1) Identify load(s) served and associated circuits controlled. Include location.
 - e. Enclosed Contactors:
 - 1) Identify load(s) and associated circuits controlled. Include location.
 - f. Transfer Switches:
 - 1) Identify power source and circuit number for both normal power source and standby power source. Include location when not within sight of equipment.
 - 2) Identify load(s) served. Include location when not within sight of equipment.
 - 3) Identify short circuit current rating based on the specific overcurrent protective device type and settings protecting the transfer switch.
 - 2. Service Equipment:

- a. Use identification nameplate to identify each service disconnecting means.
 - b. For buildings or structures supplied by more than one service, or any combination of branch circuits, feeders, and services, use identification nameplate or means of identification acceptable to authority having jurisdiction at each service disconnecting means to identify all other services, feeders, and branch circuits supplying that building or structure. Verify format and descriptions with authority having jurisdiction.
 3. Use voltage marker to identify highest voltage present for each piece of electrical equipment.
 4. Use identification label to identify equipment utilizing series ratings, where permitted, in accordance with NFPA 70.
 5. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.
 6. Use identification label or handwritten text using indelible marker on inside of door at each fused switch to identify required NEMA fuse class and size.
 7. Use identification label to identify overcurrent protective devices for branch circuits serving fire alarm circuits. Identify with text "FIRE ALARM CIRCUIT".
 8. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.
 - a. Service equipment.
 - b. Industrial control panels.
 - c. Motor control centers.
 - d. Elevator control panels.
 - e. Industrial machinery.
 9. Arc Flash Hazard Warning Labels: Comply with Section 26 05 73.
 10. Use warning labels, identification nameplates, or identification labels to identify electrical hazards for equipment where multiple power sources are present with the word message "DANGER; Hazardous voltage; Multiple power sources may be present; Disconnect all electric power including remote disconnects before servicing" or approved equivalent.
- B. Identification for Conductors and Cables:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.
 2. Identification for Communications Conductors and Cables: Comply with Section 27 10 00.
 3. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
 4. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
 - a. At each source and load connection.
- C. Identification for Raceways:
1. Use factory-painted conduits to identify specified systems for accessible conduits.
 - a. Color Code:
 - 1) Fire Alarm System: Red.

2. Use underground warning tape to identify underground raceways.

D. Identification for Boxes:

1. Use color coded boxes to identify specified systems.
 - a. Color-Coded Boxes: Field-painted in accordance with Section 09 91 23 and 09 91 13 or factory-painted per the same color code used for raceways.
2. Use identification labels or handwritten text using indelible marker to identify circuits enclosed.
 - a. For exposed boxes in public areas, provide identification on inside face of cover.

E. Identification for Devices:

1. Identification for Communications Devices: Comply with Section 27 10 00.
2. Wiring Device and Wallplate Finishes: Comply with Section 26 27 26.
3. Use identification label to identify fire alarm system devices.
4. Use identification label or engraved wallplate to identify serving branch circuit for all receptacles.
 - a. For receptacles in public areas or in areas as directed by Architect, provide identification on inside surface of wallplate.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:

1. Materials:
 - a. Indoor Clean, Dry Locations: Use plastic nameplates.
 - b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch (1.6 mm); engraved text.
3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.
4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.
5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch (25 mm) high; Four, located at corners for larger sizes.

B. Identification Labels:

1. Manufacturers:
 - a. Brady Corporation: www.bradyid.com/#sle.
 - b. Brother International Corporation: www.brother-usa.com/#sle.
 - c. Panduit Corp: www.panduit.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
2. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
 - a. Use only for indoor locations.
3. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

- C. Format for Equipment Identification:
1. Minimum Size: 1 inch (25 mm) by 2.5 inches (64 mm).
 2. Legend:
 - a. System designation where applicable:
 - 1) Fire Alarm System: Identify with text "FIRE ALARM".
 - b. Equipment designation or other approved description.
 3. Text: All capitalized unless otherwise indicated.
 4. Minimum Text Height:
 - a. System Designation: 1 inch (25 mm).
 - b. Equipment Designation: 1/2 inch (13 mm).
 - c. Other Information: 1/4 inch (6 mm).
 5. Color:
 - a. Normal Power System: Black text on white background.
 - b. Fire Alarm System: White text on red background.
- D. Format for General Information and Operating Instructions:
1. Minimum Size: 1 inch (25 mm) by 2.5 inches (64 mm).
 2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
 3. Text: All capitalized unless otherwise indicated.
 4. Minimum Text Height: 1/4 inch (6 mm).
 5. Color: Black text on white background unless otherwise indicated.
 - a. Exceptions:
 - 1) Provide white text on red background for general information or operational instructions for emergency systems.
 - 2) Provide white text on red background for general information or operational instructions for fire alarm systems.
- E. Format for Caution and Warning Messages:
1. Minimum Size: 2 inches (51 mm) by 4 inches (100 mm).
 2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
 3. Text: All capitalized unless otherwise indicated.
 4. Minimum Text Height: 1/2 inch (13 mm).
 5. Color: Black text on yellow background unless otherwise indicated.
- F. Format for Receptacle Identification:
1. Minimum Size: 3/8 inch (10 mm) by 1.5 inches (38 mm).
 2. Legend: Power source and circuit number or other designation indicated.
 3. Text: All capitalized unless otherwise indicated.
 4. Minimum Text Height: 3/16 inch (5 mm).
 5. Color: Black text on clear background.
- G. Format for Fire Alarm Device Identification:
1. Minimum Size: 3/8 inch (10 mm) by 1.5 inches (38 mm).
 2. Legend: Designation indicated and device zone or address.
 3. Text: All capitalized unless otherwise indicated.

4. Minimum Text Height: 3/16 inch (5 mm).
5. Color: Red text on white background.

2.03 WIRE AND CABLE MARKERS

- A. Manufacturers:
 1. Brady Corporation: www.bradyid.com/#sle.
 2. HellermannTyton: www.hellermanntyton.com/#sle.
 3. Panduit Corp: www.panduit.com/#sle.
 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth or wrap-around self-adhesive vinyl self-laminating type markers suitable for the conductor or cable to be identified.
- C. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.
- D. Legend: Power source and circuit number or other designation indicated.
- E. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
- F. Minimum Text Height: 1/8 inch (3 mm).
- G. Color: Black text on white background unless otherwise indicated.

2.04 VOLTAGE MARKERS

- A. Manufacturers:
 1. Brady Corporation: www.bradyid.com/#sle.
 2. Brimar Industries, Inc: www.brimar.com/#sle.
 3. Seton Identification Products: www.seton.com/#sle.
 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.
- C. Minimum Size:
 1. Markers for Equipment: 1 1/8 by 4 1/2 inches (29 by 110 mm).
- D. Legend:
 1. Markers for Voltage Identification: Highest voltage present.
- E. Color: Black text on orange background unless otherwise indicated.

2.05 UNDERGROUND WARNING TAPE

- A. Manufacturers:
 1. Brady Corporation: www.bradyid.com/#sle.
 2. Brimar Industries, Inc: www.brimar.com/#sle.

3. Seton Identification Products: www.seton.com/#sle.
 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Materials: Use foil-backed detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
- C. Foil-backed Detectable Type Tape: 3 inches (76 mm) wide, with minimum thickness of 5 mil (0.1 mm), unless otherwise required for proper detection.
- D. Legend: Type of service, continuously repeated over full length of tape.
- E. Color:
1. Tape for Buried Power Lines: Black text on red background.
 2. Tape for Buried Communication, Alarm, and Signal Lines: Black text on orange background.

2.06 WARNING SIGNS AND LABELS

- A. Manufacturers:
1. Brimar Industries, Inc: www.brimar.com/#sle.
 2. Clarion Safety Systems, LLC: www.clarionsafety.com/#sle.
 3. Insite Solutions, LLC: www.stop-painting.com/#sle.
 4. Seton Identification Products: www.seton.com/#sle.
 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- C. Warning Signs:
1. Materials:
 - a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.
 - b. Outdoor Locations: Use factory pre-printed rigid aluminum signs.
 2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
 3. Minimum Size: 7 by 10 inches (178 by 254 mm) unless otherwise indicated.
- D. Warning Labels:
1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
 - a. Do not use labels designed to be completed using handwritten text.
 2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
 3. Minimum Size: 2 by 4 inches (51 mm by 102 mm) unless otherwise indicated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
 - 1. Surface-Mounted Equipment: Enclosure front.
 - 2. Flush-Mounted Equipment: Inside of equipment door.
 - 3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
 - 4. Elevated Equipment: Legible from the floor or working platform.
 - 5. Branch Devices: Adjacent to device.
 - 6. Interior Components: Legible from the point of access.
 - 7. Conduits: Legible from the floor.
 - 8. Boxes: Outside face of cover.
 - 9. Conductors and Cables: Legible from the point of access.
 - 10. Devices: Outside face of cover.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws, rivets, self-adhesive backing, or epoxy cement and to interior surfaces using self-adhesive backing or epoxy cement.
 - 1. Do not use adhesives on exterior surfaces except where substrate cannot be penetrated.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
- F. Install underground warning tape above buried lines with one tape per trench at 12 inch(es) (300 mm) below finished grade. For trenches exceeding 24 inches (600 mm) in width, install one tape per 24 inches (600 mm).
- G. Secure rigid signs using stainless steel screws.
- H. Mark all handwritten text, where permitted, to be neat and legible.

3.02 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION 26 05 53

SECTION 26 05 83
WIRING CONNECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical connections to equipment.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
- B. Section 26 05 33.13 - Conduit for Electrical Systems.
- C. Section 26 05 33.16 - Boxes for Electrical Systems.
- D. Section 26 27 26 - Wiring Devices.
- E. Section 26 28 16.16 - Enclosed Switches.

1.03 REFERENCE STANDARDS

- A. NEMA WD 1 - General Color Requirements for Wiring Devices 1999 (Reaffirmed 2020).
- B. NEMA WD 6 - Wiring Devices - Dimensional Specifications 2021.
- C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
 - 2. Determine connection locations and requirements.
- B. Sequencing:
 - 1. Install rough-in of electrical connections before installation of equipment is required.
 - 2. Make electrical connections before required start-up of equipment.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide wiring device manufacturer's catalog information showing dimensions, configurations, and construction.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
 - 1. Colors: Comply with NEMA WD 1.
 - 2. Cord Construction: NFPA 70, Type SO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
 - 3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Disconnect Switches: As specified in Section 26 28 16.16 and in individual equipment sections.
- C. Wiring Devices: As specified in Section 26 27 26.
- D. Flexible Conduit: As specified in Section 26 05 33.13.
- E. Wire and Cable: As specified in Section 26 05 19.
- F. Boxes: As specified in Section 26 05 33.16.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 ELECTRICAL CONNECTIONS

- A. Make electrical connections in accordance with equipment manufacturer's instructions.
- B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Provide receptacle outlet to accommodate connection with attachment plug.

- E. Provide cord and cap where field-supplied attachment plug is required.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

END OF SECTION 26 05 83

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SECTION 26 09 23
LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Occupancy sensors.
- B. Time switches.
- C. Outdoor photo controls.
- D. Lighting contactors.
- E. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 29 - Hangers and Supports for Electrical Systems
- B. Section 26 05 33.16 - Boxes for Electrical Systems.
- C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 05 73 - Power System Studies.
- E. Section 26 27 26 - Wiring Devices: Devices for manual control of lighting, including wall switches, wall dimmers, and fan speed controllers.
 - 1. Includes finish requirements for wall controls specified in this section.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2016.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- D. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts 2020.
- E. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts 2008 (Reaffirmed 2020).
- F. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices 2017.
- G. NEMA ICS 6 - Industrial Control and Systems: Enclosures 1993 (Reaffirmed 2016).

- H. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 773A - Nonindustrial Photoelectric Switches for Lighting Control Current Edition, Including All Revisions.
- J. UL 916 - Energy Management Equipment Current Edition, Including All Revisions.
- K. UL 917 - Clock-Operated Switches Current Edition, Including All Revisions.
- L. UL 1472 - Solid-State Dimming Controls Current Edition, Including All Revisions.
- M. UL 60947-1 - Low-Voltage Switchgear and Controlgear - Part 1: General Rules Current Edition, Including All Revisions.
- N. UL 60947-4-1 - Low-Voltage Switchgear and Controlgear - Part 4-1: Contactors and Motor-starters - Electromechanical Contactors and Motor-starters Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the placement of lighting control devices with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 2. Coordinate the placement of wall switch occupancy sensors with actual installed door swings.
 - 3. Coordinate the placement of occupancy sensors with millwork, furniture, equipment or other potential obstructions to motion detection coverage installed under other sections or by others.
 - 4. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
- C. Shop Drawings:
 - 1. Occupancy Sensors: Provide lighting plan indicating location, model number, and orientation of each occupancy sensor and associated system component.
- D. Field Quality Control Reports.
- E. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- F. Operation and Maintenance Data: Include detailed information on device programming and setup.

- G. Project Record Documents: Record actual installed locations and settings for lighting control devices.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for all occupancy sensors.

PART 2 PRODUCTS

2.01 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.
- C. Products for Switching of Electronic Ballasts/Drivers: Tested and rated to be suitable for peak inrush currents specified in NEMA 410.

2.02 OCCUPANCY SENSORS

- A. Manufacturers:
 - 1. Hubbell Incorporated: www.hubbell.com/#sle.
 - 2. Lutron Electronics Company, Inc: www.lutron.com/#sle.
 - 3. RAB Lighting, Inc: www.rablighting.com/#sle.
 - 4. Sensor Switch Inc: www.sensorswitch.com/#sle.
 - 5. WattStopper: www.wattstopper.com/#sle.
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.
 - 7. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.
- B. All Occupancy Sensors:
 - 1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small

desktop level movements, according to published coverage areas, for automatic control of load indicated.

2. Sensor Technology:
 - a. Passive Infrared (PIR) Occupancy Sensors: Designed to detect occupancy by sensing movement of thermal energy between zones.
 - b. Ultrasonic Occupancy Sensors: Designed to detect occupancy by sensing frequency shifts in emitted and reflected inaudible sound waves.
 - c. Passive Infrared/Ultrasonic Dual Technology Occupancy Sensors: Designed to detect occupancy using a combination of both passive infrared and ultrasonic technologies.
3. Provide LED to visually indicate motion detection.
4. Operation: Unless otherwise indicated, occupancy sensor to turn load on when occupant presence is detected and to turn load off when no occupant presence is detected during an adjustable turn-off delay time interval.
5. Turn-Off Delay: Field adjustable, with time delay settings up to 30 minutes.
6. Sensitivity: Field adjustable.
7. Compatibility (Non-Dimming Sensors): Suitable for controlling incandescent lighting, low-voltage lighting with electronic and magnetic transformers, fluorescent lighting with electronic and magnetic ballasts, and fractional motor loads, with no minimum load requirements.
8. Load Rating for Line Voltage Occupancy Sensors: As required to control the load indicated on drawings.

C. Wall Switch Occupancy Sensors:

1. All Wall Switch Occupancy Sensors:
 - a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.
 - b. Unless otherwise indicated or required to control the load indicated on drawings, provide low voltage units, for use with separate compatible accessory power packs.
 - c. Operation: Field selectable to operate either as occupancy sensor (automatic on/off) or as vacancy sensor (manual-on/automatic off).
 - d. Manual-Off Override Control: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.
 - e. Finish: Match finishes specified for wiring devices in Section 26 27 26, unless otherwise indicated.
2. Passive Infrared (PIR) Wall Switch Occupancy Sensors: Capable of detecting motion within an area of 900 square feet (83.6 sq m).
3. Passive Infrared/Ultrasonic Dual Technology Wall Switch Occupancy Sensors: Capable of detecting motion within an area of 900 square feet (83.6 sq m).

D. Wall Dimmer Occupancy Sensors:

1. General Requirements:
 - a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated dimming control capability, and no leakage current to load in off mode.

