

INVITATION NO. IFB 26-31 General Construction
IFB 26-32 Mechanical Construction
IFB 26-33 Total Combined Construction

Project No. 2610

**PROJECT MANUAL
for
INDOOR FIRING RANGE
ABATEMENT AND CLOSURE
AFRC Bldg. 3420
Minot, North Dakota**

Bids must be uploaded to the electronic bid depository at <https://bidexpress.com>, NOT later than 1:00 p.m. (CT) on Thursday, September 10, 2026. The Office of the Adjutant General will NOT accept paper, faxed or emailed bids.

Bidding documents referred to herein upon which all bids for construction work shall be based are as follows:

One (1) Cover Sheet; Four (4) Architectural Sheets A2.1, A3.1, A3.2, and A4.1; Five (5) Mechanical Sheets M0.1, M1.0, M2.0, M3.0, and M4.0; and Three (3) Electrical Sheets E0.1, E1.0, and E2.0; dated August 13, 2026.

Specifications and sections included in accordance with Table of Contents and any Addenda issued prior to opening of bids.

OWNER

OFFICE OF THE ADJUTANT GENERAL
State of North Dakota
PO Box 5511
Bismarck, ND 58506-5511
Phone: (701) 791-3069

ARCHITECT

MUTCHLER BARTRAM ARCHITECTS, P.C.
505 N. Broadway, Suite 201
Fargo, ND 58102
Telephone: (701) 235-5563

ABATEMENT CONSULTANT

LEGEND TECHNICAL SERVICES
1126 Westrac Drive South
Fargo, ND 58103
Telephone: (701) 271-6779

MECHANICAL / ELECTRICAL ENGINEER

MBN ENGINEERING
701 Main Avenue
Fargo, ND 58103
Telephone: (701) 478-6336

DATED: 19 August 2026

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NOTE: Listing of specifications under specific construction categories does not relieve the Contractors from becoming familiar with all specifications affecting his work.

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INVITATION TO BID

INDOOR FIRING RANGE ABATEMENT AND CLOSURE AFRC Bldg. 3420 Minot, North Dakota IFB 26-31, IFB 26-32, IFB 26-33

An electronic bid depository, Bid Express, will be utilized for bidding. If you have **never** registered with Bid Express, the first step is to create an account at <https://bidexpress.com>. Central Time (CT) will be used when issuing the bid.

Once your business is registered, email a copy of your North Dakota Contractor's License to ng.nd.ndarnq.list.g9-contracts@army.mil. Upon confirmation of your North Dakota Contractor's License by this Agency, you will then be invited to access Bid Express, where the drawings, specifications, addendums, and project manual may be downloaded at no charge. Your emailed request must include the IFB number, along with contact information, including your name, business name, address, and telephone number.

All addendums related to this project will be uploaded to Bid Express. To receive timely notifications of addendums, complete the registration and invitation process in Bid Express. Do not wait until bid opening day to request your invite to Bid Express.

The closing date for submission of bids is Thursday, September 10, 2026, at 1:00 p.m. CT. The electronic bid depository locks promptly at 1:00 p.m. CT and will not accept late bids. Bidders must begin the electronic submission process well in advance of the bid response deadline to allow for transmission and resolution of any technical difficulties. Be advised, the OWNER is not responsible for a Bidder's failure to timely submit a Bid Response due to any technical difficulties. If you experience technical difficulties, do not contact the OWNER. You must contact the customer service department at Bid Express (888) 352-2439. Be advised, paper, faxed or emailed bids, or bid modifications, will NOT be accepted by the OWNER. All modifications to bid prices must be made by the individual bidder, through the utilization of the electronic bid depository. The OWNER is not responsible for handling or overseeing last minute modifications.

Questions pertaining to the project specifications or drawings must be directed to the project architect, Mutchler Bartram Architects, P.C., one week prior to the bid opening. Therefore, the deadline for questions from prospective bidders is Thursday, September 3, 2026.

In addition to downloading from Bid Express, the bidding documents are on file at plan rooms and builder's exchanges in the following North Dakota locations: Bismarck, Fargo, Grand Forks, Mandan, and Minot, as well as Rapid City, SD and Minneapolis, MN.

Bidders may submit separate bids for General Construction (IFB 26-31) and/or Mechanical Construction (IFB 26-32). In addition, the OWNER will allow the submission of a Total Combined Construction Bid (one single prime) for the complete project (IFB 26-33). In accordance with NDCC 48-01.2-06, the combined bid from a single prime will not be accepted unless that bid is lower than the combined total of the lowest multiple bids for the project.

Bids will be read aloud via teleconference at 2:00 p.m. CT on Thursday, September 10, 2026. To listen to the bid opening, you must call in using the following ID Number: (571) 616-7941; ID No. 844 000 912#

Each bid must be accompanied by a bidder's bond made payable to The Adjutant General, State of North Dakota, and executed by the bidder as principal and by a surety company authorized to conduct business in North Dakota, in a sum equal to five percent (5%) of the bidder's highest total bid combination, including all add alternates to the bid items; conditioned that if the bid is accepted and the contract awarded, the bidder within ten (10) business days after notice of such award, will effect and execute a contract in accordance with the terms of their bid and provide payment and performance bonds as required by North Dakota laws and regulations. A template entitled "AIA Document A310, Bid Bond", is provided within the electronic project manual and should be used to execute the bid guarantee.

In compliance with Section 43-07-12 of the North Dakota Century Code, each contractor submitting a bid must upload a copy of their North Dakota Contractor's License issued by the ND Secretary of State. Contractors must be licensed for the highest amount of their total bid combination including add alternates; and their ND Contractor's License must have been in effect at least ten (10) days prior to the date of the bid opening.

No bid will be read or considered which does not fully comply with the requirement herein for a bid bond and a ND Contractor's License. Both documents must be uploaded to "Bid Express" as separate attachments to your bid. A Certificate of Good Standing will NOT be accepted in lieu of a North Dakota Contractor's License.

The OWNER reserves the right to hold all legitimate bids for a period of thirty (30) days following the date fixed for the bid opening. It is the intent of the OWNER to award a contract to the lowest and best bidder. The OWNER further reserves the right to reject any or all bids and to waive irregularities and shall incur no legal liability for the State of North Dakota for the payment of any funds until the contract is awarded and approved by the proper authorities.

In compliance with Section 48-01.2-10 of the North Dakota Century Code, the successful bidder (awardee) shall be required to furnish payment and performance bonds covering the faithful performance of the contract award and the payment of all obligations thereunder, and all additional obligations required by the laws of the State of North Dakota. Each payment and performance bond shall be in an amount equal to the full amount of the contract award.

Questions may be directed to the Office of the Adjutant General, Contract Management Branch, Bismarck, North Dakota, Telephone (701) 791-3069.