- b. Operation: Field selectable to operate either as occupancy sensor (automatic on/off) or as vacancy sensor (manual-on/automatic off).
 - c. Manual-Off Override Control Capability: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.
 - d. Dimmer: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, and listed as complying with UL 1472; type and rating suitable for load controlled.
 - e. Finish: Match finishes specified for wiring devices in Section 26 27 26, unless otherwise indicated.
 - 2. Passive Infrared (PIR) Wall Dimmer Occupancy Sensors: Capable of detecting motion within an area of 900 square feet (83.6 sq m).
- E. Ceiling Mounted Occupancy Sensors:
- 1. All Ceiling Mounted Occupancy Sensors:
 - a. Description: Low profile occupancy sensors designed for ceiling installation.
 - b. Unless otherwise indicated or required to control the load indicated on drawings, provide low voltage units, for use with separate compatible accessory power packs.
 - c. Occupancy sensor to be field selectable as either manual-on/automatic-off or automatic on/off.
 - d. Finish: White unless otherwise indicated.
 - 2. Passive Infrared/Ultrasonic Dual Technology Ceiling Mounted Occupancy Sensors:
 - a. Standard Range Sensors: Capable of detecting motion within an area of 450 square feet (41.8 sq m) at a mounting height of 9 feet (2.7 m), with a field of view of 360 degrees.
 - b. Extended Range Sensors: Capable of detecting motion within an area of 1,200 square feet (111.5 sq m) at a mounting height of 9 feet (2.7 m), with a field of view of 360 degrees.
- F. Power Packs for Low Voltage Occupancy Sensors:
- 1. Description: Plenum rated, self-contained low voltage class 2 transformer and relay compatible with specified low voltage occupancy sensors for switching of line voltage loads.
 - 2. Provide quantity and configuration of power and slave packs with all associated wiring and accessories as required to control the load indicated on drawings.
 - 3. Input Supply Voltage: Dual rated for 120/277 V ac.
 - 4. Load Rating: As required to control the load indicated on drawings.
 - 5. Provide auxiliary contact closure output for all power packs, for use by mechanical contractor..

2.03 TIME SWITCHES

- A. Manufacturers:
- 1. Intermatic, Inc: www.intermatic.com/#sle.
 - 2. Tork, a division of NSI Industries LLC: www.tork.com/#sle.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.

4. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.

B. Digital Electronic Time Switches:

1. Description: Factory-assembled solid state programmable controller with LCD display, listed and labeled as complying with UL 916 or UL 917.
2. Program Capability:
 - a. Astronomic Time Switches: Single channel, capable of different schedule for each day of the week with additional holiday schedule available to override normal schedule for selected days and field-configurable astronomic feature to automatically adjust for seasonal changes in sunrise and sunset times.
3. Schedule Capacity: Not less than 16 programmable on/off operations.
4. Provide automatic daylight savings time and leap year compensation.
5. Provide power outage backup to retain programming and maintain clock.
6. Manual override: Capable of overriding current schedule both permanently and temporarily until next scheduled event.
7. Input Supply Voltage: As indicated on the drawings.
8. Output Switch Configuration: As required to control the load indicated on drawings.
9. Output Switch Contact Ratings: As required to control the load indicated on drawings.
10. Provide lockable enclosure; environmental type per NEMA 250 as specified for the following installation locations:
 - a. Indoor clean, dry locations: Type 1.

2.04 OUTDOOR PHOTO CONTROLS

A. Manufacturers:

1. Intermatic, Inc: www.intermatic.com/#sle.
2. Tork, a division of NSI Industries LLC: www.tork.com/#sle.
3. Substitutions: See Section 01 60 00 - Product Requirements.
4. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.

B. Stem-Mounted Outdoor Photo Controls:

1. Description: Direct-wired photo control unit with threaded conduit mounting stem and field-adjustable swivel base, listed and labeled as complying with UL 773A.
2. Housing: Weatherproof, impact resistant polycarbonate.
3. Photo Sensor: Cadmium sulfide.
4. Provide external sliding shield for field adjustment of light level activation.
5. Light Level Activation: 1 to 5 footcandles (10.8 to 53.8 lux) turn-on and 3 to 1 turn-off to turn-on ratio with delayed turn-off.
6. Voltage: As required to control the load indicated on the drawings.
7. Failure Mode: Fails to the on position.
8. Load Rating: As required to control the load indicated on the drawings.

2.05 LIGHTING CONTACTORS

A. Manufacturers:

1. ABB/GE: www.electrification.us.abb.com/#sle.
2. Eaton Corporation: www.eaton.com/#sle.
3. Rockwell Automation Inc; Allen-Bradley Products; : ab.rockwellautomation.com/#sle.
4. Schneider Electric; Square D Products: www.schneider-electric.us/#sle.
5. Siemens Industry, Inc; : www.usa.siemens.com/#sle.
6. Substitutions: See Section 01 60 00 - Product Requirements.

B. Description: Magnetic lighting contactors complying with NEMA ICS 2, and listed and labeled as complying with UL 60947-1 and UL 60947-4-1; noncombination type unless otherwise indicated; ratings, configurations and features as indicated on the drawings.

C. Short Circuit Current Rating:

1. Provide contactors with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 26 05 73.

D. Enclosures:

1. Comply with NEMA ICS 6.
2. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1 or Type 12.
3. Finish: Manufacturer's standard unless otherwise indicated.

2.06 ACCESSORIES

A. Auxiliary Contacts:

1. Comply with NEMA ICS 5.
2. Provide number and type of contacts indicated or required to perform necessary functions, including holding (seal-in) circuit and interlocking, plus one normally open (NO) and one normally closed (NC) spare contact for each lighting contactor, minimum.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that openings for outlet boxes are neatly cut and will be completely covered by devices or wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting control devices.

- F. Verify that the service voltage and ratings of lighting control devices are appropriate for the service voltage and load requirements at the location to be installed.
- G. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Install lighting control devices in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of lighting control devices provided under this section.
 - 1. Mounting Heights: As indicated on the drawings.
 - 2. Orient outlet boxes for vertical installation of lighting control devices unless otherwise indicated.
- C. Install lighting control devices in accordance with manufacturer's instructions.
- D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- E. Install lighting control devices plumb and level, and held securely in place.
- F. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 26 27 26.
- G. Provide required supports in accordance with Section 26 05 29.
- H. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- I. Identify lighting control devices in accordance with Section 26 05 53.
- J. Occupancy Sensor Locations:
 - 1. Location Adjustments: Locations indicated are diagrammatic and only intended to indicate which rooms or areas require devices. Provide quantity and locations as required for complete coverage of respective room or area based on manufacturer's recommendations for installed devices.
 - 2. Locate ultrasonic and dual technology passive infrared/ultrasonic occupancy sensors a minimum of 4 feet (1.2 m) from air supply ducts or other sources of heavy air flow and as per manufacturer's recommendations, in order to minimize false triggers.

- K. Outdoor Photo Control Locations:
 - 1. Where possible, locate outdoor photo controls with photo sensor facing north. If north facing photo sensor is not possible, install with photo sensor facing east, west, or down.
 - 2. Locate outdoor photo controls so that photo sensors do not face artificial light sources, including light sources controlled by the photo control itself.
- L. Install outdoor photo controls so that connections are weatherproof. Do not install photo controls with conduit stem facing up in order to prevent infiltration of water into the photo control.
- M. Unless otherwise indicated, install power packs for lighting control devices above accessible ceiling or above access panel in inaccessible ceiling near the sensor location.
- N. Where indicated, install separate compatible wall switches for manual control interface with lighting control devices or associated power packs.
- O. Unless otherwise indicated, install switches on load side of power packs so that switch does not turn off power pack.
- P. Where indicated or required, provide cabinet or enclosure in accordance with Section 26 05 33.16 for mounting of lighting control device system components.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect each lighting control device for damage and defects.
- C. Test occupancy sensors to verify proper operation, including time delays and ambient light thresholds where applicable. Verify optimal coverage for entire room or area. Record test results in written report to be included with submittals.
- D. Test time switches to verify proper operation.
- E. Test outdoor photo controls to verify proper operation, including time delays where applicable.
- F. Correct wiring deficiencies and replace damaged or defective lighting control devices.

3.05 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.
- B. Adjust occupancy sensor settings to minimize undesired activations while optimizing energy savings, and to achieve desired function as indicated or as directed by Architect.
- C. Where indicated or as directed by Architect, install factory masking material or adjust integral blinders on passive infrared (PIR) and dual technology occupancy sensor lenses to block undesired motion detection.
- D. Adjust time switch settings to achieve desired operation schedule as indicated or as directed by Architect. Record settings in written report to be included with submittals.

- E. Adjust external sliding shields on outdoor photo controls under optimum lighting conditions to achieve desired turn-on and turn-off activation as indicated or as directed by Architect.

3.06 COMMISSIONING

- A. See Section 01 91 13 - General Commissioning Requirements for commissioning requirements.

3.07 CLOSEOUT ACTIVITIES

- A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.
- B. Training: Train Owner's personnel on operation, adjustment, programming, and maintenance of lighting control devices.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of two hours of training.
 - 3. Instructor: Manufacturer's authorized service representative.
 - 4. Location: At project site.

END OF SECTION 26 09 23

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SECTION 26 24 16
PANELBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Power distribution panelboards.
- B. Lighting and appliance panelboards.
- C. Overcurrent protective devices for panelboards.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- C. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- D. Section 26 05 48 - Vibration and Seismic Controls for Electrical Systems.
- E. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
- F. Section 26 05 73 - Power System Studies: Additional criteria for the selection and adjustment of equipment and associated protective devices specified in this section.
- G. Section 26 43 00 - Surge Protective Devices.

1.03 REFERENCE STANDARDS

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service 2013e, with Amendment (2017).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C. NECA 407 - Standard for Installing and Maintaining Panelboards 2015.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- E. NEMA PB 1 - Panelboards 2011.
- F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less 2013.
- G. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.

- H. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- K. UL 67 - Panelboards Current Edition, Including All Revisions.
- L. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures Current Edition, Including All Revisions.
- M. UL 869A - Reference Standard for Service Equipment Current Edition, Including All Revisions.
- N. UL 943 - Ground-Fault Circuit-Interrupters Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
 - 4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.
- C. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
 - 1. Include dimensioned plan and elevation views of panelboards and adjacent equipment with all required clearances indicated.
 - 2. Clearly indicate whether proposed short circuit current ratings are fully rated or, where acceptable, series rated systems.
 - 3. Include documentation of listed series ratings upon request.
 - 4. Identify mounting conditions required for equipment seismic qualification.
- D. Manufacturer's equipment seismic qualification certification.

- E. Field Quality Control Test Reports.
- F. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. ABB/GE: www.electrification.us.abb.com/#sle.
- B. Eaton Corporation: www.eaton.com/#sle.
- C. Schneider Electric; Square D Products: www.schneider-electric.us/#sle.
- D. Siemens Industry, Inc: www.usa.siemens.com/#sle.
- E. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Source Limitations: Furnish panelboards and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 PANELBOARDS - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:

1. Altitude: Less than 6,600 feet (2,000 m).
2. Ambient Temperature:
 - a. Panelboards Containing Circuit Breakers: Between 23 degrees F (-5 degrees C) and 104 degrees F (40 degrees C).
- C. Short Circuit Current Rating:
 1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 26 05 73.
 2. Listed series ratings are acceptable, except where not permitted by motor contribution according to NFPA 70.
 3. Label equipment utilizing series ratings as required by NFPA 70.
- D. Panelboards Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.
- E. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
- F. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
- G. Bussing: Sized in accordance with UL 67 temperature rise requirements.
 1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
 2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
- H. Conductor Terminations: Suitable for use with the conductors to be installed.
- I. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
 2. Boxes: Galvanized steel unless otherwise indicated.
 - a. Provide wiring gutters sized to accommodate the conductors to be installed.
 - b. Increase gutter space as required where sub-feed lugs, feed-through lugs, gutter taps, or oversized lugs are provided.
 3. Fronts:
 - a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
 - b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
 - c. Finish for Painted Steel Fronts: Manufacturer's standard grey unless otherwise indicated.
 4. Lockable Doors: All locks keyed alike unless otherwise indicated.
- J. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

- K. Surge Protective Devices: Where factory-installed, internally mounted surge protective devices are provided in accordance with Section 26 43 00, list and label panelboards as a complete assembly including surge protective device.
- L. Selectivity: Where the requirement for selectivity is indicated, furnish products as required to achieve selective coordination.
- M. Multi-Section Panelboards: Provide enclosures of the same height, with feed-through lugs or sub-feed lugs and feeders as indicated or as required to interconnect sections.
- N. Load centers are not acceptable.
- O. Provide the following features and accessories where indicated or where required to complete installation:
 - 1. Feed-through lugs.
 - 2. Sub-feed lugs.

2.03 POWER DISTRIBUTION PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
 - 1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 - 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
 - 1. Phase and Neutral Bus Material: Aluminum or copper.
 - 2. Ground Bus Material: Aluminum or copper.
- D. Circuit Breakers:
 - 1. Provide bolt-on type or plug-in type secured with locking mechanical restraints.
 - 2. Provide thermal magnetic circuit breakers unless otherwise indicated.
 - 3. Provide electronic trip circuit breakers where indicated.
- E. Enclosures:
 - 1. Provide surface-mounted enclosures unless otherwise indicated.
 - 2. Fronts: Provide lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
 - 3. Provide clear plastic circuit directory holder mounted on inside of door.

2.04 LIGHTING AND APPLIANCE PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:

1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
 2. Phase and Neutral Bus Material: Aluminum or copper.
 3. Ground Bus Material: Aluminum or copper.
- D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.
- E. Enclosures:
1. Provide surface-mounted or flush-mounted enclosures as indicated.
 2. Fronts: Provide lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
 3. Provide clear plastic circuit directory holder mounted on inside of door.

2.05 OVERCURRENT PROTECTIVE DEVICES

- A. Molded Case Circuit Breakers:
1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
 2. Interrupting Capacity:
 - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
 - 1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
 - 2) 14,000 rms symmetrical amperes at 480 VAC.
 - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
 - c. Series Rated Systems: Provide circuit breakers listed in combination with upstream devices to provide interrupting rating not less than the short circuit current rating indicated.
 3. Conductor Terminations:
 - a. Provide mechanical lugs unless otherwise indicated.
 - b. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
 - a. Provide field-adjustable magnetic instantaneous trip setting for circuit breaker frame sizes 225 amperes and larger.
 5. Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units.
 - a. Provide the following field-adjustable trip response settings:
 - 1) Long time pickup, adjustable by replacing interchangeable trip unit or by setting dial.

- 2) Long time delay.
- 3) Short time pickup and delay.
- 4) Instantaneous pickup.
- 5) Ground fault pickup and delay where ground fault protection is indicated.
- 6. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
- 7. Provide the following circuit breaker types where indicated:
 - a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
 - b. Ground Fault Equipment Protection Circuit Breakers: Designed to trip at 30 mA for protection of equipment.
 - c. 100 Percent Rated Circuit Breakers: Listed for application within the panelboard where installed at 100 percent of the continuous current rating.
- 8. Do not use tandem circuit breakers.
- 9. Do not use handle ties in lieu of multi-pole circuit breakers.
- 10. Provide multi-pole circuit breakers for multi-wire branch circuits as required by NFPA 70.
- 11. Provide the following features and accessories where indicated or where required to complete installation:
 - a. Shunt Trip: Provide coil voltage as required for connection to indicated trip actuator.
 - b. Handle Pad-Lock Provision: For locking circuit breaker handle in OFF position.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive panelboards.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.
- D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- E. Provide required support and attachment in accordance with Section 26 05 29.
- F. Provide required seismic controls in accordance with Section 26 05 48.