AIA® Document A701® – 2018

Instructions to Bidders

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

THE OWNER:

(Name, legal status, address, and other information)

OFFICE OF THE ADJUTANT GENERAL
State of North Dakota
PO Box 5511
Bismarck, ND 58506-5511

THE ARCHITECT:

(Name, legal status, address, and other information)

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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. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

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

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

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

ARTICLE 1 DEFINITIONS

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

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

§ 1.3 Addenda are written or graphic instruments issued by the Architect or Owner, 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;
- .6 the Bidder has read and understands the provisions for liquidated damages, if any, set forth in the form of Agreement between the Owner and Contractor;
- .7 the prices in this Bid have been arrived at independently, without consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other Bidder or with any competitor;
- .8 unless otherwise required by law, the prices which have been quoted in this Bid have not been knowingly disclosed by the Bidder and will not knowingly be disclosed by the Bidder prior to bid opening, directly or indirectly, to any other Bidder or to any competitor; and
- .9 no attempt has been made or will be made by the Bidder to induce any other person or firm to submit or not to submit a Bid for the purpose of restricting competition.

§ 2.2 Site Investigation and Conditions Affecting the Work

§ 2.2.1 The Bidder acknowledges that the Bidder has taken steps reasonably necessary to ascertain the nature and location of the Work, and that the Bidder has investigated and is satisfied as to the general and local conditions which can affect the Work or its cost, including but not limited to:

- .1 conditions bearing upon transportation, disposal, handling, and storage of materials;
- .2 the availability of labor, water, electric power, and roads;
- .3 uncertainties of weather, river stages, tides, or similar physical conditions at the site;
- .4 the conformation and conditions of the ground; and
- .5 the character of equipment and facilities needed preliminary to and during work performance.

§ 2.2.2 The Bidder also acknowledges that the Bidder is satisfied as to the character, quality and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, including all exploratory work done by the Owner, as well as from the drawings and specifications made a part of the Bidding Documents. Any failure of the Bidder to take the actions described and acknowledged in this paragraph will not relieve the Bidder from responsibility for estimating properly the difficulty and cost of successfully performing the Work, or for proceeding to successfully perform the Work without additional expense to the Owner.

§ 2.2.3 The Owner assumes no responsibility for any conclusions or interpretations made by the Bidder based on the information made available by the Owner. Nor does the Owner assume responsibility for any understanding reached or representation made concerning conditions which can affect the Work by any of its officers or agents before the execution of this contract, unless that understanding or representation is expressly stated in this Contract.

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 Distribution

§ 3.1.1 Bidders shall obtain complete Bidding Documents, as indicated below, from the issuing office designated in the advertisement or Invitation to Bid, for the deposit sum, if any, stated therein.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall obtain Bidding Documents.)

Bidding Documents may be downloaded from bidexpress.com after receiving access or obtained through local plan rooms and exchanges. Refer to the Invitation to Bid.

§ 3.1.2 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.

§ 3.1.3 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.

(Paragraph deleted)

§ 3.1.4 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 Bidders and sub-bidders requiring clarification or interpretation of Bidding Documents shall make a written or verbal request which shall reach the Architect at least seven days prior to the date for receipt of Bids.

(Paragraphs deleted)

§ 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.

§ 3.2.4 Where a clear understanding of the work is prevented due to contradictions between the drawings and the specifications, and there is not sufficient time to make an interpretation, correction, or change as per subparagraph

3.2.3, the Bidder shall consider the more restrictive conditions as governing and/or shall bid the larger quantity or better quality of work. Appropriate adjustment, if required, will be made after contract award.

§ 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. Under no condition, shall Bids be submitted on work or materials not approved by the Architect for this specific project, even though approval might have been given on other projects previously.

§ 3.3.6 Those requesting Architect consideration of their products as "equal" in accord with subparagraph 3.3.2, shall make such request in electronic PDF format providing space for Architect approval and/or comments on each item requested. An electronic PDF copy of the request form, with Architect action on same, will be returned to the proposer.

§ 3.3.7 Bidders and Sub-bidders submitting proposals on individually specified items of Work or on Work included in complete Specification sections, must quote in accord with all requirements of Plans and Specifications without modification or exclusion.

§ 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 bidexpress.com and provided to local plan rooms and exchanges.

§ 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, or one which includes additional prior approvals, or one which is essential to the bidding process.

§ 3.4.4 Each Bidder shall ascertain prior to submitting a Bid that the Bidder has received all Addenda issued, and the Bidder shall acknowledge receipt of all Addenda on the Bid Form. Failure to acknowledge all Addenda may cause rejection of Bid.

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 Preparation of Bids

§ 4.1.1 Bids must be uploaded to the electronic bid depository at bidexpress.com. A sample Bid response form is included in the project manual labeled as "Sample Bid Form".

§ 4.1.2 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.

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

(Paragraphs deleted)

§ 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.)

Bidders Bond: 5%. Reference AIA Document A310 for an electronic template.

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

§ 4.2.3 If a Bid Bond is required, it may be secured through the Bidder's usual sources provided the surety is licensed to do business in the State of North Dakota. The attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of the attorney-in-fact's power of attorney. AIA Document A310, Bid Bond, will be provided by the Owner and should be used to execute the surety bond.

§ 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.)

Bids must be uploaded to the electronic bid depository at bidexpress.com.

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

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

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

(Paragraph deleted)

§ 4.4 Modification or Withdrawal of Bid

§ 4.4.1 Prior to the date and time designated for receipt of Bids, a Bidder may submit a new Bid to replace a Bid previously submitted, or withdraw its Bid entirely through the online bid depository at bidexpress.com.

§ 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 best Bidder, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and does not exceed the funds available. 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 The Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Specifications, and to determine the lowest and best Bidder on the basis of the sum of the Bid Items and Alternates accepted.

§ 5.3.3 If this Contract is funded in whole or in part with federal funds, the Owner shall not make any award or permit any award (subcontract) at any tier to any party which is debarred or suspended or is otherwise excluded from or ineligible for participation in federal assistance programs under the DOD implementation of 2 CFR Part 180 (at 2 CFR Part 1125).

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. Such bonds must cover all additional obligations required by the laws of the State of North Dakota.

§ 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 Required performance and payment bonds shall be secured through a surety licensed to do business within the state of North Dakota. If any surety upon any bond furnished in connection with the Contract becomes unacceptable to the State of North Dakota, or if any such surety fails to furnish reports as to the financial conditions of the surety from time to time as requested by the state of North Dakota, or if the Contract price is increased so that the penal sum of any bond becomes inadequate in the opinion of the Contracting Officer, the Contractor shall promptly furnish such additional security as may be required to protect the interests of the State of North Dakota and of persons supplying labor or materials in the prosecution of the Work contemplated by this Contract.

§ 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.)

§ 7.1.5 Companies executing the bond as sureties must be among those appearing in the Treasury Department's list of approved sureties and must be acting within the limitations set forth therein.

§ 7.2 Time of Delivery and Form of Bonds

§ 7.2.1 The Bidder shall deliver the required payment and performance bonds to the Owner within ten days of notification of award of a contract for the Work. 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 before the date of the Contract execution.

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

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

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

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

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

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

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

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

N/A

- .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.)