- G. Install panelboards plumb.
- H. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.
- I. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches (2000 mm) above the floor or working platform.
- J. Mount floor-mounted power distribution panelboards on properly sized 4 inch (100 mm) high concrete pad constructed in accordance with Section 03 30 00.
- K. Provide minimum of six spare 1 inch (27 mm) trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling and below floor.
- L. Provide grounding and bonding in accordance with Section 26 05 26.
- M. Install all field-installed branch devices, components, and accessories.
- N. Multi-Wire Branch Circuits: Group grounded and ungrounded conductors together in the panelboard as required by NFPA 70.
- O. Set field-adjustable circuit breaker tripping function settings as determined by overcurrent protective device coordination study performed according to Section 26 05 73.
- P. Provide filler plates to cover unused spaces in panelboards.
- Q. Provide circuit breaker lock-on devices to prevent unauthorized personnel from de-energizing essential loads where indicated. Also provide for the following:
 - 1. Emergency and night lighting circuits.
 - 2. Fire detection and alarm circuits.
 - 3. Communications equipment circuits.
 - 4. Intrusion detection and access control system circuits.
 - 5. Video surveillance system circuits.
- R. Identify panelboards in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers and circuit breakers larger than _____ amperes. Tests listed as optional are not required.
- D. Test GFCI circuit breakers to verify proper operation.
- E. Test shunt trips to verify proper operation.
- F. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.04 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of panelboard fronts.

3.05 CLEANING

- A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION 26 24 16

SECTION 26 27 26
WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall switches.
- B. Receptacles.
- C. Wall plates.
- D. Floor box service fittings.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 33.16 - Boxes for Electrical Systems.
- B. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for 2014h, with Amendments (2017).
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification) 2014g, with Amendment (2017).
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- D. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2016.
- E. NEMA WD 1 - General Color Requirements for Wiring Devices 1999 (Reaffirmed 2020).
- F. NEMA WD 6 - Wiring Devices - Dimensional Specifications 2021.
- G. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 20 - General-Use Snap Switches Current Edition, Including All Revisions.
- I. UL 498 - Attachment Plugs and Receptacles Current Edition, Including All Revisions.
- J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices Current Edition, Including All Revisions.
- K. UL 943 - Ground-Fault Circuit-Interruption Current Edition, Including All Revisions.

- L. UL 1310 - Class 2 Power Units Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
 - 3. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
 - 4. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.
- C. Products: Listed, classified, and labeled as suitable for the purpose intended.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 PRODUCTS

2.01 WIRING DEVICE APPLICATIONS

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.
- C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.

- D. Provide GFCI protection for receptacles installed within 6 feet (1.8 m) of sinks.
- E. Provide GFCI protection for receptacles installed in kitchens.
- F. Provide GFCI protection for receptacles serving electric drinking fountains.
- G. Unless noted otherwise, do not use combination switch/receptacle devices.
- H. For flush floor service fittings, use tile rings for installations in tile floors.
- I. For flush floor service fittings, use carpet flanges for installations in carpeted floors.

2.02 WIRING DEVICE FINISHES

- A. Provide wiring device finishes as described below unless otherwise indicated.
- B. Wiring Devices, Unless Otherwise Indicated: White with white nylon wall plate.
- C. Wiring Devices Installed in Finished Spaces: White with white nylon wall plate.
- D. Wiring Devices Installed in Unfinished Spaces: Gray with galvanized steel wall plate.
- E. Wiring Devices Installed in Wet or Damp Locations: White with specified weatherproof cover.
- F. Above-Floor Service Fittings: Gray wiring devices with satin aluminum housing.
- G. Flush Floor Box Service Fittings: Gray wiring devices with aluminum cover and ring/flange.

2.03 WALL SWITCHES

- A. Manufacturers:
 1. Hubbell Incorporated: www.hubbell.com/#sle.
 2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 3. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
- C. Standard Wall Switches: Commercial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

2.04 RECEPTACLES

- A. Manufacturers:
 1. Hubbell Incorporated: www.hubbell.com/#sle.
 2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 3. Lutron Electronics Company, Inc; Designer Style: www.lutron.com/#sle.

4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
 5. Substitutions: See Section 01 60 00 - Product Requirements.
 6. Source Limitations: Where wall controls are furnished as part of lighting control system, provide accessory matching receptacles and wallplates by the same manufacturer in locations indicated.
- B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
 2. NEMA configurations specified are according to NEMA WD 6.
- C. Convenience Receptacles:
1. Standard Convenience Receptacles: Commercial specification grade, 15A, 125V, NEMA 5-15R; single or duplex as indicated on the drawings.
 2. Weather Resistant Convenience Receptacles: Commercial specification grade, 15A, 125V, NEMA 5-15R, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.
 3. Tamper Resistant Convenience Receptacles: Industrial specification grade, 15A, 125V, NEMA 5-15R, listed and labeled as tamper resistant type; single or duplex as indicated on the drawings.
- D. GFCI Receptacles:
1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
 2. Standard GFCI Receptacles: Commercial specification grade, duplex, 15A, 125V, NEMA 5-15R, rectangular decorator style.
 3. Weather Resistant GFCI Receptacles: Commercial specification grade, duplex, 15A, 125V, NEMA 5-15R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.
 4. Tamper Resistant GFCI Receptacles: Industrial specification grade, duplex, 15A, 125V, NEMA 5-15R, rectangular decorator style, listed and labeled as tamper resistant type.
- E. USB Charging Devices:
1. USB Charging Devices - General Requirements: Listed as complying with UL 1310.
 - a. Charging Capacity - Two-Port Devices: 18 W, minimum.
 2. USB Charging/Tamper Resistant Receptacle Combination Devices: Two-port (Type A/A) USB charging device and receptacle, commercial specification grade, duplex, 15A, 125V, NEMA 5-15R, listed and labeled as tamper resistant type; rectangular decorator style.
- F. Locking Receptacles: Industrial specification grade, configuration as indicated on the drawings.

2.05 WALL PLATES

A. Manufacturers:

1. Hubbell Incorporated: www.hubbell-wiring.com/#sle.
 2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 3. Lutron Electronics Company, Inc: www.lutron.com/#sle.
 4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
 5. Substitutions: See Section 01 60 00 - Product Requirements.
 6. Source Limitations: Where wall controls are furnished as part of lighting control system, provide accessory matching receptacles and wallplates by the same manufacturer in locations indicated.
- B. Wall Plates: Comply with UL 514D.
1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
 2. Size: Standard.
 3. Screws: Metal with slotted heads finished to match wall plate finish.
- C. Nylon Wall Plates: Smooth finish, high-impact thermoplastic.
- D. Galvanized Steel Wall Plates: Rounded corners and edges, with corrosion resistant screws.
- E. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

2.06 FLOOR BOX SERVICE FITTINGS

- A. Manufacturers:
1. Hubbell Incorporated: www.hubbell.com/#sle.
 2. Thomas & Betts Corporation: www.tnb.com/#sle.
 3. Wiremold, a brand of Legrand North America, Inc: www.legrand.us/#sle.
 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Description: Service fittings compatible with floor boxes provided under Section 26 05 33.16 with components, adapters, and trims required for complete installation.
- C. Flush Floor Service Fittings:
1. Single Service Flush Convenience Receptacles:
 - a. Cover: Round.
 - b. Configuration: Two standard convenience duplex receptacle(s) with rectangular decorator style flap opening(s).
 2. Dual Service Flush Combination Outlets:
 - a. Cover: Round.
 - b. Configuration:
 - 1) Power: One standard convenience duplex receptacle(s) with rectangular decorator style flap opening(s).
 - 2) Communications: _____.
 - 3) Voice and Data Jacks: Provided by others.
 3. Accessories:
 - a. Carpet Flanges: Finish to match covers; configuration as required to accommodate specified covers.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that floor boxes are adjusted properly.
- F. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- G. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of wiring devices provided under this section.
 - 1. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
 - 2. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
 - 3. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.
- C. Install wiring devices in accordance with manufacturer's instructions.
- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. Where required, connect wiring devices using pigtails not less than 6 inches (150 mm) long. Do not connect more than one conductor to wiring device terminals.
- F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
- I. Install wiring devices plumb and level with mounting yoke held rigidly in place.

- J. Install wall switches with OFF position down.
- K. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
- L. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- M. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.
- N. Identify wiring devices in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect each wiring device for damage and defects.
- C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.
- D. Test each receptacle to verify operation and proper polarity.
- E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- F. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.04 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.

3.05 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION 26 27 26

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SECTION 26 28 16.13
ENCLOSED CIRCUIT BREAKERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Enclosed circuit breakers.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- B. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service 2013e, with Amendment (2017).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- D. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.
- E. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- G. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- H. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for circuit breakers, enclosures, and other installed components and accessories.

- C. Manufacturer's equipment seismic qualification certification.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to enclosed circuit breaker internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. ABB/GE: www.electrification.us.abb.com/#sle.
- B. Eaton Corporation: www.eaton.com/#sle.
- C. Schneider Electric; Square D Products: www.schneider-electric.us/#sle.
- D. Siemens Industry, Inc: www.usa.siemens.com/#sle.
- E. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Source Limitations: Furnish enclosed circuit breakers and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 ENCLOSED CIRCUIT BREAKERS

- A. Description: Units consisting of molded case circuit breakers individually mounted in enclosures.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet (2,000 m).

2. Ambient Temperature: Between 23 degrees F (-5 degrees C) and 104 degrees F (40 degrees C).
 - D. Short Circuit Current Rating:
 1. Provide enclosed circuit breakers with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 26 05 73.
 - E. Conductor Terminations: Suitable for use with the conductors to be installed.
 - F. Provide thermal magnetic circuit breakers unless otherwise indicated.
 - G. Provide insulated, groundable fully rated solid neutral assembly where a neutral connection is required, with a suitable lug for terminating each neutral conductor.
 - H. Provide solidly bonded equipment ground bus in each enclosed circuit breaker, with a suitable lug for terminating each equipment grounding conductor.
 - I. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 2. Finish for Painted Steel Enclosures: Manufacturer's standard, factory applied grey unless otherwise indicated.
 3. Provide surface-mounted enclosures unless otherwise indicated.
 - J. Provide externally operable handle with means for locking in the OFF position.
- 2.03 MOLDED CASE CIRCUIT BREAKERS
- A. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
 - B. Interrupting Capacity:
 1. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
 - a. 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
 - b. 14,000 rms symmetrical amperes at 480 VAC.
 2. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
 - C. Conductor Terminations:
 1. Provide mechanical lugs unless otherwise indicated.
 2. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 - D. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.

1. Provide field-adjustable magnetic instantaneous trip setting for circuit breaker frame sizes 225 amperes and larger.
- E. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings of the enclosed circuit breakers are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive enclosed circuit breakers.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required support and attachment in accordance with Section 26 05 29.
- E. Provide required seismic controls in accordance with Section 26 05 48.
- F. Install enclosed circuit breakers plumb.
- G. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed circuit breakers such that the highest position of the operating handle does not exceed 79 inches (2000 mm) above the floor or working platform.
- H. Provide grounding and bonding in accordance with Section 26 05 26.
- I. Set field-adjustable circuit breaker tripping function settings as determined by overcurrent protective device coordination study performed according to Section 26 05 73.
- J. Identify enclosed circuit breakers in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with manufacturer's instructions and NETA ATS, except Section 4.

- C. Perform inspections and tests listed in NETA ATS, Section 7.6.1.1. Tests listed as optional are not required.
- D. Correct deficiencies and replace damaged or defective enclosed circuit breakers.

3.04 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.05 CLEANING

- A. Clean dirt and debris from circuit breaker enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION 26 28 16.13

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SECTION 26 28 16.16
ENCLOSED SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Enclosed safety switches.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- B. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- C. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum) 2013.
- D. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.
- E. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- G. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- H. UL 98 - Enclosed and Dead-Front Switches Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.

2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to enclosed switch internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. ABB/GE: www.electrification.us.abb.com/#sle.
- B. Eaton Corporation: www.eaton.com/#sle.
- C. Schneider Electric; Square D Products: www.schneider-electric.us/#sle.
- D. Siemens Industry, Inc: www.usa.siemens.com/#sle.
- E. Substitutions: See Section 01 60 00 - Product Requirements.

- F. Source Limitations: Furnish enclosed switches and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 ENCLOSED SAFETY SWITCHES

- A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty; ratings, configurations, and features as indicated on the drawings.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet (2,000 m).
 - 2. Ambient Temperature: Between -22 degrees F (-30 degrees C) and 104 degrees F (40 degrees C).
- D. Horsepower Rating: Suitable for connected load.
- E. Voltage Rating: Suitable for circuit voltage.
- F. Short Circuit Current Rating:
 - 1. Provide enclosed safety switches, when protected by the fuses or supply side overcurrent protective devices to be installed, with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 26 05 73.
 - 2. Minimum Ratings:
 - a. Heavy Duty Single Throw Switches Protected by Class R, Class J, Class L, or Class T Fuses: 200,000 rms symmetrical amperes.
- G. Provide with switch blade contact position that is visible when the cover is open.
- H. Fuse Clips for Fusible Switches: As required to accept fuses indicated.
 - 1. Where NEMA Class R fuses are installed, provide rejection feature to prevent installation of fuses other than Class R.
- I. Conductor Terminations: Suitable for use with the conductors to be installed.
- J. Provide insulated, groundable fully rated solid neutral assembly where a neutral connection is required, with a suitable lug for terminating each neutral conductor.
- K. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.
- L. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.

2. Finish for Painted Steel Enclosures: Manufacturer's standard, factory applied grey unless otherwise indicated.
- M. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.
- N. Heavy Duty Switches:
 1. Comply with NEMA KS 1.
 2. Conductor Terminations:
 - a. Provide mechanical lugs unless otherwise indicated.
 - b. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings of the enclosed switches are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive enclosed safety switches.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required support and attachment in accordance with Section 26 05 29.
- E. Provide required seismic controls in accordance with Section 26 05 48.
- F. Install enclosed switches plumb.
- G. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches (2000 mm) above the floor or working platform.
- H. Provide grounding and bonding in accordance with Section 26 05 26.
- I. Provide fuses complying with Section 26 28 13 for fusible switches as indicated or as required by equipment manufacturer's recommendations.

- J. Identify enclosed switches in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.
- D. Correct deficiencies and replace damaged or defective enclosed safety switches or associated components.

3.04 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.05 CLEANING

- A. Clean dirt and debris from switch enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION 26 28 16.16

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SECTION 26 51 00
INTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior luminaires.
- B. Emergency lighting units.
- C. Exit signs.
- D. Ballasts and drivers.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- B. Section 26 05 33.16 - Boxes for Electrical Systems.
- C. Section 26 27 26 - Wiring Devices: Manual wall switches and wall dimmers.

1.03 REFERENCE STANDARDS

- A. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products 2019.
- B. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources 2021.
- C. NECA/IESNA 500 - Standard for Installing Indoor Lighting Systems 2006.
- D. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems 2006.
- E. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts 2020.
- F. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility 2012 (Reaffirmed 2018).
- G. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. NFPA 101 - Life Safety Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 924 - Emergency Lighting and Power Equipment Current Edition, Including All Revisions.
- J. UL 1598 - Luminaires Current Edition, Including All Revisions.

- K. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
4. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.
5. Match existing light fixtures where designated on drawings.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.

- C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.

1. LED Luminaires:

- a. Include estimated useful life, calculated based on IES LM-80 test data.

- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

- E. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.

2.02 LUMINAIRES

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. Recessed Luminaires:
 - 1. Ceiling Compatibility: Comply with NEMA LE 4.
 - 2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.
- H. LED Luminaires:
 - 1. Components: UL 8750 recognized or listed as applicable.
 - 2. Tested in accordance with IES LM-79 and IES LM-80.
 - 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

2.03 EMERGENCY LIGHTING UNITS

- A. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
- B. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
- C. Battery:
 - 1. Size battery to supply all connected lamps, including emergency remote heads where indicated.

- D. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
- E. Provide low-voltage disconnect to prevent battery damage from deep discharge.

2.04 EXIT SIGNS

- A. Description: Exit signs complying with NFPA 101 and applicable state and local codes, and listed and labeled as complying with UL 924.
 - 1. Number of Faces: Single- or double-face as indicated or as required for installed location.
 - 2. Directional Arrows: As indicated or as required for installed location.
- B. Powered Exit Signs: Internally illuminated with LEDs unless otherwise indicated.
 - 1. Self-Powered Exit Signs:
 - a. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
 - b. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
 - c. Provide low-voltage disconnect to prevent battery damage from deep discharge.

2.05 BALLASTS AND DRIVERS

- A. Ballasts/Drivers - General Requirements:
 - 1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
 - 2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
 - 3. Electronic Ballasts/Drivers: Inrush currents not exceeding peak currents specified in NEMA 410.
- B. Dimmable LED Drivers:
 - 1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.
 - 2. Control Compatibility: Fully compatible with the dimming controls to be installed.
 - a. Wall Dimmers: See Section 26 27 26.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.

- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).
- D. Provide required support and attachment in accordance with Section 26 05 29.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Suspended Ceiling Mounted Luminaires:
 - 1. Do not use ceiling tiles to bear weight of luminaires.
 - 2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
 - 3. Secure surface-mounted and recessed luminaires to ceiling support channels or framing members or to building structure.
 - 4. Secure pendant-mounted luminaires to ceiling grid system framing members or to building structure.
 - 5. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
 - 6. In addition to ceiling support wires, provide two galvanized steel safety wire(s), minimum 12 gauge, connected from opposing corners of each recessed luminaire to building structure.
 - 7. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.
- G. Recessed Luminaires:
 - 1. Install trims tight to mounting surface with no visible light leakage.
 - 2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
 - 3. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.
- H. Suspended Luminaires:
 - 1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
 - 2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
 - 3. Install canopies tight to mounting surface.

- I. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- J. Install accessories furnished with each luminaire.
- K. Bond products and metal accessories to branch circuit equipment grounding conductor.
- L. Emergency Lighting Units:
 - 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
- M. Exit Signs:
 - 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
- N. Install lamps in each luminaire.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Operate each luminaire after installation and connection to verify proper operation.
- D. Test self-powered exit signs, emergency lighting units, and fluorescent emergency power supply units to verify proper operation upon loss of normal power supply.
- E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.04 ADJUSTING

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.
- B. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Architect or authority having jurisdiction.
- C. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect or authority having jurisdiction.

END OF SECTION 26 51 00

SECTION 26 56 00
EXTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Exterior luminaires.
- B. Ballasts.
- C. Poles and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Materials and installation requirements for concrete bases for poles.
- B. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- C. Section 26 05 33.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

- A. IEEE C2 - National Electrical Safety Code(R) (NESC(R)) 2023.
- B. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products 2019.
- C. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources 2021.
- D. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- E. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems 2000 (Reaffirmed 2006).
- F. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts 2020.
- G. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility 2012 (Reaffirmed 2018).
- H. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 1598 - Luminaires Current Edition, Including All Revisions.
- J. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate placement of poles and associated foundations with utilities, curbs, sidewalks, trees, walls, fences, striping, etc. installed under other sections or by others. Coordinate elevation to obtain specified foundation height.
 - 2. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.
 - 3. All exterior lighting to be approved by owner prior to purchase. Final locations to be submitted and approved by Architect.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
 - 2. Provide structural calculations for each pole and associated pole base. Indicate all steel reinforcing and concrete type proposed.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.
 - 1. LED Luminaires:
 - a. Include estimated useful life, calculated based on IES LM-80 test data.
 - 2. Poles: Include information on maximum supported effective projected area (EPA) and weight for the design wind speed.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- E. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.

2.02 LUMINAIRES

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. Provide luminaires listed and labeled as suitable for wet locations unless otherwise indicated.
- H. Recessed Luminaires:
 - 1. Ceiling Compatibility: Comply with NEMA LE 4.
- I. LED Luminaires:
 - 1. Components: UL 8750 recognized or listed as applicable.
 - 2. Tested in accordance with IES LM-79 and IES LM-80.
 - 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

2.03 BALLASTS AND DRIVERS

- A. Ballasts/Drivers - General Requirements:
 - 1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
 - 2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
 - 3. Electronic Ballasts/Drivers: Inrush currents not exceeding peak currents specified in NEMA 410.
- B. Dimmable LED Drivers:
 - 1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.
 - 2. Control Compatibility: Fully compatible with the dimming controls to be installed.

2.04 POLES

A. All Poles:

1. Provide poles and associated support components suitable for the luminaire(s) and associated supports and accessories to be installed.
2. Material: Steel, unless otherwise indicated.
3. Shape: Square straight, unless otherwise indicated.
4. Finish: Match luminaire finish, unless otherwise indicated.
5. Mounting: Install on concrete foundation, height as indicated on the drawings, unless otherwise indicated.
6. Unless otherwise indicated, provide with the following features/accessories:
 - a. Top cap.
 - b. Handhole.
 - c. Anchor bolts with leveling nuts or leveling shims.
 - d. Anchor base cover.

B. Metal Poles: Provide ground lug, accessible from handhole.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires in accordance with NECA/IESNA 501.
- D. Provide required support and attachment in accordance with Section 26 05 29.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Recessed Luminaires:
 1. Install trims tight to mounting surface with no visible light leakage.

2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
- G. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- H. Pole-Mounted Luminaires:
 1. Maintain the following minimum clearances:
 - a. Comply with IEEE C2.
 - b. Comply with utility company requirements.
 2. Foundation-Mounted Poles:
 - a. Provide cast-in-place concrete foundations for poles as indicated, in accordance with Section 03 30 00.
 - 1) Install anchor bolts plumb per template furnished by pole manufacturer.
 - 2) Position conduits to enter pole shaft.
 - b. Install foundations plumb.
 - c. Install poles plumb, using leveling nuts or shims as required to adjust to plumb.
 - d. Tighten anchor bolt nuts to manufacturer's recommended torque.
 - e. Install non-shrink grout between pole anchor base and concrete foundation, leaving small channel for condensation drainage.
 - f. Install anchor base covers as indicated.
 3. Grounding:
 - a. Bond luminaires, metal accessories, metal poles, and foundation reinforcement to branch circuit equipment grounding conductor.
 4. Install separate service conductors, 12 AWG copper, from each luminaire down to handhole for connection to branch circuit conductors.
- I. Install accessories furnished with each luminaire.
- J. Bond products and metal accessories to branch circuit equipment grounding conductor.
- K. Install lamps in each luminaire.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Operate each luminaire after installation and connection to verify proper operation.
- D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.04 ADJUSTING

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.

- B. Luminaires with Field-Rotatable Optics: Position optics according to manufacturer's instructions to achieve lighting distribution as indicated or as directed by Architect.

END OF SECTION 26 56 00

SECTION 31 25 00
EROSION CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Prevention of soil or sediment leaving project site.
2. Prevention of soil or sediment impacting on-site or off-site activities or conditions.
3. Dust control.

B. Related Sections:

1. Division 02 Section "Selective Site Demolition".
2. Division 31 Section "Site Clearing".
3. Division 31 Section "Earthwork".
4. Division 32 Section "Seeding".

1.2 SUBMITTALS

A. Product data for the following:

1. Silt fence.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:

1. The standard for erosion/sediment control for this project is the Indiana Handbook for Erosion Control in Developing Areas, latest edition (Indiana Department of Natural Resources, Division of Soil Conservation). All erosion control work shall conform to this manual.

B. General Requirements:

1. Erosion/sediment control measures are to be installed prior to beginning any earth disturbing activities and maintained throughout construction.
2. The Contractor is responsible for ensuring all specified and necessary erosion/sediment control measures are installed, functioning and properly maintained.
3. Any fines or other costs incurred due to inadequate or improper installation, maintenance or performance of erosion/sediment control measures as identified by the self-monitoring

process and/or other agency having jurisdiction over erosion control shall be the sole responsibility of the Contractor.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Silt Fence:

1. Woven or non-woven produced from 100% polypropylene, designed specifically to retain sediment and remain highly permeable to water.
2. Geotextile shall be attached to wood stakes with wood laths and staples or nails.
3. Bottom 12 inches of fabric shall be left unsecured to allow for entrenchment.
4. Stakes: 2" x 2" x 36" hardwood sharpened to a point on one end, maximum 5' spacing.
5. Lath: ½" x 1 ½" x 24" for attaching the fabric to the stakes.

B. Inlet Filters: Streamguard catch basin insert by Bowhead Environmental & Safety (800-909-3677), or Architect/Engineer approved equal.

C. Refer to Division 32 Sections "Seeding" for temporary and permanent ground cover requirements.

PART 3 - EXECUTION

3.1 REQUIREMENTS

A. General:

1. Prevent mud and dirt accumulations on all streets surrounding the project. Utilize stone tracking strips/construction entrances, street sweepers, spray trucks, power washers and other necessary and appropriate means as required. Roadways shall be kept clear of accumulated sediment that is a result of runoff or tracking.
2. Dust control: Use all necessary and appropriate means, such as water sprinkling, calcium chloride (AASHTO M 144), vegetative cover, spray-on adhesives, as required to prevent dust from being a nuisance to the Owner, public or concurrent performance of work on the site.
3. Keep the amount of disturbed area to a minimum at all times.
4. Seed immediately after grading soil, and install erosion control blanket where applicable.
5. Sequence installation of measures to ensure proper erosion control. See Drawings for basic sequencing requirements.
6. Temporary seed all areas that cannot be final seeded within a time period that will prevent soil erosion. For temporary seeding, utilize a fast growing seed of oats, annual rye grass, wheat or rye depending on the time of year.
7. See Division 32 Section "Seeding" for seeding requirements.

8. The Contractor shall inform all Subcontractors of the requirements of the Construction Stormwater Pollution Prevention Plan (SWP3) and its maintenance provisions, so that erosion/sediment disruption may be prevented by all those working on site.
9. Un-vegetated areas that are likely to be left inactive for more than 15 days must be stabilized.
10. Proper storage and handling of materials, such as fuels or hazardous wastes, and spill prevention and cleanup measures shall be implemented to minimize the potential for pollutants to contaminate surface or ground water or degrade soil quality. Notify Indiana Department of Environmental Management (IDEM) of any release.
11. Final stabilization shall be achieved when all land disturbing activities have been completed and a perennial vegetative cover exists with at least a 70% density. Once this has been achieved, the Contractor shall notify the Owner and Architect/Engineer. The Contractor must still complete all maintenance and quality requirements as specified in Division 32 Sections "Seeding" and "Planting".

3.2 INSTALLATION

A. Silt Fence:

1. Install silt fence where indicated on Drawings and on other areas as required.
2. Follow all manufacturer guidelines for installation.
3. Dig a minimum 8" deep trench along proposed fence line to allow toe-in.
4. Install fence with stakes on the down stream/slope side.
5. Backfill and compact both sides of trench and ensure fence is anchored sufficiently.

B. Stone Tracking Area/Construction Entrance:

1. Install at all temporary entrances/exits for construction traffic and in other areas as needed to prevent soil materials from being deposited on streets, parking areas, etc.
2. Minimum thickness is 6" of #2 stone. Increase as necessary for field conditions. Install geotextile fabric underneath stone to improve stability if needed.
3. Minimum dimensions are shown on the plans. Increase as necessary for field conditions.

3.3 INSPECTION AND MAINTENANCE

A. General:

1. Inspect all erosion control measures periodically and after each storm event.
2. Repair and replace all measures as necessary to ensure proper soil erosion prevention.
3. Maintain temporary measures until vegetation has been adequately established and construction activities have been completed to a point where the potential for soil erosion has been sufficiently eliminated. The Contractor is responsible for maintaining temporary measures until such a point and then removing the measures, even if all other construction work is complete.
4. Implement erosion/sediment control modifications as directed by the Architect/Engineer.

B. Silt Fence:

1. Inspect periodically and after each storm event.
2. If fabric tears, starts to decompose, or in any way becomes ineffective, replace the affected portion immediately.
3. Remove deposited sediment when it reaches 1/3 of the height of the fence at its lowest point or when it is causing the fabric to bulge. Do not undermine the fence during cleanout.
4. After the contributing drainage area has been stabilized, remove the fence and sediment deposits, bring the disturbed area to grade and stabilize.

C. Stone Tracking Area/Construction Entrance:

1. Inspect weekly and after storm events or heavy use.
2. Re-shape as needed for drainage and runoff control.
3. Top dress with clean stone as needed.
4. Immediately remove mud and sediment tracked or washed onto roads, parking lots, etc. by brushing or sweeping. Flushing is only to be used if the water is conveyed to a sediment trap or basin.

D. Inlet Filters:

1. Inspect each inlet periodically and after each storm event.
2. If fabric tears, starts to decompose, or in any way becomes ineffective, replace the affected portion immediately.
3. Remove deposited sediment often and do not allow to build up and cause damage to the fabric or reduce the flow capacity of the inlet.
4. Remove inlet fabric after the contributing drainage area has been stabilized.

E. Seeding:

1. Inspect temporary and permanent seeding periodically and after each storm event.
2. Repair damaged, bare or sparse areas by filling any gullies, re-fertilizing, over-seeding, re-seeding and re-mulching.
3. Install erosion control blanket over areas that do not hold.

F. Final Inspection and Acceptance:

1. Contractor shall notify the Owner in writing, 24 hours in advance that the project is ready for final inspection and acceptance. The following conditions must be met:
 - a. All land disturbing activities have been completed and the entire site has been stabilized.
 - b. All temporary erosion and sediment control measures have been removed.

END OF SECTION

SECTION 31 20 00 - EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavation, filling, backfilling and compacting.
2. Trenching and trench backfilling.
3. Mass earthwork and rough grading.
4. Finish grading, including spreading of topsoil.
5. Dewatering.
6. Soil stabilization.
7. Testing and inspection.

B. Related Sections:

1. Division 02 Section "Selective Site Demolition".
2. Division 31 Section "Site Clearing".
3. Division 31 Section "Erosion Control".

1.2 QUALITY ASSURANCE

A. Testing and Inspection:

1. All testing and inspection shall be performed by an independent Geotechnical Engineering Consultant ("Geotechnical Engineer").
2. The Geotechnical Engineer is responsible for all testing, sampling and inspection.
3. The Geotechnical Engineer is responsible for approving materials, installation and procedures.
4. The Contractor is responsible for providing these services.
5. The Contractor is responsible for all coordination and scheduling with the Geotechnical Engineer.

B. Topsoil:

1. All topsoil shall be tested and approved by the Soil Scientist.
2. Refer to 1.3 Submittals for more information.

C. Any work in public right-of-way or other areas subject to the jurisdiction of any body shall be performed either to the requirements of that jurisdiction or to the requirements of this Specification, whichever is more stringent.

1.3 SUBMITTALS

A. All submittals shall be reviewed approved by Architect/Engineer and Geotechnical Engineer.

B. Product Data and Test Reports:

1. Field and laboratory tests and inspections.
2. Drainage fill: Include material specifications and sieve analysis. Include signed material certificate from manufacturer/supplier.
3. Chemical modification: Include material specifications and signed material certificate from manufacturer/supplier.
4. Geo-synthetic materials: Include material specifications and signed material certificate from manufacturer/supplier.

C. Topsoil:

1. Furnish topsoil analysis performed by a soil scientist.

Approved Vendors:

- a. A&L Greatlakes Laboratories at 3505 Conestoga Dr. Fort Wayne, IN 46808.
- b. Lawn & Garden Soil Analysis at 682 North Pleasant Street, University of Massachusetts, Amherst, MA 01003.

2. Analysis shall state the following: (Refer to Part 2 for minimum requirements)

- a. Percentage of organic matter.
- b. Gradation of sand, silt and clay, Include USDA textural classification.
- c. Cation exchange capacity.
- d. Deleterious material.
- e. pH.
- f. Mineral and plant nutrient content (phosphorus, potassium, magnesium, calcium).
- g. Any requirements or recommendations necessary to make it suitable.
- h. Annual nutrient requirements and recommendations for evergreens shrubs, trees, and flowers. Soil test results without recommendations will be rejected.