**BID OPENING: BIDS WILL ONLY BE ACCEPTED VIA THE BID DEPOSITORY AT
WWW.BIDEXPRESS.COM UNTIL 1:00 PM CT ON 10 SEPTEMBER 2026.**

GENERAL CONSTRUCTION
INVITATION NO: IFB 26-31

Office of the Adjutant General
ATTN: NGND-G9-CM
030 Fraine Barracks Lane (58504)
P.O. Box 5511
Bismarck, North Dakota 58506-5511

10 September 2026

The undersigned being familiar with the local conditions affecting the cost of the work, and after careful and complete examination of all sections of the Project Manual; to include Invitation to Bid, Instructions to Bidders, Bid Form, and sample Contract Documents; including General and Additional Conditions, Architectural/Engineering Specifications, and Drawings as prepared Mutchler Bartram Architects, Fargo, North Dakota and their consultants and the Office of the Adjutant General, Directorate of Installations and Environment; and

Issued Addenda No.'s _____

hereby proposes to furnish all labor, materials, equipment and services required for Indoor Firing Range Abatement & Closure, AFRC Bldg. 3420, Minot, North Dakota, in accordance with the following:

BID ITEM NO. G-1: (INDOOR FIRING RANGE ABATEMENT & CLOSURE –
GENERAL / ELECTRICAL CONSTRUCTION):

Dollars \$ _____

The undersigned agrees to start and complete all work within the time limits set forth in Construction Schedule section of the specifications.

Accompanying and uploaded as an attachment to this bid, is a bidder's bond in a sum equal to five percent (5%) of the total bid, including all add alternates, which shall be forfeited to the Owner should the bidder fail to effect a contract and deliver Payment and Performance Bonds and other documents required by Instructions to Bidders within ten (10) days after receipt of notice to award.

<The remainder of this page intentionally left blank.>

GENERAL CONSTRUCTION
INVITATION NO: IFB 26-31 (con't)

In submitting this bid, it is understood that the right is reserved by the Owner to reject any or all bids, and it is agreed that this bid may not be withdrawn for a period of thirty (30) days after the opening of bids.

In compliance with the laws of the State of North Dakota, the undersigned is a licensed contractor duly registered with the Secretary of State under License Number _____, Class _____, which license has been renewed or granted on the _____ day of _____ 20____.

The names of all persons interested in the foregoing bid as principals are:

(NOTE: If bidder or other interested person is a corporation, give legal name of corporation, state where incorporated, and names of president and secretary thereof; if a partnership, give name of firm and names of all individual co-partners composing the firm; if bidder or other interested person is an individual, give first and last names in full.)

Respectfully submitted,

FIRM: _____

BY: _____
(e-signature)

TITLE: _____

Business Address: _____

Email Address: _____

Telephone No.: _____

Fax No.: _____

**BID OPENING: BIDS WILL ONLY BE ACCEPTED VIA THE BID DEPOSITORY AT
WWW.BIDEXPRESS.COM UNTIL 1:00 PM CT ON 10 SEPTEMBER 2026.**

MECHANICAL CONSTRUCTION

INVITATION NO: IFB 26-32

Office of the Adjutant General
ATTN: NGND-G9-CM
030 Fraire Barracks Lane (58504)
P.O. Box 5511
Bismarck, North Dakota 58506-5511

10 September 2026

The undersigned being familiar with the local conditions affecting the cost of the work, and after careful and complete examination of all sections of the Project Manual; to include Invitation to Bid, Instructions to Bidders, Bid Form, and sample Contract Documents; including General and Additional Conditions, Architectural/Engineering Specifications, and Drawings as prepared Mutchler Bartram Architects, Fargo, North Dakota and their consultants and the Office of the Adjutant General, Directorate of Installations and Environment; and

Issued Addenda No.'s _____

hereby proposes to furnish all labor, materials, equipment and services required for Indoor Firing Range Abatement & Closure, AFRC Bldg. 3420, Minot, North Dakota, in accordance with the following:

BID ITEM NO. M-1: (INDOOR FIRING RANGE ABATEMENT & CLOSURE –
MECHANICAL CONSTRUCTION):

Dollars \$ _____

The undersigned agrees to start and complete all work within the time limits set forth in Construction Schedule section of the specifications.

Accompanying and uploaded as an attachment to this bid, is a bidder's bond in a sum equal to five percent (5%) of the total bid, including all add alternates, which shall be forfeited to the Owner should the bidder fail to effect a contract and deliver Payment and Performance Bonds and other documents required by Instructions to Bidders within ten (10) days after receipt of notice to award.

<The remainder of this page intentionally left blank.>

MECHANICAL CONSTRUCTION
INVITATION NO: IFB 26-32 (con't)

In submitting this bid, it is understood that the right is reserved by the Owner to reject any or all bids, and it is agreed that this bid may not be withdrawn for a period of thirty (30) days after the opening of bids.

In compliance with the laws of the State of North Dakota, the undersigned is a licensed contractor duly registered with the Secretary of State under License Number _____, Class _____, which license has been renewed or granted on the _____ day of _____ 20____.

The names of all persons interested in the foregoing bid as principals are:

(NOTE: If bidder or other interested person is a corporation, give legal name of corporation, state where incorporated, and names of president and secretary thereof; if a partnership, give name of firm and names of all individual co-partners composing the firm; if bidder or other interested person is an individual, give first and last names in full.)

Respectfully submitted,

FIRM: _____

BY: _____
(e-signature)

TITLE: _____

Business Address: _____

Email Address: _____

Telephone No.: _____

Fax No.: _____

**BID OPENING: BIDS WILL ONLY BE ACCEPTED VIA THE BID DEPOSITORY AT
WWW.BIDEXPRESS.COM UNTIL 1:00 PM CT ON 10 SEPTEMBER 2026.**

TOTAL COMBINED CONSTRUCTION
INVITATION NO: IFB 26-33

Office of the Adjutant General
ATTN: NGND-G9-CM
030 Fraine Barracks Lane (58504)
P.O. Box 5511
Bismarck, North Dakota 58506-5511

10 September 2026

The undersigned being familiar with the local conditions affecting the cost of the work, and after careful and complete examination of all sections of the Project Manual; to include Invitation to Bid, Instructions to Bidders, Bid Form, and sample Contract Documents; including General and Additional Conditions, Architectural/Engineering Specifications, and Drawings as prepared Mutchler Bartram Architects, Fargo, North Dakota and their consultants and the Office of the Adjutant General, Directorate of Installations and Environment; and

Issued Addenda No.'s _____

hereby proposes to furnish all labor, materials, equipment and services required for Indoor Firing Range Abatement & Closure, AFRC Bldg. 3420, Minot, North Dakota, in accordance with the following:

BID ITEM NO. TC-1: (INDOOR FIRING RANGE ABATEMENT & CLOSURE –
BASE BID – TOTAL COMBINED CONSTRUCTION):

* Same Scope as Bid Items G-1 and M-1 Combined.

Dollars \$ _____

The undersigned agrees to start and complete all work within the time limits set forth in Construction Schedule section of the specifications.

Accompanying and uploaded as an attachment to this bid, is a bidder's bond in a sum equal to five percent (5%) of the total bid, including all add alternates, which shall be forfeited to the Owner should the bidder fail to effect a contract and deliver Payment and Performance Bonds and other documents required by Instructions to Bidders within ten (10) days after receipt of notice to award.

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TOTAL COMBINED CONSTRUCTION
INVITATION NO: IFB 26-33 (con't)

In submitting this bid, it is understood that the right is reserved by the Owner to reject any or all bids, and it is agreed that this bid may not be withdrawn for a period of thirty (30) days after the opening of bids.

In compliance with the laws of the State of North Dakota, the undersigned is a licensed contractor duly registered with the Secretary of State under License Number _____, Class _____, which license has been renewed or granted on the _____ day of _____ 20____.