3. This analysis is required for both on site and off site topsoil.

4. Samples of the topsoil shall be taken under the following conditions:

- a. Within four (4) weeks prior to placing topsoil, take three representative samples of proposed topsoil.
- b. Within one week after placing topsoil, take three representative samples of in-place topsoil.
- c. All samples shall be taken in witness of the Owner, in areas approved by the Owner. Contractor to coordinate with Owner as required.

5. Provide copies of all topsoil analysis and recommendations to Owner and Architect/Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:

1. All soil materials shall be approved by the Geotechnical Engineer.
2. All soil materials shall be suitable for each application.
3. Suitable soils are defined as soils which provide proper strength, compaction and drainage requirements and which are approved by the Geotechnical Engineer.
4. Fill material which is unsuitable due to excess moisture will not be classified as unsuitable if it can be dried to optimum moisture specified herein by manipulation, aeration or blending with other materials satisfactorily as approved by the Geotechnical Engineer.

B. Fill Materials:

1. Note: The following describes fill materials and their application for use. The materials shall be used for the listed applications, unless designated otherwise on the Drawings. If the Contractor has any questions or concerns regarding the materials or intended application, contact the Architect/Engineer for direction. Compaction requirements are the percentage of maximum dry density per ASTM D698 Standard Proctor Test, unless noted otherwise in the Geotechnical Report.
2. General fill:
 - a. Suitable on-site or off-site fill material free of debris, roots, organic and frozen materials, and stones having a maximum dimension of 2”.
 - b. Minimum compaction: 95%.
 - c. Application: General filling and backfilling of excavations and trenches outside of the building.
3. Structural fill:
 - a. Suitable on-site or off-site fill material free of debris, roots, organic and frozen materials, and stones having a maximum dimension of 2”.
 - b. Minimum compaction: 100%.
 - c. Application: Compacted subgrade under buildings, foundations and areas subject to structural loads.
4. Granular fill:
 - a. Clean, natural or manufactured sand per requirements of INDOTSS Type “B” borrow, 4.75mm (No. 4) gradation. Pea gravel is not acceptable.
 - b. Minimum compaction: 95%.
 - c. Application: Backfilling of excavations and trenches which are under or within 5’ of pavement, and underneath exterior concrete pavement, walks, curbs and slabs on grade.

5. Drainage Fill:

- a. General: Clean, washed fill sand with 100% passing the 4.75mm (No.4) sieve and no more than 5% passing the 0.075 mm (No. 200) sieve. Pea gravel or #53 stone are not acceptable.
- b. Minimum compaction: 95%.
- c. Application: Free draining material required for applications such as the outside of basement walls, the back side (earth side) of retaining walls and building slabs on grade.

6. Aggregate fill: Unless otherwise indicated, shall meet the following:

- a. Naturally or artificially graded mixture of natural or crushed gravel, crushed stone and natural or crushed sand.
- b. ASTM D2940, with 100 percent passing a 1 ½ inch sieve and not more than 8 percent passing a No. 200 sieve.
- c. Application: base course under concrete and other items per plans.

C. Topsoil:

1. Topsoil shall be fertile, friable, natural surface soil obtained from well-drained areas and possessing characteristics of representative soils in the project vicinity that produce heavy growths of crops, grass or other vegetation.
2. Topsoil shall consist of friable loam, reasonably free of subsoil, clay lumps, brush, roots, weeds or other objectionable vegetation, stones or similar objects larger than 1-1/2" in any dimension, litter or other materials unsuitable or harmful to plant growth.
3. Supplement on-site topsoil with off-site topsoil as necessary.
4. Unless otherwise indicated, minimum compacted thickness in lawn areas is 4".
5. The mechanical analysis of topsoil shall be as follows:
 - a. 1" mesh sieve size: 99%-100% passing.
 - b. 1/4" mesh sieve size: 97%-99% passing.
 - c. No. 100 mesh sieve size: 40%-60% passing.
 - d. No. 200 mesh sieve size: 20%-40% passing.
6. The following minimum requirements shall also be met:
 - a. Organic matter: 3-5%.
 - b. pH: 6.5 to 7.3.
 - c. Sand, silt, clay content: per USDA loam textural classification.
 - d. Minerals and nutrients: Per Geotechnical Engineer or Soil Scientist recommendations and amendments suitable for use in local area.

D. Soil Separator Fabric:

1. Nonwoven, needle-punched geotextile fabric manufactured from polyolefins or polyesters per ASTM M288, suitable for subsurface drainage and other specified applications.
2. Application: subsurface drains and as specified in Contract Documents.

3. Specifications (values based on Mirafi 140N):
 - a. Apparent opening size: 70 (U.S. Standard Sieve Size); ASTM D-4751-99A.
 - b. Flow rate: 135 gpm/sf; ASTM D-4491-99A.
 - c. Puncture strength: 65 lbs; ASTM D-4833-00.
 - d. Mullen Burst: 225 lb/sq. in.
 - e. Grab tensile/elongation: 155 lbs/50%.
 - f. UV Resistance: 70% at 500 hours.

E. Geo-synthetic Reinforcement:

1. General: TriAx Geogrid TX5 as manufactured by Tensar International Corp., Atlanta Georgia.
2. Application: Soil stabilization as required and as recommended by the Geotechnical Engineer.

F. Chemical Modification:

1. General: INDOTSS 215.
2. Materials: Hydrated lime per INDOTSS 913.04(b) and Type I Portland cement per INDOTSS 901-01(b).
3. Quantity: 4.0 +/- 0.5% by dry unit mass of the soils.
4. Application: If Geotechnical report indicates that chemical modification may be needed for soil stabilization, then Contractor shall include provisions for chemical modification in their bid.

G. Other Materials:

1. All other materials not specifically described but not required for proper completion of the Work of this Section, shall be as selected by the Contractor subject to the approval of the Architect/Engineer and Geotechnical Engineer.

PART 3 - EXECUTION

3.1 REQUIREMENTS

A. General:

1. Weather: Do not perform earthwork activities during inclement weather.
2. Dust: Use all necessary and appropriate means, such as water sprinkling, as required to prevent dust from being a nuisance to the Owner, public and concurrent performance of other work on the site.
3. Conflicts: Should the preceding job conditions or other items specified herein because actual or possible conflicts, notify the Architect/Engineer immediately and do not proceed until such conflict has been resolved.
4. Refer to Division 31 Section "Termite Control" for termite protection requirements.

B. Preparation: Verify that the following has been completed prior to beginning earthwork:

1. Protective fencing has been installed for trees and vegetation to remain.
2. Site clearing (clearing and grubbing).
3. Selective site demolition.
4. Erosion and sediment control measures are in place.

C. Protection:

1. For items indicated to remain, provide protection to prevent damage from construction activities. Any damage or destruction to items intended to remain intact shall be repaired or replaced to the satisfaction of the Owner at the Contractor's expense.
2. Topsoil: Protect placed topsoil from heavy machinery traffic. Remove and replace topsoil that is compacted by heavy machinery traffic.
3. Subgrade: Ditches and drains along the subgrade shall be maintained to drain effectively at all times. Repair subgrade of any ruts that may occur by reshaping and recompacting as required.
4. Utilities: Determine locations of existing utilities and the extent to which they may affect earthwork operations. Where service and utility lines are to remain, provide protection to prevent damage or disruption of services.
5. Damaged utilities shall be repaired immediately at the Contractor's expense.
6. Open excavation:
 - a. The Contractor is responsible for ensuring all open excavations are properly barricaded and protected at all times. This includes work such as mass excavation and trenching, and also includes other potentially dangerous conditions such as retention ponds.
 - b. Provide and install all necessary and appropriate means such as, but not limited to, signage, fencing, traffic barricades, and lighting to warn, discourage, and prevent danger to adjacent workers and general public.
 - c. Unless otherwise indicated, install a minimum 6' 10-gauge chain link fence around all open excavations, retention ponds, and other areas of potential danger, and maintain them while such conditions exist. Increase measures as required per site conditions.

3.2 LAYOUT

- A. Surveyor: Secure the services of a licensed land surveyor, acceptable to the Architect/Engineer and Owner, to layout locations of building, parking areas, drive, walks, curbs, finish elevations and other work, including mechanical and electrical items that are to be installed on the project site.
- B. References: Establish and maintain lines, corners, elevations and general reference points. Verify dimensions indicated on Drawings. If conflicts exist, immediately notify the Architect/Engineer before continuing work.

3.3 EXCESS WATER CONTROL

- A. Excess moisture: If excess moisture is present in soils, do not resume operations until moisture content and density are reported to be satisfactory by the Geotechnical Engineer.
- B. Flooding: Provide berms or channels to prevent flooding of subgrade. Promptly remove all water collecting in depressions.
- C. Softened subgrade: Where soil has been softened or eroded by flooding or placement during inclement weather, remove all damaged areas and recompact as specified for fill and compaction.
- D. Dewatering:
 - 1. Provide and maintain ample means and devices with which to promptly remove and dispose of all water from every source entering the excavations or other parts of the work at all times during construction.
 - 2. Dewater by means which will ensure dry excavations and the preservation of the final lines and grades at bottom of excavations, such as sump pumps, trenching, etc.
 - 3. Do not use extreme measures or durations as to cause adverse effects to Project Site or adjoining properties.

3.4 CHEMICAL MODIFICATION

- A. General:
 - 1. Scarify and/or disc area to a depth of 12" prior to distributing modifiers.
 - 2. Utilize screw type, cyclone, or pressure manifold type distributors to apply modifier.
 - 3. Do not apply when wind conditions create potential hazards or transference of material to adjacent areas.
 - 4. Mix modifiers with rotary speed mixers or disc harrow, and continue until a homogenous layer of the required thickness is obtained.
 - 5. Compaction:
 - a. Lime modified soils shall be compacted within 3 days.
 - b. Cement modified soils shall be compacted within 30 minutes.
 - 6. Observation and testing: Quantities of materials, placing, mixing, and compacting shall be, as recommended, observed and tested by the Geotechnical Engineer.

3.5 STOCKPILING

- A. General:
 - 1. See drawings for designated stockpiling areas. If Drawings do not designate specific areas, or areas shown are insufficient, contact Architect/Engineer for direction.
 - 2. Stockpile earth materials in manners that will prevent intermixing of different materials and intrusion of trash, debris and organic materials.

3. Slope stockpiled materials to provide adequate surface drainage.
4. Install and maintain erosion control measures. Refer to drawings and Division 31 Section "Erosion Control". At a minimum, silt fence shall be installed around all stockpiled areas. Seed areas which are to remain stockpiled for extended periods of time.
5. Storage or stockpiling of materials on the subgrade is prohibited.

3.6 EXCAVATION

A. General:

1. Excavation shall conform to OSHA and all other applicable safety regulations.
2. Excavation shall conform to the dimensions and elevations indicated on the Drawings, except as specified herein.
3. Excavation shall extend sufficient distance from walls and footings to allow for placing and removal of forms, installation of services and inspection.
4. Remove unsuitable material below indicated depths and replace with suitable, compacted material or lean concrete, at the Architect/Engineer discretion.
5. Topsoil stripping: Strip topsoil to its depth from areas to be covered by building, by walks and by other work and where existing surface areas required grading in order to establish new elevations.
6. Subgrade: Unless otherwise indicated, excavate to following subgrades:
 - a. Slab-on-grade: Sub-grade at bottom of drainage fill or at bottom of existing topsoil, whichever is lower.
 - b. Drives and paving: Sub-grade at bottom of aggregate base.
 - c. Footing: Sub-grade at indicated bottom of footing.
 - d. Lawn area: Sub-grade 4" below indicated surface elevation.

3.7 TRENCHING

A. General:

1. All trenching shall conform to OSHA and all other applicable safety standards.
2. Verification:
 - a. Contractor shall verify all existing grades, inverts, utilities, obstacles and topographical conditions prior to any trenching, excavation or underground installations.
 - b. In the event existing conditions are such as to prevent installations in accordance with the Contract Documents, immediately notify the Architect/Engineer and await decision before continuing work.
 - c. Architect/Engineer decision will be final and binding upon the Contractor, and installations shall be in accordance with same.
3. Saw cut existing pavements to proper width for trenching.
4. Legally dispose materials unsuitable for trench backfilling off-site.

B. Width:

1. Trenches for piping shall be not less than 12" wide or more than 16" wider than the outside diameter of the pipe to be laid therein, and shall be excavated true-to-line, so that a clear space not less than 6" or more than 8" in width is provided on each side of the pipe.
2. For sewers, the maximum width of trench specified shall apply to the width at and below the level at the top of the pipe. The width of the trench above that level may be made as wide as necessary for sheeting and bracing, and proper installation of the Work.
3. Trenches shall be open vertical construction.

C. Depth:

1. Trench as required to provide the elevations shown on the drawings.
2. Where elevations are not shown on the drawings, trench to sufficient depth to give a minimum of 36" of fill above the top of the pipes measured from the adjacent finish grade.
3. Where trench excavation is inadvertently carried below proper elevation, backfill with approved material and then compact to provide a firm and unyielding subgrade and/or foundation at no additional cost to the Owner.

D. Trench Bracing:

1. Properly support all trenches in strict accordance with all pertinent rules and regulations.
2. Brace, sheet, and support trench walls in such a manner that they will be safe and that the ground alongside the excavation will not slide or settle, and that all existing improvements of every kind, whether on public or private property, will be fully protected from damage.
3. In the event of damage to such improvements, immediately make all repairs and replacements necessary at no additional cost to the Owner.
4. Arrange all bracing, sheeting, and shoring so as to not place stress on any portion of the completed Work until the general construction thereof has proceeded far enough to provide sufficient strength.
5. All shoring and sheeting required to perform and protect the excavation and as required for the safety of employees and abutting structures shall be performed. All workmen performing work in 48" or deeper trench or excavation shall be protected by use of a welded sheet steel "safety box."
6. Removal: Exercise care in the drawing and removal of sheeting, shoring, bracing, and timbering to prevent collapse or caving of the excavation faces being supported.

E. Bedding:

1. Where pipes or conduits are to be installed, excavate below the proposed alignment of the pipe and backfill with clean sand to provide uniform support unless otherwise noted on the drawings.
2. Unless shown otherwise on Drawings, minimum bedding to be 4" below pipe.
3. Storm sewer pipes are to be bedded with stone.
4. Refer to drawings and details for further information and requirements.

F. Grading and Handling of Trenched Material:

1. During excavation, material shall be stacked in an orderly manner a sufficient distance back from edges of trenches to avoid overloading and prevent slides or cave-ins.
2. Control the temporary stockpiling of trenched material in a manner to prevent water from running into the excavations.
3. Do not obstruct the surface drainage but provide means whereby stormwater is diverted into existing gutters, surface drains or other temporary drains.
4. Any water accumulated in the trenches shall be removed by pumping or by other approved methods.

3.8 FILLING, BACKFILLING AND COMPACTING

- A. Prior to filling, backfilling and compacting, proof-roll and remediate subgrade per Part 3 Quality Assurance.
- B. Unless otherwise indicated, maximum lift thickness is 8" of un-compacted material.
- C. Moisture:
 1. Thoroughly mix each layer to assure uniformity of material.
 2. Supplement mixing with wetting or drying as required to obtain the moisture content required for the indicated percentages of compaction.
 3. All fill shall be placed so that the moisture content is within +/- 2% of the optimum moisture content according to ASTM D698.
 4. Do not use frozen materials in the fill or allow the fill to be placed upon frozen materials.
- D. Compaction:
 1. Compaction shall be accomplished by approved means and shall meet the following densities for various parts of the Work. See Part 2 for density requirements of individual soil materials.
 2. Compaction by flooding is not acceptable.
 3. In cut areas where pavement is planned, scarify the upper 12" of subgrade prior to compaction.
- E. Equipment:
 1. Tracked equipment shall not be used as compaction equipment.
 2. The static weight of compaction equipment utilized for the compaction of backfill materials near walls as defined in No.3 below shall not exceed 2,000 lbs. for non-vibratory equipment and 1,000 lbs. for vibratory equipment.
 3. All heavy equipment, including compaction equipment heavier than noted herein, shall not be allowed closer to walls than 3 feet plus the vertical distance from backfill surface to the bottom of the wall.

3.9 GRADING

- A. General:

1. After filling and backfilling operations are complete, neatly and evenly grade areas to be seeded or sodded.
2. Scarify subgrade to a depth of 6" and place minimum 4" topsoil (6" maximum).
3. Grade to obtain the elevations indicated within a tolerance of plus or minus 0.1 foot.
4. Slope finished subgrade surface to provide drainage away from building walls.

B. Treatment After Completion of Grading:

1. After grading is completed and inspected, permit no further excavation, filling, or grading except with the review of and the inspection by the Owner.
2. Use all necessary means to prevent the erosion of freshly graded areas during construction and until such time as permanent drainage and erosion control measures have been installed.

3.10 QUALITY ASSURANCE

A. Coordination:

1. A representative from the Geotechnical Engineer shall be present to observe and perform tests at all times earthwork is in progress.
2. Contractor shall provide minimum 72 hour notice to Geotechnical Engineer before each operation requiring testing or inspection.

B. Testing:

1. To verify adequacy of compaction, the Geotechnical Engineer shall perform field density tests.
2. A grid pattern shall be established with a maximum area of 1,000 square feet.
3. For each grid, provide minimum one test per each lift of compacted material.

C. Proofrolling:

1. Proofrolling shall be supervised by the Geotechnical Engineer.
2. Since standard test procedures are not available for proofrolling, the necessary scope and method of testing shall be determined by the Geotechnical Engineer, subject to review by the Architect/Engineer.
3. In areas to be covered by buildings and other site improvements, and other areas deemed necessary by the Geotechnical Engineer or Architect/Engineer, prepare and test subgrade as follows:
 - a. Using a loaded tri-axle dump truck or other approved method, the Contractor shall proof-roll the exposed subgrade under the observation of the Geotechnical Engineer.
 - b. Based on this observation, plus supplemental testing as required, the Geotechnical Engineer shall determine when and where soft, loose or other undesirable materials are to be removed and replaced.

D. Approval and Remediation:

1. When testing and proofrolling indicate proper compaction has been obtained, and after approval from Geotechnical Engineer has been given, continue fill and backfill work until the indicated elevation is achieved.
2. If required density has not obtained, the Contractor shall remove the defective material and repeat operations until the required density is obtained and approval is given by the Geotechnical Engineer.
3. Cost of material removal, replacement, compaction and re-testing shall be the responsibility of the Contractor.

3.11 SURPLUS SOIL MATERIALS

- A. Unless otherwise indicated or directed by Owner, remove excess soil materials and legally dispose of off-site.

3.12 JOB COMPLETION

- A. Upon completion of the Work of this Section:
 1. Remove all trash and debris from earthwork operations.
 2. Remove surplus equipment and tools.
 3. Leave the site in a neat and orderly condition.
 4. Restore all adjacent areas disrupted by earthwork activities to their original condition.

END OF SECTION 31 20 00

SECTION 32 13 00
SITE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cast-in-place concrete outside of the building for site improvements including, but not limited to, the following:
 - a. Curbing, gutters, walks and pavement.
 - b. Retaining walls, vaults, utility structures.

1.2 QUALITY ASSURANCE

A. Any work in public right-of-way or other areas subject to the jurisdiction of anybody shall be performed either to the requirements of that jurisdiction or to the requirements of this Specification, whichever is more stringent.

B. Qualifications of Workers:

1. Provide at least one person who shall be present at all times during execution of this portion of the work.
2. This person shall be thoroughly familiar with the type of materials being installed and the best methods for their installation.
3. This person shall direct all work performed under this Section.

C. Manufacturer: manufacturer of ready-mixed concrete products complying with ASTM C94 requirements for production facilities and equipment.

D. Codes and Standards:

1. In addition to complying with all pertinent codes and regulations, comply with all pertinent requirements of the following American Concrete Institute Publications:
 - a. "Building Code Requirements for Reinforced Concrete" ACI 318-99.
 - b. "Recommended Practice for Cold Weather Concreting" ACI 306 R-88.
 - c. "Recommended Practice for Hot Weather Concreting" ACI 305 R-91.
 - d. "Recommended Practice for Evaluation of Strength Test Result for Concrete" ACI 214-77.
 - e. "Standard Practice for Selecting Proportions for Normal, Heavy Weight, and Mass Concrete" ACI 211.1-98.

2. Where provisions of pertinent codes and standards conflict with this Section, the more stringent provisions shall govern.

E. Testing and Inspection:

1. All testing and inspection shall be performed by an independent Geotechnical Engineering Consultant ("Geotechnical Engineer").
2. The Geotechnical Engineer is responsible for all testing, sampling and inspection.
3. The Geotechnical Engineer is responsible for approving all materials, installation and procedures.
4. The Contractor is responsible for providing these services.
5. The Contractor is responsible for all coordination and scheduling with the Geotechnical Engineer.

1.3 SUBMITTALS

- A. Mix Designs.
- B. Testing and inspection reports.
- C. Chloride ion tests or total chloride tests (with generally accepted method to relate total chloride to chloride ion) to show compliance with maximum ion concentrations.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Concrete:

1. Cement: ASTM C150, Type I or III.
2. Fine aggregate: ASTM C33.
3. Coarse aggregate: ASTM C33.
 - a. Crushed stone shall be used for exterior concrete, unless otherwise noted.
 - b. Maximum aggregate size is 3/4 of the minimum clear spacing (per code) between reinforcing bars or between bars and forms.
4. Water: Clean, fresh, potable.
5. Air-entraining admixture: ASTM C260.
6. Fly ash: ASTM C618.
7. Fiber mesh:

- a. Fiber mesh shall be polypropylene fibrillated and mix shall contain minimum 1.5 lbs. of fiber per cubic yard of concrete, unless otherwise prescribed by manufacturer and approved by Architect/Engineer.
 - b. Fiber shall be mixed at batch plant, field mixing is not acceptable.
- 8. Sealer/curing compound:
 - a. ASTM C309, Type I, clear.
 - b. Compatible with texture of surfaces.
- B. Mix Design:
 - 1. Strength: 4000 psi, ready mixed in accordance with ASTM C94.
 - 2. Slump: 4" +/- 1".
 - 3. Minimum cement content: 517 pounds per cubic yard (adjust for air entrainment)
 - 4. Fly ash shall not replace more than 20% of the cement.
 - 5. Maximum water/cement ratio: 0.40.
 - 6. Air entrainment: 6%. Percentage of air content shall be determined in accordance with the admixture manufacturer's recommendations based on aggregate size and a moderate level of exposure.
 - 7. White concrete must have a 3-year aged minimum SR value of 0.28, or initial SR value of at least 33.
- C. Other Requirements:
 - 1. Proportions of materials for concrete shall be established in accordance with Section 5.2 of ACI 318 (Latest edition).
 - 2. Follow ACI 211 and ACI 301 to determine the water-cement ratios.
 - 3. Concrete shall not exceed maximum chloride ion content for corrosion protection as defined in ACI 318 Table 4.4.1.
 - 4. Do not use calcium chloride or admixtures containing soluble chlorides.
 - 5. Do not use re-tempered concrete or concrete that has been contaminated by foreign materials.
 - 6. All exterior concrete shall be air entrained.
 - 7. Unless otherwise indicated, all reinforcing for concrete pavement shall be epoxy coated.
- D. Isolation Joints: Unless specified otherwise on Drawings, use the following:
 - 1. Cork isolation joints with sealant:
 - a. Joint material: AASHTO M213; 1/2 inch thick.
 - b. Joint sealer: AASHTO M173; polyurethane with color matching adjacent concrete
 - c. Application: Use cork isolation joint with sealant for isolation joints for sidewalks, drop-offs, decorative concrete pavement areas, areas adjacent to buildings, structures, and columns.
 - 2. Asphalt saturated cellulosic fiber:

- a. Joint material: AASHTO M213; 1/2 inch thick.
 - b. Do not place sealant on asphalt saturated cellulosic fiber isolation joints.
 - c. Application: Use this type of isolation joint for items such as curbs and walks, which are in areas not adjacent to buildings, structures and columns, etc. Do not use in areas of colored concrete.
3. Contact Architect/Engineer if further direction is needed for proper application in specific areas.

2.2 STEEL REINFORCING

A. Reinforcing Bars:

1. Reinforcing bars and dowels: ASTM A615, Grade 60.
2. Reinforcing to be welded: ASTM A615, Grade 40.
3. Epoxy coated bars and dowels: ASTM A884, Grade 60.

B. Welded Wire Fabric:

1. ASTM A185 6"x6"xW1.4xW1.4, unless otherwise indicated.
2. Provide in flat sheets, not rolled form.

C. Other Embedded Items: Provide standard manufactured products as approved by the Architect/Engineer.

D. Bar Supports:

1. Conform to the requirements of the "Manual of Standard Practice", published by the Concrete Reinforcing Steel Institute.
2. Accessories shall be plastic protected Class "C" for all concrete exposed in the finished structure, except as specified below.
3. Accessories shall be Class "A", bright basic, for unexposed concrete.
4. Utilize Call "E," stainless steel bar supports, for exterior concrete to be finished by sand blasting.
5. Do not use continuous high chairs. Use individual high chairs laced with bottom cross bars plus #5 support bars. (Minimum of 2 rows of support for all reinforcing).
6. Supports must be capable of supporting construction loads without failing. Contractor to furnish additional supports at no cost to the Owner if in the Architect/Engineer estimation the supports are not adequate.

2.3 FORMWORK

A. Form Lumber:

1. All form lumber in contact with exposed concrete shall be new or of sufficient quality to insure an unblemished texture.
2. All form lumber shall be plywood, board lumber, hardwood or other material of grade or quality to best suit each particular usage.

B. Fiber Forms:

1. Fiber forms may be utilized to construct round columns/piers.
2. Seamless forms must be used for concrete exposed in the finished structure.
3. Standard seamed tubes are permissible for non-exposed concrete.

C. Form Release Agent:

1. Standards:
 - a. Release agent shall be similar to Symons Manufacturing Company Magic Kote.
 - b. Grace Construction Products Formshield Chemical Release Agent.

D. Bracing/Shoring/Studs:

1. Such supports shall be selected for economy consistent with safety requirements and the quality required in the finished work. The Contractor is responsible for the design, illustration, safety and serviceability of all formwork.

E. Other Materials: All other materials, not specifically described, but required for proper completion of concrete formwork, shall be as selected by the Contractor subject to advance acceptance by the Architect/Engineer.

2.4 OTHER

A. Precast Concrete Wheel Stops:

1. Reinforced, precast concrete units 6" high x 9" wide x 7' long.
2. Provide minimum 2-#4 deformed bars 80" in length.
3. Provide chamfers on the top edges and drainage slots on the underside.
4. Anchor pins shall be 5/8" diameter deformed bars minimum 18" long.

PART 3 - EXECUTION

3.1 GENERAL

A. Job Conditions:

1. Extreme temperature conditions:

- a. When extreme hot or cold weather conditions occur, or are expected to occur, which might detrimentally affect concrete, employ handling and placing techniques to guard against such effects.
 - b. Comply with the recommendations of American Concrete Institute for hot and cold weather concreting. ACI Publications ACI 306 and ACI 305.
 2. Inclement weather: Unless adequate protection is provided, do not place exterior concrete during rain, sleet or snow.
- B. Preparation and Verification:
1. Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly begin.
 2. Verify all items to be embedded in concrete are in place.
 3. Verify concrete may be placed to the lines and elevations indicated on the Drawings, with all required clearances for reinforcement.
 4. Verify forms may be constructed in accordance with all pertinent codes and regulations, the referenced standards and the original design.
 5. Remove all dirt, oil, paint, loose rust and other foreign materials from the concrete reinforcement prior to placement.
 6. In the event of discrepancy, contact Architect/Engineer immediately and do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.
 7. Verify approval of mock-ups by Owner and Architect/Engineer before beginning work.
- C. Other: Unless otherwise indicated, all exterior concrete shall be placed on a compacted aggregate fill per the following:
1. Minimum depth equal to the concrete thickness for pavement, walks and other slabs on grade.
 2. Minimum 6" depth of fill for curbing and other support bases.

3.2 FORMWORK

- A. Protection:
1. Use all necessary and appropriate means to protect formwork materials before, during and after installation.
 2. Protect the installed work and materials of all others trades.
 3. In the event of damage, immediately make all repairs and replacements necessary at no additional cost to Owner or other trades.
- B. General:
1. Forms shall have sufficient strength and be sufficiently tight to prevent leakage of mortar.
 2. The design and engineering of the formwork shall be the responsibility of the Contractor.

3. Refer to this Section for construction joint requirements.
4. Tolerances: Construct all forms straight, true, plumb and square within the tolerances recommended by ACI 347.
5. Embedded items: Set all required steel frames, angles, grilles, bolts, reglets, inserts, pipe, conduit and other such items required to be anchored in the concrete before the concrete is placed.
6. Wetting: Keep forms sufficiently wetted to prevent joints opening up before concrete is placed, except as recommended in ACI 306 R-78, "Recommended Practice for Cold Weather Concreting."

C. Layout:

1. Form all required cast-in-place concrete to the shapes, sizes, lines and dimensions indicated on the Drawings.
2. Exercise particular care in the layout of forms to ensure the proper finish structure size and shape.
3. Make proper provision for all openings, offsets, recesses, anchorage, blocking and other features of the Work as shown or required.
4. Carefully examine the Contract Documents and consult with other trades as required to ensure proper provisions for openings, reglets, chases, and other items in the forms.

D. Bracing and Shoring:

1. Properly brace and tie the forms together so as to maintain position and shape and to ensure safety to personnel.
2. Construct all bracing, supporting members, and centering of ample size and strength to safely carry, without excessive deflection, all dead and live loads to which they may be subjected.
3. Properly space the forms apart and securely tie them together, using metal spreader ties that give positive tying and accurate spreading.
4. All shoring shall extend to adequate foundations.
5. The Contractor is responsible for both the proper design and installation of all bracing and shoring, to properly insure the safety and serviceability of the structure.

E. Plywood Forms:

1. Assembly: Nail the plywood panels directly to studs and apply in a manner to minimize the number of joints.
2. Joints: Make all panel joints tight butt joints with all edges true and square.

F. Reuse of forms:

1. Reuse of forms shall in no way delay or change the schedule for placement of concrete from the schedule obtainable if all forms were new.
2. Reuse of forms shall in no way impart less structural stability to the forms, nor less acceptable appearance to finished concrete.

G. Cleaning:

1. Before concrete is placed the forms shall be cleaned of all debris, ice, snow, frost, and standing water.
2. Remove all loose earth materials from the surfaces of earth forms.

H. Removal of Forms:

1. Forms shall be removed in such a manner to ensure complete safety of the structure.
2. Formwork for columns, walls, and other parts not supporting the weight of the concrete may be removed as soon as the concrete has hardened sufficiently to resist damage from removal operations with the following minimums:
 - a. Formwork for walls and columns shall remain in place a minimum of two (2) days during which the temperature of the air surrounding the concrete must be above 50° F.
 - b. This minimum time period represents a cumulative number of days or fractions thereof.
 - c. Such formwork for concrete placed during cold weather with surrounding air temperatures 50° F shall remain in place one day after the artificial heating and/or freeze protection is discontinued/removed.
3. Forms and false-work:
 - a. Any supporting vertical loads shall remain in place until the members have acquired sufficient strength to safely support their weight and any superimposed loads.
 - b. Such forming shall remain in place until the concrete has attained its specified 28 day strength as indicated by the test cylinders unless re-shores are installed in sufficient quantities to transmit the loads to adequate foundations without over stressing the particularly cured structure.
 - c. The requirements of ACI 305 and 306 must also be met before forms may be removed.
 - d. Removal of forms and false-work is the responsibility of the Contractor, and the Contractor shall bear the full responsibility for this operation.
 - e. Concrete damaged by too early removal of forms or false-work shall be repaired or replaced as directed by the Architect/Engineer.
4. Concrete exposed by form removal during the curing period shall be cured by one of the methods specified in this Section.
5. Curing compound is not permitted in certain locations. In these cases, curing is to be by an alternate method. Refer alternate methods in this Section.
6. In no case shall the superimposed load or relatively new concrete exceed 50 pounds per square foot unless proper shoring to suitable foundations is installed as required by the Architect/Engineer.
7. Use all necessary and appropriate means to protect workman, public, the installed work and materials of other trades, and the complete safety of the structure.
8. Cut nails and similar fasteners off flush and leave all surfaces smooth and clean.