The names of all persons interested in the foregoing bid as principals are:

(NOTE: If bidder or other interested person is a corporation, give legal name of corporation, state where incorporated, and names of president and secretary thereof; if a partnership, give name of firm and names of all individual co-partners composing the firm; if bidder or other interested person is an individual, give first and last names in full.)

Respectfully submitted,

FIRM: _____

BY: _____
(e-signature)

TITLE: _____

Business Address: _____

Email Address: _____

Telephone No.: _____

Fax No.: _____



AIA[®] Document A310[™] – 2010

Bid Bond

CONTRACTOR:

(Name, legal status and address)

SURETY:

(Name, legal status and principal place of business)

OWNER:

(Name, legal status and address)

OFFICE OF THE ADJUTANT GENERAL
State of North Dakota
PO Box 5511
Bismarck, ND 58506-5511

BOND AMOUNT: \$**PROJECT:**

(Name, location or address, and Project number, if any)

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

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

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

ADDITIONS AND DELETIONS:

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

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

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

Signed and sealed this day of ,

(Witness)

(Witness)

(Contractor as Principal) (Seal)

(Title)

(Surety) (Seal)

(Title)





AIA® Document A101® – 2017

Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

AGREEMENT No. 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)

OFFICE OF THE ADJUTANT GENERAL
State of North Dakota
PO Box 5511
Bismarck, ND 58506-5511

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

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

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

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. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

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

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.

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.

Init.

/

[X] 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.

Item

Price

§ 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:
(Paragraph deleted)

Item

Quantity/Unit

Price per Unit (\$0.00)

§ 4.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any.)

Scheduled completion date carries a liquidated damages clause which is referenced in Article 13.7 General Conditions of the Contract for Construction.

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

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:

The period covered by each Application for Payment shall be one calendar month. Email a draft copy of the Application for Payment to the Architect and the Construction Coordinator no later than the TENTH day of the following month, except the month of June.

§ 5.1.3

(Paragraphs deleted)

The Owner requires FORTY-FIVE days AFTER Owner's receipt of Certificate of Payment from the Architect/Engineer for processing and issuing of payment.

§ 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.)

10% of the Contractor's Total Completed and Stored to Date amount.

Init.

§ 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.)

N/A

§ 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.)

The Owner may withhold retainage as stated in Section 5.1.7.1 from payments otherwise due when less than 50% of the Contract Sum to Date is complete and from the payment due when 50% completion of the Contract Sum to Date is first attained. On subsequent payments, the Owner may withhold retainage equal to 5% of the Contract Sum to Date.

§ 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.)

Up to 95% of the amount previously retained may be paid at the discretion of the Architect/Engineer.

§ 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 45 days AFTER THE OWNER'S RECEIPT of the Architect's final Certificate of Payment.

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

0 % per annum.

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.)

(Paragraphs deleted)

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.

(Paragraphs deleted)

§ 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 a building information modeling exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with a building information modeling exhibit, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

§ 8.7 Other provisions:

None.

Init.

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

N/A

- .5 Drawings

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

- .6 Specifications

Section
REFER TO EXHIBIT A FOR A SUMMARY LIST OF SPECIFICATIONS DESCRIBED IN THE PROJECT MANUAL.

- .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
-------	------	-------

[X] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
AGND Document 418	Labor Provisions Standards	April 2024	1-2
AGND Document 419	Federal Provisions	March 2025	1-4

- .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.)

	Number	Title	Date
	IFB	Invitation to Bid	
	AIA Document 701	Instructions to Bidders	2018 Edition
	N/A	Contractor's Bid Form	
	N/A	Contractor's Bid Bond	

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

OWNER *(Signature)*

CONTRACTOR *(Signature)*

(Printed name and title)

(Printed name and title)





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)

THE OWNER:
(Name, legal status and address)

OFFICE OF THE ADJUTANT GENERAL
State of North Dakota
PO Box 5511
Bismarck, ND 58506-5511

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. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

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

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.

§ A.2.3 Required Property Insurance

§ A.2.3.1 If required in Administrative Requirements, Section 01 3000 of the Specifications, the Contractor shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. This property insurance shall in no case be less than that specified in Exhibit A of the Standard Form of Agreement. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Paragraph 9.10 of AIA Document 201 or until no person or entity other than the Owner has an insurable interest in the property required by this Paragraph A.3.4 to be covered, whichever is later. The Owner (The Adjutant General, State of North Dakota) and all Contractors, Subcontractors and Sub-subcontractors in the Project shall be endorsed on this policy as additional insureds.

§ 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 Contractor 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.** A property insurance deductible is allowed as identified in Exhibit A of the Contract for Construction. The Contractor purchasing and maintaining this insurance shall pay all costs not covered because of such deductible, except that each and every Contractor (prime, subcontractor, sub-subcontractor, etc.) who sustains a loss shall be responsible for said deductible as pertains to materials and/or equipment stored off the site or in transit. Once materials and/or equipment are on site or have been installed and are a permanent part of the building itself, all losses shall be the responsibility of the Contractor furnishing the property insurance.

§ 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, Automobile 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 insurance required by Subparagraph 11.1.1 of AIA Document 201 General Conditions of the Contract for Construction shall be written for not less than the limits of liability specified in Exhibit A or required by law, whichever coverage is greater. Neither the Owner nor the Architect shall be responsible in the event limits are insufficient. Coverages shall be written on an occurrence basis and shall be maintained without interruption from date of commencement of the Work until date of final payment and termination of any coverage required to be maintained after final payment. Products and completed operations coverage will be maintained for a period of one year after final payment unless longer warranty period is specified.

§ 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 \$500,000.00 per person, \$2,000,000.00 each occurrence, \$2,000,000.00 general aggregate, and \$2,000,000.00 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 \$500,000.00 per person and \$2,000,000.00 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 \$2,000,000.00 per occurrence.

§ 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 Only if applicable, 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 \$1,000,000.00 per claim and \$1,000,000.00 in the aggregate.

(Paragraphs deleted)

§ 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** Unless otherwise provided in the Contract Documents, this property insurance shall cover portions of the Work stored off the site and portions of the Work in transit in the limits specified in Exhibit A of the Contract for Construction.
- ☐ **§ 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

Init.

§ 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:

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AIA® Document A201® – 2017

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

THE OWNER:

(Name, legal status and address)

OFFICE OF THE ADJUTANT GENERAL
State of North Dakota
PO Box 5511
Bismarck, ND 58506-5511

THE ARCHITECT:

(Name, legal status and address)

TABLE OF ARTICLES

1	GENERAL PROVISIONS
2	OWNER
3	CONTRACTOR
4	ARCHITECT
5	SUBCONTRACTORS
6	CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
7	CHANGES IN THE WORK
8	TIME
9	PAYMENTS AND COMPLETION
10	PROTECTION OF PERSONS AND PROPERTY
11	INSURANCE AND BONDS
12	UNCOVERING AND CORRECTION OF WORK
13	MISCELLANEOUS PROVISIONS

ADDITIONS AND DELETIONS:

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

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

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

14 TERMINATION OR SUSPENSION OF THE CONTRACT

15 CLAIMS AND DISPUTES



Init.

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User Notes:

(1278236746)

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.

§ 1.2.4 Omissions from the drawings or specifications or the mis-description of details of work which are manifestly necessary to carry out the intent of the drawings and specifications, or which are customarily performed, shall not relieve the Contractor from performing such omitted or mis-described details of the work but they shall be performed as if fully and correctly set forth and described in the drawings and specifications.

§ 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

§ 1.4.1 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.

§ 1.4.2 In the event of conflicting provisions, the more specific provision will take precedence over the less specific; the more stringent will take precedence over the less stringent; the more expensive item will take precedence over the less expensive. On all drawings, figures take precedence over scaled dimensions. Scaling of dimensions, if done, is done at the Contractor's own risk. In case of a conflict between the Contract Documents, if not reconciled by Addendum, the Architect/Engineer and the Owner will determine which document is the most specific and the Contractor shall do the Work accordingly, at no change in price.

§ 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.

(Paragraphs deleted)

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 Information and Services Required of the Owner

§ 2.2.1 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.

§ 2.2.2 The term "Architect," throughout these Contract Documents, refers to the person or entity lawfully engaged in the practice of architecture or engineering and who is identified as the Architect or Engineer on page one of the Standard Form of Agreement Between Owner and Contractor (AIA® Document A101®).

§ 2.2.3 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.

§ 2.2.4 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.

(Paragraphs deleted)

§ 2.2.5 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.

§ 2.2.6 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.

§ 2.3 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.

§ 2.4 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.

§ 3.1.4 If the Contractor hereunder is comprised of more than one legal entity, each entity shall be jointly and severally liable hereunder.

§ 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 and geotechnical report, if any.

§ 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, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such construction means, methods, techniques, sequences or procedures. If the Contractor determines that such construction means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect, as approved by the Owner. If the Contractor is then instructed to proceed with the required construction means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any resulting loss or damage arising solely from those Owner-required 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.

§ 3.5.3 The Contractor shall furnish to the Architect, when requested, material certifications on manufactured items to be used on this project.

§ 3.5.4 Defects of any kind, due to faulty work or materials appearing during the above-mentioned period must be immediately made good by the Contractor at the Contractor's own expense to the entire satisfaction of the Owner and Architect. Such construction and repairs shall include the costs of all damages to the finish or furnishings of the building resulting from the original defect or repairs thereto. Where equipment is required to be replaced, the one-

year warranty shall be reinstated for that piece of equipment from date of replacement.

§ 3.5.5 The Contractor shall guarantee and maintain the stability of all work and materials and keep same in perfect repair and condition for the period of one (1) year from the date of final acceptance of the Work, but with respect to any part of the Work which the Owner takes possession of prior to final acceptance, such guarantee shall continue for a period of one year from the date the Owner takes possession.

§ 3.5.6 The guarantee shall not apply to injuries or damages occurring after final acceptance due to "acts of God," fire, violence, abuse or carelessness of other Contractors or agents of the Owner; however, the Owner reserves the right to make temporary repairs as necessary to keep equipment in operating condition without voiding the Contractor's guarantee nor relieving the Contractor of any responsibilities during the guarantee period.

§ 3.5.7 This guarantee shall be extended where other guarantees for different lengths of time are specifically called for in the Contract Documents or where manufacturer's standard warranties extend for a longer period.

§ 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. Where the Contract Documents require Work better than that required by statute, the Contract Documents shall govern.

§ 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. In the event the Contractor does not employ a superintendent, the Contractor must subcontract with another entity to ensure a competent superintendent meets the requirements of this section. 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 Contingent upon the Prime General Contractor's Work being timely scheduled and performed, the Contractor shall, within ten days after Contract award or another period of time determined by the Owner and Architect, prepare and submit to the Architect for approval, five copies of a practicable schedule showing by written description, the order in which the Contractor proposes to perform the Work, and the dates on which the Contractor contemplates starting and completing the several salient features of the Work (including acquiring materials, plant, and equipment). The schedule shall be in the form of a progress chart of suitable scale to indicate appropriately the percentage of Work scheduled for completion by any given date during the period.

§ 3.10.2 The schedule shall not exceed the time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project or by the Architect, shall be related to the entire Project to the extent required by the Contract Documents, shall provide for expeditious and practicable execution of the Work and shall allow the Architect reasonable time to review all required submittals.

§ 3.10.3 If the Contractor fails to submit or resubmit an approved schedule within the time prescribed, the Architect may withhold approval of progress payments until the Contractor submits the required schedule.

§ 3.10.4 Contingent upon the Prime General Contractor's Work being timely scheduled and timely performed, during construction, the Contractor shall enter the actual progress on the chart as directed by the Architect. If, in the opinion of the Architect, the Contractor falls behind the approved schedule, the Contractor shall take steps necessary to improve progress, including those that may be required by the Architect, without additional cost to the State. In this circumstance, the Architect may require the Contractor to increase the number of shifts, overtime operations, days of work, and/or the amount of construction plant, and to submit for approval any supplementary schedule or

schedules in chart form as the Architect deems necessary to demonstrate how the approved rate of progress will be regained.

§ 3.10.5 Failure of the Contractor to comply with the requirements of the Architect under this clause shall be grounds for a determination by the Owner and Architect that the Contractor is not prosecuting the Work with sufficient diligence to ensure completion within the time specified in the Contract. Upon making this determination, the Owner may terminate the Contractor's right to proceed with the Work, or any separable part of it, in accordance with the termination for cause terms of this Contract.

§ 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. Submittals which are not marked as reviewed for compliance with the Contract Documents and approved by the Contractor may be returned by the Architect without action.

§ 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. If shop drawings, samples, or similar submittals are not resubmitted to the Architect after the Architect has made corrections thereto, it will be assumed the Contractor has checked and approved all corrections made.

§ 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.

§ 3.12.11 The Architect and Owner may duplicate, use and disclose, in any manner and for any purpose, shop drawings delivered under this Contract and all subcontracts hereunder at any tier.

§ 3.13 Use of Site

§ 3.13.1 The Contractor shall confine operations (including storage of materials) at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents as approved by the Architect and Owner, and shall not unreasonably encumber the site with materials or equipment.

§ 3.13.2 The Contractor shall at all times so conduct the Work as to ensure the least possible obstruction to traffic and inconvenience to the general public and the residents in the vicinity of the Work, and to ensure the protection of persons and property. No road or street shall be closed to the public except with the permission of the proper authorities. Fire hydrants on or adjacent to the Work shall be kept accessible to firefighting equipment at all times. Temporary provisions shall be made by the Contractor to ensure the use of sidewalks and the proper functioning of all gutters, sewer inlets, drainage ditches, irrigation ditches, etc., which shall not be obstructed.

§ 3.13.3 The Contractor shall hold and save the Owner, its officers, employees, and agents, free and harmless from liability of any nature occasioned by Contractor's operations on the site.

§ 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 and authorized representatives of the State and Federal Governments with access to the Work in preparation and progress wherever located. The Contractor shall furnish without additional charges, all reasonable facilities necessary for safe and convenient inspections. The Contractor shall confine the Work, the storage of items, and parking within the building and the "Contract Limit Lines" shown on the Site Plan.