3.3 REINFORCEMENT

A. Protection:

1. Use all necessary and appropriate means necessary to protect concrete reinforcement before, during and after installation and to protect the installed work and materials of all other trades.
2. Store in a manner to prevent excessive rusting and fouling with dirt, grease, and other bond-breaking coatings.
3. In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the Owner.

B. Placing:

1. Reinforcing bars:

- a. Positively secure reinforcing to bar supports and tie or otherwise anchor bars to prevent displacement by construction loads or by the placing of concrete.
- b. Splice bars with a minimum lap of 40 bar diameters, unless otherwise indicated.
- c. Use mechanical splicers/couplers where quantity of reinforcement restricts placement of concrete if lapped splices are utilized.
- d. Splice bars only at locations indicated on the Contract Documents and shop drawings.
- e. Both shop and field bending shall be accomplished without heating the bars.
- f. Minor placing adjustments can be made to avoid interference with other reinforcement and/or embedded devices. The final arrangement, however, is subject to review and acceptance of the Architect/Engineer.
- g. Immediately notify the Architect/Engineer if reinforcing cannot be installed as shown on drawings. No cutting of reinforcing shall occur unless the Architect/Engineer has reviewed and approved such cuts.

2. Embedded devices:

- a. Set hangers, anchor bolts, inserts, and other embedded devices accurately in place.
- b. Make sure all such devices are installed so that work to be attached thereto will be properly received.
- c. Keep devices straight and true-to-line.

3. Welded wire fabric:

- a. Splice by lapping each section at least two meshes wide plus one wire with the adjacent section, but not less than 8".
- b. Extend fabric into all openings, doorways, and the like, unless otherwise indicated.

C. Final Cleaning:

1. Prior to placing concrete, remove all loose mill and rust scale, oil, mud, ice, and other foreign coatings which destroy and/or reduce bond between the reinforcement and concrete.
2. Use wire brushing and/or other suitable methods to complete cleaning operations.

3.4 CONCRETE PLACEMENT

A. Preparation:

1. Remove all wood scraps, ice, snow, frost, standing water and debris from the area in which concrete will be placed.
2. Thoroughly wet the surface of excavations (except in freezing weather), coat forms with release agent and remove all standing water.

B. Method:

1. Convey concrete from mixer to place of final deposit by methods that will prevent separation and loss of materials.
2. For chuting, pumping and pneumatically conveying concrete, use only equipment of such size and design as to ensure a practically continuous flow of concrete at the delivery end without loss or separation of materials.
3. Deposit concrete as nearly as possible in its final position to avoid segregation due to re-handling and flowing.
4. Use screed poles or similar devices to ensure that all slabs are cast at the proper elevations and that specified tolerances are maintained.

C. Rate of Placement:

1. Place concrete at such a rate that concrete is at all times plastic and flows readily between reinforcement.
2. Once placing is started, carry it on as a continuous operation until placement of the panel or section is complete.
3. Do not pour a greater area at one time than can be properly finished. This is particularly important during hot or dry weather.

D. Consolidation:

1. Thoroughly consolidate all concrete by mechanical vibration, hand, and other suitable means during placement, working it around all embedded fixtures and into corners of forms.
2. Do not over-consolidate with when using mechanical vibration as to cause separation of the aggregate.

3.5 JOINTS

A. Unless otherwise shown on Drawings, joints shall meet the following minimum requirements. If questions or concerns exist, contact Architect/Engineer for direction.

B. Isolation Joints:

1. General:

- a. Tool concrete on both sides of joint (1/4" radius).
- b. Install joint material to full depth of concrete.
- c. See Part 2 Products for type of joint material to be used.
- d. Install sufficient smooth doweling reinforcing to prevent differential movement in curbing, walks and pavement.
- e. Do not dowel into such items as columns and exterior building walls/foundations, unless specified on drawings. Refer to structural drawings also.
- f. Unless otherwise indicated, install isolation joints per the following minimum requirements.

2. Curbing:

- a. Provide each side of inlet castings.
- b. Provide at all tangent points and changes in direction.

3. Walks:

- a. For walks 6 feet in width and less, provide at intervals not exceeding 25 feet.
- b. For larger walks and plaza areas, provide at intervals not exceeding 20 feet in any direction.

4. Pavement: Provide at intervals not exceeding 20 feet in any direction.

5. Retaining walls: Provide at intervals not exceeding 40 feet per linear length of wall.

6. Other:

- a. Provide at accessible ramps, buildings, columns, bollards, castings, drains and other locations as necessary to prevent excess cracking or displacement.
- b. Contact Architect/Engineer if any areas of question or concern are encountered.

C. Control Joints:

1. General:

- a. Control joint depth shall be minimum $\frac{1}{4}$ of the slab thickness.
- b. Continue one half of reinforcing through joint.
- c. Install joints by tooling or saw cutting as described below, unless otherwise indicated.

- d. Construction joints may be used where appropriate.
 - 2. Curbing: Saw cut at intervals not exceeding 10 feet.
 - 3. Walks: Tool joints at intervals not-to-exceed 5 feet in any direction.
 - 4. Pavement: Saw cut at intervals not exceeding 18x pavement thickness feet in any direction.
 - 5. Retaining walls: Provide at intervals not exceeding 20 feet per linear length of wall.
 - 6. Other:
 - a. Provide at accessible ramps, columns, bollards, castings, drains and other locations as necessary to prevent excess cracking.
 - b. Contact Architect/Engineer if any areas of question or concern are encountered.
- D. Construction Joints:
- 1. Joints shall be made with properly constructed bulkheads and formed keyways.
 - 2. Extend reinforcing through construction joints, unless otherwise indicated.
 - 3. The Contractor shall consult with the Architect/Engineer before starting concrete work to establish a satisfactory placing schedule and to confirm joint locations.
 - 4. Retaining walls: Provide at intervals not exceeding 80 feet per linear length of wall.
- E. Tooled Joints and Scoring:
- 1. Make straight, clean and non-ragged.
 - 2. Tool or score concrete on both sides of joint (1/4" radius).
 - 3. Provide window pane joint finish unless otherwise indicated.
- F. Bond Break: 15# per 100 square foot building paper.

3.6 FINISHING

- A. Unless otherwise indicated, provide a light-broom finish on all exterior slabs, walks and stairs.
- B. Provide a dry-rub finish for all exposed concrete walls, curbs or edge surfaces.

3.7 CURING

- A. Formed Surfaces:
 - 1. Cure formed surfaces by either of the following methods:
 - a. Leave forms in place until the cumulative number of days or fractions thereof, not necessarily consecutive, has totaled seven days during which the temperature of the air in contact with the concrete is 50°F or above.
 - b. Remove forms at an earlier time, but apply curing compound to concrete surfaces.
 - c. Apply compound in accordance with manufacturer's recommendations.

2. If curing compound is not used and the forms are stripped prior to 7 days curing, the following methods are approved:
 - a. Ponding or continuous sprinkling.
 - b. Continuously wet mats.
 - c. Sand kept continuously wet.

3.8 PATCHING

- A. Patch existing concrete to receive new finish in a manner so that existing and patched surfaces are smooth and continuous and have a uniform appearance.

3.9 QUALITY ASSURANCE

A. Coordination:

1. A representative from the Geotechnical Engineer shall be present to observe and perform tests at all times site concrete work is in progress.
2. Contractor shall provide minimum 72 hour notice to Geotechnical Engineer before each operation requiring testing or inspection.

B. Inspection:

1. Immediately after forms and curing membranes have been removed, inspect all concrete surfaces and patch all pour joints, voids, rock pockets, form tie holds and other imperfections before the concrete is thoroughly dry.
2. If the defects are serious or affect the strength of the structure, or if patching does not satisfactorily restore the quality and appearance of the surface, the concrete shall be removed and replaced complete, at no additional cost to the Owner.

C. Testing: The Geotechnical Engineer shall perform the following:

1. Compression tests:

- a. Secure three standard cylinders from each pour of concrete, in accordance with ASTM C31, and cure under standard moisture and temperature conditions.
- b. Test in accordance with ASTM C39.
- c. Test one cylinder at 7 days and two cylinders at 28 days.
- d. Submit duplicate test reports of results from testing to Architect/Engineer.
- e. Take steps immediately to evaluate unsatisfactory test results.
- f. In the event of unsatisfactory test results, an investigation as outlined in Section 5.6.5 of ACI 318-99 shall be employed.

2. Slump and air entrainment:

- a. Perform slump tests in accordance with ASTM C143.
 - b. Determine the air content of concrete in accordance with ASTM standards.
 - c. Submit results of slump tests and air content on each compression test report.
3. Should additional testing be required because of unsatisfactory test results, the Contractor is responsible for the costs incurred for correcting any deficiencies and the cost of additional testing.

END OF SECTION

SECTION 32 92 19
SEEDING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Furnish and install all labor, material, and equipment necessary for seeding all areas as indicated or implied by the Contract Documents.

B. Related Sections:

1. Division 31 Section "Earthwork".

1.2 QUALITY ASSURANCE:

A. Installer Qualifications:

1. Engage an experienced installer who has completed seeding work similar in material, design, and extent to that indicated for this project and with a record of successful lawn establishment.
2. All work described in this Section is to be done by an installer specializing in such work within the five (5) documented years of experience in similar work.

B. Refer to Division 31 Section "Earthwork" for topsoil requirements and amendment recommendations to bring soil to optimal condition for growing lawn grass seed.

C. Applicable Publications:

1. Publications of the following institutes, associations, societies, and agencies are referred to in this Section.
2. American Joint Committee on Horticulture Nomenclature Standard: Standardized Plant Names, 1942 Edition and Additions.

D. Requirements of Regulatory Agencies:

1. Certificates of inspection: All shipments of orders of seed shall be properly inspected at the nursery or at the growing site by the authorized Federal and State authorities. All necessary inspection certificates shall accompany the invoice for each shipment or order of stock, as may be required by law for the necessary transportation. Certificates shall be filed with the Architect/Engineer, prior to acceptance of the materials.

1.3 SUBMITTALS

- A. Certification of grass seed from seed vendor for each grass seed mixture stating the botanical name, common name, and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
 - 1. Certification of each seed mixture for lawn seeding identifying source including name and telephone number of supplier.
- B. Topsoil analysis: Refer to Division 31 Section "Earthwork".
- C. One copy of Certificates of Inspection of Regulatory Agencies as specified herein.
- D. Qualification data for firms and persons specified in the "Quality Assurance" articles to demonstrate their capabilities and experience. Include list of completed projects with project names and addresses; names and address of Owners and other information specified.

1.4 SCHEDULING

- A. Seasonal Requirements:
 - 1. Perform the seeding work between 1 March and 15 May or between 15 August and 15 October, or both, unless otherwise approved by the Architect/Engineer; and at such time that the seeding work will not be damaged by freezing temperatures, rain or high winds.
- B. Scheduling:
 - 1. Seeding operations shall not commence in any area until other trades no longer need machine access to these areas.
 - 2. Begin installation of seeding after preceding related work is accepted.

1.5 PRODUCT HANDLING

- A. Storage:
 - 1. Store in a dry, secure location off the ground, free from physical abuse.
 - 2. Protect from adverse weather conditions.

PART 2 - PRODUCTS

2.1 SEED

- A. Grass Seed: Fresh, clean, dry new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.
- B. Seed Species: Seed of grass species as follows, with not less than 98 percent pure seed, not less than 85 percent germination, and not more than 0.3 percent weed seed:

1. Permanent seed: Full sun or partial shade:
 - a. 90% Hybrid Bluegrass blend – a minimum of 3 varieties evenly blended, such as Midnight II, Rugby II, Nuglade, or as approved by Architect/Engineer..
 - b. 10% Perennial Rye Grass.
2. Permanent seed: Full shade:
 - a. 20% Hybrid Bluegrass.
 - b. 40% Creeping Red Fescue.
 - c. 20% Hard Fescue.
 - d. 20% Chewings Fescue.
3. Temporary seed:
 - a. 100% Annual Rye Grass.

2.2 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C602 agricultural limestone containing a minimum 80 percent calcium carbonate equivalent as follows:
 1. Class: Class T with a minimum 99 percent passing through No 8 sieve and a minimum 75 percent passing through No 60 sieve.
- B. Aluminum Sulfate: Commercial grade, unadulterated
- C. Agricultural Gypsum: Finely ground, containing a minimum of 90 percent calcium sulfate
- D. Sand: Clean, washed, natural or manufactured, free of toxic materials.

2.3 ORGANIC SOIL AMENDMENTS

- A. Peat: Sphagnum peat moss, partially decomposed, finely divided or granular texture, with a pH range of 3.4 – 4.8.
- B. Compost: Well-composted, stable and weed free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1 inch sieve; not exceeding 0.5 percent inert contaminants and free of substances toxic to humans and plantings.

2.4 MULCHES

- A. Straw Mulch: Provide air dry, clean mildew and seed free, salt hay or thrashed straw of wheat, rye, oats, or barley.

- B. Non-Asphaltic Tackifier: Colloidal tackifier recommended by fiber mulch manufacturer for slurry application; nontoxic and free of plant material or germination inhibitors.
- C. Asphalt Emulsion: ASTM D977, Grade SS-1 nontoxic and free of plant-growth or germination inhibitors.

2.5 FERTILIZER

- A. Bone Meal: Commercial, raw or steamed, finely ground; a minimum 4 percent nitrogen and 20 percent phosphoric acid.
- B. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.
- C. Commercial Fertilizer: Commercial grade complete fertilizer of neutral character, consisting of fast and slow release nitrogen 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - 1. Composition: 12 percent of actual nitrogen, 12 percent phosphorous, and 12 percent potassium by weight.
- D. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water insoluble nitrogen, phosphorous, and potassium in the following composition:
 - 1. Composition: 20 percent nitrogen, 10 percent phosphorous and 10 percent potassium by weight.

2.6 WATER

- A. Potable.

PART 3 - EXECUTION

3.1 GENERAL

- A. Inspection:
 - 1. Verify soil preparation and related preceding work have been completed.
 - 2. Do not start work until other trades no longer need machine access to these areas.
 - 3. Do not start work until conditions are satisfactory.
- B. Preparation:
 - 1. Protect structures, utilities, sidewalks, pavements and other facilities, trees, shrubs and plantings from damage caused by planting operations.

2. Provide erosion control measures to prevent erosion or displacement of soils and discharge of soil bearing water runoff or airborne dust to adjacent properties or walkways.

3.2 LAWN PREPARATION

- A. Limit lawn preparation to areas to be planted.
- B. Newly Graded Subgrades:
 1. Loosen subgrade to a minimum depth of 6”.
 2. Remove stones larger than 1” in any dimension, sticks, roots, trash, and other extraneous matter.
 3. Apply soil amendments and fertilizer as recommended by topsoil analyst directly to topsoil before loosening.
- C. Unchanged Sub-grades: If lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations, prepare surface soil as follows:
 1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
 2. Loosen surface soil to a minimum depth of 6”.
Remove stones larger than 1” any dimension, sticks, roots, trash, and other extraneous matter.
 3. Apply soil amendments and fertilizers according to topsoil analysis and mix thoroughly into top 6 inches of soil. Till soil to a homogeneous mixture of fine texture.
- D. Finish Grading:
 1. Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture.
 2. Grade to within plus or minus 1/2 inch of finish elevation.
 3. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future.
- E. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- F. Restore areas if eroded or otherwise disturbed after finish grading and before planting.
- G. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.