§ 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 Contractor agrees to defend, indemnify, and hold harmless the state of North Dakota, its agencies including Owner, officers, and employees (State), from claims resulting from the performance of the contractor or its agent, including all costs, expenses and attorneys' fees, which may in any manner result from or arise out of this agreement, except claims based upon the State's sole negligence or intentional misconduct. The legal defense provided by Contractor to the State under this provision must be free of any conflicts of interest, even if retention of separate legal counsel for the State is necessary. Any attorney appointed to represent the State must first qualify as and be appointed by the North Dakota Attorney General as a Special Assistant Attorney General as required under N.D.C.C. § 54-12-08. Contractor also agrees to reimburse the State for all costs, expenses and attorneys' fees incurred in establishing and litigating the indemnification coverage provided herein. This obligation shall continue after the termination of this agreement.

§ 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, and from time to time during the one-year period for correction of Work as described in 12.2. 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 work and 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 any person or entity declared ineligible under Federal laws or regulations from participating in Federally assisted construction projects or to whom the Owner or the Architect has made reasonable objection under the provisions of Subparagraph 5.2.1. The Contractor shall not be required to contract with anyone to whom the Contractor has a 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 previously selected and to whom the Owner and Architect have made no reasonable objection except with the written consent of the Owner and Architect.

§ 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.

§ 7.1.4 Neither the Owner nor the Architect is responsible to give notice of Change Orders, Construction Change Directives, and/or orders for minor changes in the Work to the surety (if any).

§ 7.2 Change Orders

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

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

§ 7.2.2 The Contractor, in connection with any proposal for a Change Order, shall furnish a price breakdown, itemized as required in Subparagraph 7.2.3 below. Unless otherwise directed, the breakdown shall be in sufficient detail to permit an analysis of all materials, labor, equipment, subcontract, and overhead costs, as well as profit, and shall cover all work involved in the change proposal, whether such work was deleted, added, or changed. Any amount claimed for subcontracts shall be supported by a similar price breakdown. In addition, if the change proposal includes a time extension, a justification therefor, shall also be furnished. The proposal, together with the price breakdown and time extension justification, shall be furnished by the date specified by the Owner.

§ 7.2.3 Costs for proposals to perform changes in the Work consisting of additions, deletions, or other revisions shall be limited to the following:

- .1 Actual labor costs involved to include fringe benefits required by agreement or custom plus ten (10%) for all labor overhead factors which include job superintendent salary and subsistence.
- .2 Actual costs of materials, supplies, and equipment including all transportation costs and applicable taxes
- .3 Actual rental costs of machinery and equipment, exclusive of hand tools
- .4 Ten percent (10%) of direct labor, material, supplies, equipment, and rental gross amounts and ten percent (10%) of subcontracts for all overhead and profit factors, which includes all insurance costs.
- .5 One percent (1%) for all bond premium adjustments unless actual costs are greater as evidenced by invoices or other data.
- .6 Credits are to be calculated in a similar manner, but not including overhead and profit factors, except when both additions and credits covering related Work or substitutions are involved in a change proposal, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change proposal.

§ 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;
- .4 As provided in Section 7.3.4; or
- .5 By the method provided in subparagraph 7.2.3. This method will be utilized exclusively for all construction change directives unless other above listed methods are specifically authorized by Owner.

§ 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, amounts not in dispute for such changes in the Work shall be included in Applications for Payment accompanied by a Change Order indicating the parties' agreement with such costs.

§ 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; 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. The following will not be considered justifications for extension of time unless due to one of the cause stated within this Article 8: (a) delay caused by subcontractors, sub-subcontractors, or suppliers, except if the supplier goes out of business and another supplier cannot be found in time to meet the schedule; (b) shortage of employees.

§ 8.3.2 Claims relating to time shall be subject to the same notice and timing requirements as any other claim.

§ 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.

§ 8.4 Notices to the Owner of Labor Disputes

§ 8.4.1 If the Contractor has knowledge that any actual or potential labor dispute is delaying or threatens to delay the timely performance of this Contract, the Contractor shall immediately give notice, including all relevant information, to the Owner.

§ 8.4.2 The Contractor agrees to insert the substance of this clause, including this paragraph 8.4.2, in any subcontract to which a labor dispute may delay the timely performance of this Contract, except that each subcontract shall provide that in the event its timely performance is delayed or threatened by delay by any actual or potential labor dispute, the subcontractor shall immediately notify the next higher tier subcontractor or the prime Contractor, as the case may be, of all relevant information concerning the dispute.

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 and which are accompanied by a Change Order indicating the parties' agreement with costs associated with such Work.

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

§ 9.3.1.3 Contractor shall submit Application for Payment to Architect, with signature, to include notarization of Contractor's signature. Said application for payment shall be written on AIA Document G702, Application and Certificate for Payment, templates of which shall be furnished by the Owner.

§ 9.3.1.4 If required by Architect, Contractor shall furnish with each Application for Payment lien waivers from specified subcontractors and suppliers for labor and materials approved for progress payment under previous application.

§ 9.3.1.5 Applications for payment made prior to Substantial Completion shall reflect a retainage equal to 10% of the Contractor's Total Completed and Stored to Date amount. The Owner may withhold retainage from payments otherwise due when less than 50% of the Contract Sum to Date is complete and from the payment due when 50% completion of the Contract Sum to Date is first attained. On subsequent payments, the Owner may withhold retainage equal to 5% of the Contract Sum to Date. Upon Substantial Completion of the Work, up to 95% of the amount previously retained may be paid at the discretion of the Architect. Final payment of all moneys due the Contractor shall be made immediately following completion and acceptance of the project as provided in paragraph 9.10.

§ 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 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.

(Paragraph deleted)

§ 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. The Owner shall have forty-five days AFTER receipt of Certificate for Payment from Architect for administrative processing and issuance of payment. No contractor payment shall become due and/or unpaid prior to the expiration of said forty-five day period.

§ 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 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.

§ 9.6.9 Retainage and payments of to the Contractor will be pursuant to N.D.C.C. § 48-01.2-13.

§ 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.

§ 9.10.6 Items specifically required by Owner to be submitted by Contractor prior to final payment as per Subparagraph 9.10.2 as a minimum, are enumerated as follows:

- .1 Contractor's Affidavit of Payment of Debts and Claims, conditioned that the Contractor has satisfied all obligations for all materials and equipment furnished and all work, labor, and services performed in connection with the performance of this Contract, and further, that the Contractor will indemnify the Owner against all liability for any and all claims, judgments, and costs brought or obtained by subcontractors, all suppliers of materials and equipment, and all performers of work, labor, or services arising in any manner out of the performance of the Contract.
- .2 Consent of Surety to Final Payment (if performance/payment bonds were required).
- .3 Contractor's Release or Waiver of Liens.
- .4 Current Statement of ND Tax Commissioner relating to income tax and sales tax clearance.
- .5 Current Certificate of Premium Payment to North Dakota Workforce Safety and Insurance.

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.

§ 10.1.1 When required by the Owner, the Contractor shall submit to the Owner a copy of the written safety program to be used as guidelines and direction for the Contractor's and subcontractors' activities. This program must meet all federal, state, and local laws, regulations, and other legal requirements and shall include the following minimum provisions:

- .1 a worksite safety policy and mission statement.
- .2 assigned responsibilities among management, supervisors, and employees.
- .3 a system for periodic self-inspections, including inspections of job sites, materials, work performance, and equipment.
- .4 a thorough accident and injury reporting and investigation process.
- .5 a safety orientation program including first aid, medical attention, emergency facilities, fire protection and

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prevention, housekeeping, illumination, sanitation, personal protective equipment, and occupational noise exposure.

.6 a safety training program including safety "toolbox" meetings and other systems for ongoing training and also including training for employees on the recognition, avoidance, and prevention of unsafe conditions.

§ 10.1.2 It will be a condition of this Contract and shall be made a condition of each subcontract entered into pursuant to this contract, that the Owner shall assume no liability relating to its receipt and review of the Contractor's safety plan or activities. Safety remains the responsibility of the Contractor. Furthermore, the right of the Owner to receive and review the safety plan or activities 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.

§ 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 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.

§ 10.3.4 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.

§ 10.3.5 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.

§ 10.3.6 No material, supplies, or equipment shall be furnished or installed by the Contractor for this Project which contains hazardous materials. A hazardous material is any material, because of its quantity, concentration, physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or the environment if released into the workplace or the environment; or any material that is required to have a Safety Data Sheet.

§ 10.3.7 Exceptions to 10.3.6:

- .1 Lubricating oil is exempt if the total volume of each type of lubricating oil handled at that facility does not exceed 55 gallons, and the total volume of all types of lubricating oil handled at that facility does not exceed 275 gallons at any one time.
- .2 Hazardous material contained solely in a consumer product for direct distribution to, and use by, the general public (this exemption does NOT include the materials used to manufacture these products).
- .3 Any material that is in transit under active shipping papers and are on site for 30 days or less.
- .4 The on-premises use, storage, or both, of propane in the amount not to exceed 300 gallons used for the sole purpose of heating the employee work areas within the business.

§ 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, from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located, such insurance as will protect the Contractor from claims set for below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- .1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- .2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- .3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- .4 Claims for damages insured by usual personal injury liability coverage;
- .5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- .6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- .7 Claims for bodily injury or property damage arising out of completed operations; and
- .8 Claims involving the Contractor's indemnity obligations under Section 3.18, however such coverage shall not limit the Contractor's indemnity obligations.

§ 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.

§ 11.1.5 The liability insurance required by Section 11.1.1 shall be written for not less than \$2,000,000 per occurrence, \$2,000,000 aggregate limit for bodily injury, property damage, personal injury, contractual and completed operations/product liability, EXCEPT that these amounts may be higher if insurer furnishing the umbrella or excess coverage requires larger amounts.

§ 11.1.6 Failure to provide insurance as required in this Contract is a material breach of contract entitling the Owner to terminate this Contract immediately.

§ 11.1.7 **Certificates of Insurance.** The Contractor shall provide certificates of insurance acceptable to the Owner 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 period for correction

of Work. The certificates shall show the Owner as an additional insured on the Contractor's commercial general liability and excess or umbrella liability policy or policies.

§ 11.1.8 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.

§ 11.1.9 The insurance coverages listed above must meet the following additional requirements:

- 1) Any deductible or self-insured retention amount or other similar obligation under the policies shall be the sole responsibility of the Contractor. Optional Provision: The amount of any deductible or self-retention is subject to approval by the State.
- 2) This insurance may be in policy or policies of insurance, primary and excess, including the so-called umbrella or catastrophe form and must be placed with insurers rated "A-" or better by A.M. Best Company, Inc., provided any excess policy follows form for coverage. Less than an "A-" rating must be approved by the State. The policies shall be in form and terms approved by the State.
- 3) The State will be defended, indemnified, and held harmless to the full extent of any coverage actually secured by the Contractor in excess of the minimum requirements set forth above. The duty to indemnify the State under this agreement shall not be limited by the insurance required in this agreement.
- 4) The state of North Dakota and its agencies, officers, and employees (State) shall be endorsed on the commercial general liability policy on a primary and noncontributory basis, including any excess policies (to the extent applicable), as additional insured. The State shall have all the benefits, rights, and coverages of an additional insured under these policies that shall not be limited to the minimum limits of insurance required by this agreement or by the contractual indemnity obligations of the Contractor.
- 5) The insurance required in this agreement, through a policy or endorsement, shall include:
 - a) a "Waiver of Subrogation" waiving any right to recovery the insurance company may have against the State.
 - b) a provision that Contractor's insurance coverage shall be primary (i.e. pay first) as respects any insurance, self-insurance or self-retention maintained by the State and that any insurance, self-insurance or self-retention maintained by the State shall be in excess of the Contractor's insurance and shall not contribute with it.
 - c) cross liability/severability of interest for all policies and endorsements.
 - d) The legal defense provided to the State under the policy and any endorsements must be free of any conflicts of interest, even if retention of separate legal counsel for the State is necessary.
 - e) The insolvency or bankruptcy of the insured Contractor shall not release the insurer from payment under the policy, even when such insolvency or bankruptcy prevents the insured Contractor from meeting the retention limit under the policy.
- 6) The Contractor shall furnish a certificate of insurance to the undersigned State representative prior to commencement of this agreement. All endorsements shall be provided as soon as practicable. The Contractor shall provide a certificate of insurance prior to commencement of this agreement and any required endorsements as soon as practicable electronically to:

OFFICE OF THE ADJUTANT GENERAL
ng.nd.ndarng.list.g9-certified-payrolls@army.mil

- 7) Failure to provide insurance as required in this agreement is a material breach of contract entitling the State to terminate this agreement immediately.
- 8) Contractor shall provide at least 30-day notice of any cancellation or material change to the policies or endorsements. Contractor shall provide on an ongoing basis, current certificates of insurance during the term of the contract. A renewal certificate will be provided 10 days prior to coverage expiration.

§ 11.2 Waivers of Subrogation

§ 11.2.1 The Owner does not waive any rights against the Contractor (term "Contractor" includes any of Contractor's subcontractors, sub-subcontractors, agents and employees, each of the other) for losses caused by Contractor's negligence or intentional act or failure to act.

(Paragraphs deleted)

§ 11.3 Adjustment and Settlement of Insured Loss

§ 11.3.1 All references in above listed paragraphs that refer to Owner's duties/responsibilities, Owner's property insurance, Owner as "fiduciary", etc., shall be changed to mean Contractor's duties/responsibilities, Contractor's property insurance, Contractor as "fiduciary", etc. The Contractor referred to in these paragraphs is that Contractor responsible for purchasing and maintaining the property insurance.

(Paragraphs deleted)

§ 11.3.2 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. 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.

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. 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.

(Paragraph deleted)

§ 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

This Contract is governed by the laws of the State of North Dakota. Any action to enforce this Contract must be brought in the State District Court of Burleigh County, North Dakota.

§ 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 within forty-five (45) days of the due date shall bear 0.00% interest per annum.

§ 13.6 Maintenance of Records by Contractor

The Contractor shall maintain all directly pertinent books, documents, papers, and other records involving transactions related to this Contract for three years after the Owner makes final payment and all other pending matters are closed.

§ 13.7 Liquidated Damages

§ 13.7.1 The parties agree that damages for non-performance by the Contractor would be difficult to estimate at the time of entering this contract. If the Contractor fails to complete the Work within the time specified in the Contract, or any extension, the Contractor shall pay to the Owner as liquidated damages the amount of \$100.00 for each day of delay, plus any costs incurred by the Owner for legal review and Contract modification.