3.3 SEEDING

- A. General:
 1. Sow seed with spreader or seeding machine.
 2. Do not broadcast or drop seed when wind velocity exceeds 5 mph.
 3. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

4. Do not use wet seed or seed that is moldy or otherwise damaged.
5. Rake seed lightly into top 1/8 inch of topsoil, roll lightly, and water with fine spray.
6. Unless otherwise indicated, sow seed at the rate of 4 to 6 lb/1000 sq. ft.

B. Slope Protection:

1. On slopes 5:1 and steeper, install erosion control blanket.
2. On slopes less than 5:1, install straw mulch.
 - a. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose depth over seeded areas.
 - b. Spread by hand, blower, or other suitable equipment.
 - c. Anchor straw mulch by crimping into topsoil with suitable mechanical equipment.

3.4 HYDROSEEDING

A. Hydro-seeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydro-seed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.

1. Mix slurry with non-asphaltic or asphalt-emulsion tackifier.

B. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply mulch at a minimum rate of 1500-lb/acre dry weight but not less than the rate required to obtain specified seed-sowing rate.

3.5 PROTECTION

A. Description:

1. Erect temporary barricades and warning signs to protect against pedestrians and vehicular traffic.

3.6 CLEANING

A. Description:

1. Immediately clean spills from paved and finished surface areas.
2. Remove debris and excess materials from project site.
3. Dispose of protective barricades and warning signs at termination of lawn establishment.
4. Remove erosion control measures after lawn establishment period.

3.7 LAWN ESTABLISHMENT

A. Watering:

1. Water daily for the first 14 days after seeding.
2. After first 14 days, supplement rainfall to produce a total of 2 inches water per week until lawn is clearly established and growing healthy.

B. Mowing:

1. When grass reaches 2-1/2 inches in height, mow to 1-3/4 inch in height.
2. Maintain grass between 1-3/4 inch and 2-1/2 inch height.
3. Do not cut off more than 40% of grass leaf in single mowing.
4. Remove grass clippings.
5. Re-seed spots larger than 1 square foot not having uniform strands of grass.

C. Weed Eradication:

1. Between second and third mowing, apply herbicide uniformly at manufacturer recommended rate.

D. Fertilizer:

1. Apply fertilizer uniformly at 1 lb of nitrogen per 1000 square feet 30 days and 60 days after seeding and water immediately.

E. Satisfactory Seeded Lawn:

1. At end of maintenance period, a healthy, uniform, close stand of grass has been established free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 inches by 5 inches.

3.8 WARRANTY AND MAINTENANCE

A. Begin maintenance of lawns immediately after each area is seeded and continue until acceptable lawn is established, but not less than 60 days after date of Substantial Completion.

1. If full maintenance period has not elapsed before the end of planting season, or if lawn is not fully established, continue maintenance during the next planting season.
2. Maintenance includes watering, fertilizing, weeding, mowing, trimming, replanting, and other operations to provide a uniform, weed free, smooth lawn.

B. Begin warranty period after date of Substantial Completion and continue for a period of (one full year).

1. Warranty specified in this section does not deprive the Owner of other rights; he may have in these specifications.
2. The warranty period for new lawn areas shall be for (one full year) after date of Substantial Completion against defects including death and unsatisfactory growth except for defects resulting from Owner abuse or neglect or incidents beyond Contractor's control.

3. Replacement seeding under this warranty shall be granted for (one full year) from date of installation and acceptance.
4. The Contractor shall, at no cost to the Owner, repair damage done to walks, buildings, roads, and other plants or lawns during reseeding.
5. Inspection of the lawn to determine its completion for the beginning of the warranty period will be made by the Architect/Engineer upon notice requesting such inspection by the Contractor at least seven (7) days prior to the anticipated inspection date.

3.9 FINAL INSPECTION AND ACCEPTANCE

A. Description:

1. Request final inspection in writing for acceptance at least ten (10) days before end of warranty period.
2. At the end of the warranty period on the completed lawn, and on written notice from the Contractor, the Architect/Engineer will, within 15 days of such written notice, make an inspection of the lawn to determine if a satisfactory stand of grass has been produced.
3. If a satisfactory lawn has not been established, another inspection will be made after written notice from the Contractor that the lawn is ready for inspection following the next growing season.

END OF SECTION

SECTION 33 05 00
COMMON WORK RESULTS FOR UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. All utility systems 5 feet outside the building line, as shown or implied in the Contract Documents and as required for the Work, including but not limited to:
 - a. Storm drainage.
2. Contractor is responsible for all utility work as shown on contract documents or as required, unless specifically indicated otherwise.

B. Related Sections:

1. Division 02 Section "Maintenance of Existing Conditions".
2. Division 33 Section "Storm Drainage".

1.2 SUBMITTALS

A. Warning Tape System.

1.3 DEFINITIONS

- A. Utilities include all underground and above ground piping, conduits, cables and related structures and appurtenances. Utilities also include sewers.
- B. "Utility Companies" as referenced herein includes all public, private and other companies and agencies supplying utility services or having jurisdiction over such services.

1.4 QUALITY ASSURANCE

- A. All materials and installation shall meet the requirements of utility companies.
- B. All installation shall meet the requirements and recommendations of the material manufacturers and suppliers.
- C. All installation shall meet the requirements and recommendations of the material manufacturers and suppliers.

1.5 COORDINATION

- A. All installation shall meet the requirements and recommendations of the material manufacturers and suppliers.
- B. Verify all proposed utility work with utility companies prior to beginning work.
- C. Provide sufficient notice to utility companies for all work affecting services of utility companies.
- D. Contractor shall maintain complete and operable utility services at all times.
- E. Coordinate timing of utility work and temporary measures with Owner and Utility Companies.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Warning Tape:
 - 1. Verify warning tape requirements with Utility Companies, Owner and Architect/Engineer prior to installation. Unless otherwise indicated or required, provide per the following.
 - 2. Color:
 - a. Blue: Water, fire and chilled water lines.
 - b. Red: Electric.
 - c. Orange: Telecommunications.
 - d. Yellow: Gas, oil, steam, dangerous materials.
 - e. Green: Sanitary laterals
 - 3. Use one of the following systems:
 - a. Non-detectable warning tape with toning wire below:
 - 1) Acid- and alkali-resistant polyethylene warning tape manufactured for marking and identifying underground utilities, 6" inches wide and 4 mils thick.
 - 2) Label: continuous "CAUTION—BURIED (name of utility) BELOW". Toning wire: 12 gauge copper wire with protective jacket for corrosion protection.
 - 3) Unless otherwise indicated, install warning tape 18" below finished grade with toning wire 12" below warning tape.
 - 4) Turn up and tie toning wire as indicated or as required by Utility Companies and Owner.
 - b. Detectable warning tape:

- 1) Acid- and alkali-resistant polyethylene warning tape manufactured for marking and identifying underground utilities, 6" inches wide and 4 mils thick with metallic core with protective jacket for corrosion protection.
 - 2) Label: continuous "CAUTION—BURIED (name of utility) BELOW".
 - 3) Unless otherwise indicated, install warning tape 18" below finished grade.
- B. Unless otherwise indicated or required, warning tape does not apply to sewers or subsurface drains.
- C. Refer to individual Sections for further utility product specifications.

PART 3 - EXECUTION

3.1 REQUIREMENTS

A. General:

1. New utilities shall be installed and operational prior to displacing existing utilities. Service must be maintained at all times.
2. All work shall be made readily accessible for inspection by Utility Companies and Owner at all times during working hours.
3. Refer to Division 31 Section "Earthwork" for excavation, trenching and backfilling.

B. Preparation:

1. Verify existing utilities and topographic conditions prior to trenching, excavation or installation.
2. If existing field conditions prevent installation per the contract documents, notify the Architect/Engineer immediately.
3. Review proposed utility work prior to installation and notify Architect/Engineer immediately of any conflicts or concerns.
4. Mark underground utilities prior to beginning any excavation or other underground work in area of proposed activity.

C. Installation:

1. Provide and maintain all necessary stakes, benchmarks and batter boards for installing utilities to alignment and grades.
2. During backfilling, install continuous warning tape over all utilities. Install tape full length of utility and terminate properly to allow for charging of tape or toning wire. If utility is installed by Utility Companies, provide warning tape and coordinate installation.

END OF SECTION

SECTION 33 40 00
STORM DRAINAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Storm sewers and drainage structures outside of the building.

B. Related Sections:

1. Division 33 Section "Common Work Results for Utilities".

1.2 QUALITY ASSURANCE

A. Regulatory Requirements:

1. All materials and work within the right-of-way or easement of any local government or other agency having jurisdiction over storm drainage, shall meet the requirements of such agency.

1.3 SUBMITTALS

A. Each item in submittal must state that the item meets or exceeds the specified standards referenced herein. If multiple sizes or types are included in the submittal, clearly indicate which are to be used, and where, if applicable.

B. Product Data:

1. Sewer pipe, fittings and joint materials.
2. Frames and grates.
3. Steps.
4. Cleanouts.
5. End sections.

C. Shop Drawings: Reinforced concrete manholes, inlets, and any other structures, including steps, sealing materials and any other required appurtenances.

D. Test Reports: Submit results for all testing and inspections to Architect/Engineer.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

- A. Unless otherwise indicated, pipe sizes refer to the nominal inside diameter.
- B. Unless otherwise indicated, the following materials shall be used as described below.
 - 1. Reinforced concrete pipe (RCP):
 - a. ASTM C76, Class III, Wall B.
 - b. Bell and spigot joints with rubber gaskets ASTM C443.
 - c. Application: Storm sewers 12" and larger.
 - 2. High density polyethylene (HDPE) pipe and fittings:
 - a. ASTM D3350 and AASHTO M294 Type S, corrugated with smooth interior wall.
 - b. Silt-tight joints ASTM D3212 with ASTM F477 gaskets.
 - c. Application: Storm sewer 12" to 36" where sewer has a minimum cover of 3 feet from top of pipe to top of finished grade.
 - 3. Polyvinyl chloride (PVC) pipe and fittings:
 - a. SDR 35 ASTM D1784, ASTM D3034.
 - b. Compression type bell and spigot joints ASTM D3212 with ASTM F477 gaskets.
 - c. Application: Storm sewer 12" and smaller which runs directly from building. Do not use in between storm structures or for culverts.
 - 4. Ductile iron (DI) pipe and fittings:
 - a. Pipe: AWWA C151, pressure class 350.
 - b. Fittings: AWWA C110, standard pattern or AWWA C153 compact pattern.
 - c. Joints: bell and spigot with push-on joints and gaskets.
 - d. Gaskets: AWWA C111, rubber.
 - e. Interior lining: epoxy coating (do not use cement mortar lining).
 - f. Polyethylene encasement: AWWA C105 tube or sheet, Linear Low Density (LLD, minimum 8 mil) or High Density Cross Laminated (HDCL, minimum 4 mil) with 2" polyethylene tape (minimum 12 mil).
 - g. Application: Sewers 6" and larger. Required when crossing water lines with less than 18" vertical or 10' horizontal clearance.

2.2 EXTERIOR CLEANOUTS

- A. General:
 - 1. Unless otherwise indicated, cleanouts shall be the same diameter as the sewer they serve for pipe sizes up to 8", pipes greater than 8" shall use an 8" cleanout.

2. Unless otherwise indicated, riser pipes and cleanout bodies shall be the same material as the sewer they serve.
3. Each cleanout shall have an exterior housing to prevent transfer of load to the cleanout.
4. Medium duty housings may be used in non-vehicular areas, all others shall be heavy duty.
5. Exterior housing:
 - a. ASME A112.36.2M gray iron with round, secured, scoriae and gray iron cover.
 - b. Refer to Part 3 for concrete anchorage.
6. Cast iron cleanouts:
 - a. Gray iron ferrule with tapered-thread, brass closure plug, ASME A112.36.2M.
 - b. Riser pipe and fittings: cast iron soil pipe, ASTM A74.
 - c. Ferrule connection may be inside caulk, spigot or no-hub; however, connection must be water and air-tight.
7. Plastic cleanouts:
 - a. PVC body with PVC tapered-thread plug.
 - b. Riser pipe and fittings: SDR 35, ASTM D3034.

2.3 MANHOLES AND CATCH BASINS

A. General:

1. Precast concrete per ASTM C478.
2. Manhole base shall be minimum 8" thick. To prevent flotation, increase thickness of precast sections or add concrete to base section as required.
3. Steps: Polypropylene encased #4 rebar per ASTM D4101, meeting OSHA requirements.
4. Castings: All frames and castings shall be heavy duty and constructed of gray iron free from blowholes, porosity, hard spots, shrinkage distortion, etc. They shall be smooth and clean.
5. Adjusting rings: Precast concrete, interlocking with ½ butyl rubber base or extrudable preformed gasket material. Bricks, blocks or other means are not acceptable.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Piping:

1. Cleanouts and manholes shall be installed in sewer where shown on the Drawings and as required by applicable Codes and/or field conditions.
2. Install manholes and cleanouts at all changes in direction. Blind turns or gradual deflection of pipe is not permitted.
3. The maximum distance between manholes is 400'.

4. Verify existing and proposed grades, connections and pipe sizes before installing any pipe. Notify Architect/Engineer of any conflicts with Drawings or Specifications.
5. Pipe installation shall proceed upgrade with spigot ends of bell and spigot pipe pointing into direction of flow.
6. Each pipe shall be laid true to line and grade and in such a manner as to form a close concentric joint with adjoining pipe and to prevent sudden offset in the flow line.
7. During backfilling, install detectable warning tape. See Division 33 Section "Common Work Results for Utilities" for warning tape requirements.
8. Pipe trenches shall be excavated parallel to the specified pipe, slope and grade.
9. The bottom of the pipe shall be supported by a minimum 6" thick layer of #8 crushed stone. The #8 crushed stone shall extend 6" on each side of the pipe and 12" above the top of the pipe unless indicated otherwise.
10. The remaining backfill in lawn and non-pavement areas shall be suitable fill material approved by the soils testing laboratory.
11. Pipes under and within 5' of pavements, slabs, sidewalks and other hard surfaces shall be backfilled with compacted granular fill.
12. All backfilling and compaction shall be in accordance with Division 31 Section "Earthwork"
13. Any breaks or defects in pipe must be immediately repaired. Any pipe which has been disturbed after being laid must be taken up, joints cleaned and properly relaid.
14. Interior of all pipe shall be cleaned of all dirt and superfluous materials as the work progresses. After pipe installation, install erosion control measures as shown on Drawings and as necessary to prevent sediment or other materials from entering or building up in pipe.
15. Water and sewer minimum clearances:
 - a. Where minimum 18" vertical or 10' horizontal separation cannot be provided between sewers and water lines, the sewer shall be ductile iron, refer to Part 2.
 - b. At crossings, extend ductile iron sewer pipe a minimum of 10 feet on both sides of the water line.
 - c. Do not install water and sewer lines in the same trench under any circumstances.

B. Manholes and Catch Basins:

1. Set solid lid castings flush with grade in pavement areas and 1" above grade in other areas. Set inlet castings at elevation grades per Drawings.
2. Install 2 to 4 precast adjusting rings for an overall 6" to 12" adjustment height.
3. Grade to drain into inlet castings positively and adequately.
4. Install steps from 12" below top to 12" above bottom at 16" on center.
5. Bench bottom of structures per Drawings.

C. Cleanouts:

1. Install piping so cleanouts open in direction of flow in sewer pipe.
2. Set cleanout covers flush with grade.
3. In areas other than concrete walks and concrete pavements, install concrete anchor pad.
4. Unless otherwise indicated, pad dimensions are 12" height with a diameter of the cleanout housing diameter + 12", to provide a 6" ring around the cleanout frame. Place

on properly compacted subgrade and stone per Division 31 Section “Earthwork” and Division 32 Section “Site Concrete”.

END OF SECTION