§ 13.7.2 If the Owner terminates the Contractor's right to proceed, the resulting damage will consist of liquidated damages until such reasonable time as may be required for final completion of the work together with any increased costs occasioned the Owner in completing the Work.

§ 13.7.3 If the Owner does not terminate the Contractor's right to proceed, the resulting damage will consist of liquidated damages until the Work is completed or accepted.

§ 13.8 Hiring Preference

Pursuant to N.D.C.C. § 43-07-20, the Contractor must give preference to the employment of bona fide North Dakota residents, as determined by N.D.C.C. § 54-01-26, with preference given first to honorably discharged disabled veterans and veterans of the armed forces of the United States, as defined in N.D.C.C. § 37-19.1-01, who are deemed to be qualified in the performance of that work. The preference shall not apply to Engineering, superintendence, management, or office or clerical work.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

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

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

§ 14.1.2 If one of the reasons described in Section 14.1.1 exists, the Contractor may, upon seven days' written 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.

§ 14.1.3 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 14.1.2.

(Paragraph deleted)

§ 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 order the Contractor in writing to suspend, delay or interrupt the Work of this Contract for the period of time that the Owner determines appropriate for the convenience of the State.

§ 14.3.2 If the performance of all or any part of the Work is, for an unreasonable period of time, suspended, delayed, or interrupted (1) by an act of the Owner in the administration of this Contract, or (2) by the Owner's failure to act within the time specified in this Contract (or within a reasonable time if not specified), an adjustment shall be made for any increase in the cost of performance of this Contract (excluding profit) necessarily caused by the unreasonable suspension, delay, or interruption, and the Contract modified in writing accordingly. However, no adjustment shall be made under this clause for any suspension, delay, or interruption to the extent that performance would have been so suspended, delayed, or interrupted by any other cause, including the fault or negligence of the Contractor, or for which an equitable adjustment is provided for or excluded under any other term or condition of this Contract.

§ 14.3.3 A claim under this clause shall not be allowed:

- .1 for any costs incurred more than 21 days before the Contractor shall have notified the Owner in writing of the act or failure to act involved (but this requirement shall not apply as to a claim resulting from a suspension

- order), and
- .2 unless the claim, in an amount stated, is asserted in writing as soon as practicable after the termination of the suspension, delay, or interruption, but not later than the date of final payment under the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner, by written notice, may terminate this Contract, in whole or in part, when it is in the best interest of the State. If this Contract is so terminated, the Owner shall be liable only for payment in accordance with the payment provisions of this Contract for Work executed prior to the effective date of termination, and costs incurred by reason of such termination.

§ 14.4.2

(Paragraphs deleted)

If this Contract is so terminated, the Owner shall be liable only for payment in accordance with the payment provisions of this Contract for Work executed prior to the effective date of termination, and costs incurred by reason of such termination.

(Paragraphs deleted)

§ 14.5 Termination by the Owner for Lack of Funding or Authority

§ 14.5.1 The Owner, by written notice, may terminate this Contract under any of the following conditions:

- .1 If funding from federal, state, or other sources is not available at levels sufficient to allow for the continuation of the Work.
- .2 If federal or state laws or rules are modified or interpreted in a way that the Work under this contract is no longer eligible for the funding proposed for payments authorized by this contract.
- .3 If any license, permit or certificate required by law or rule, or by the terms of this contract, is for any reason denied, revoked, suspended or not renewed.

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, 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.

(Paragraphs deleted)

§ 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. The Owner does not agree to binding arbitration, mediation or any other form of mandatory Alternative Dispute Resolution. The parties may enforce the rights and remedies in judicial proceedings. The Owner does not waive any right to a jury trial.

§ 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 approve or reject Claims by written decision, which shall state the reasons therefor and which shall notify the parties of any change in the Contract Sum or Contract Time or both. The approval or rejection of a Claim by the Initial Decision Maker shall be final and binding on the parties but subject to litigation.

§ 15.2.6 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.

(Paragraph deleted)

§ 15.2.7 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.

(Paragraph deleted)

§ 15.3 Alternative Dispute Resolution

The parties under this Contract shall have the option to resolve disputes by means of alternative dispute resolution. However, the Owner does not agree to any form of binding arbitration, mediation, or other forms of mandatory alternative dispute resolution, nor does the Owner waive any right to a jury trial. The parties shall retain their right to seek remedies in judicial proceedings.

(Paragraphs deleted)

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LABOR STANDARDS PROVISIONS

CONTRACT WORK HOURS AND SAFETY STANDARDS ACT (CWHSSA)

1.1 OVERTIME REQUIREMENTS

1.1.1 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 he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

1.2 VIOLATION - LIABILITY FOR UNPAID WAGES LIQUIDATED DAMAGES

1.2.1 In the event of any violation of the clause set forth in paragraph 1.1.1 the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages and interest from the date of the underpayment. 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 watchpersons and guards, employed in violation of the clause set forth in paragraph 1.1.1, in the sum of \$32 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph 1.1.1.

1.3 WITHHOLDING FOR UNPAID WAGES AND LIQUIDATED DAMAGES

1.3.1 **Withholding process.** The Contracting Officer may, upon its own action, or must, upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to satisfy the liabilities of the prime contractor or any subcontractor for any unpaid wages; monetary relief, including interest; and liquidated damages required by the clauses set forth in this section of the contract, any other Federal contract with the same prime contractor, or any other federally assisted contract subject to the Contract Work Hours and Safety Standards Act that is held by the same prime contractor (as defined in [§ 5.2](#)). The necessary funds may be withheld from the contractor under this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract that is subject to the Contract Work Hours and Safety Standards Act and is held by the same prime contractor, regardless of whether the other contract was awarded or assisted by the

same agency, and such funds may be used to satisfy the contractor liability for which the funds were withheld.

1.3.2 **Priority to withheld funds.** The Department has priority to funds withheld or to be withheld in accordance with paragraph 1.3.1 over claims to those funds by:

- .1 A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;
- .2 A contracting agency for its procurement costs;
- .3 A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;
- .4 A contractor's assignee(s);
- .5 A contractor's successor(s); or
- .6 A claim asserted under the Prompt Payment Act, [31 U.S.C. 3901-3907](#).

1.4 SUBCONTRACTS

1.4.1 The contractor or subcontractor must insert in any subcontracts the clauses set forth in paragraphs 1.1 through 1.5 of this section and a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor is responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs 1.1 through 1.5. In the event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower-tier subcontractors, and associated liquidated damages and may be subject to debarment, as appropriate.

1.5 ANTI-RETAILIATION

1.5.1 It is unlawful for any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, or to cause any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, any worker or job applicant for:

- .1 Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the Contract Work Hours and Safety Standards Act (CWHSSA) or its implementing regulations in this part;
- .2 Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under CWHSSA or this part;
- .3 Cooperating in any investigation or other compliance action, or testifying in any proceeding under CWHSSA or this part; or
- .4 Informing any other person about their rights under CWHSSA or this part.

1.6 PAYROLL AND BASIC RECORDS

1.6.1 The Contractor and its subcontractors shall maintain payrolls and basic payroll records for all laborers and mechanics working on the contract during the contract and shall make them available to the Government until 3 years after the prime contract is complete. The records shall contain the name, last known address, telephone number, email address, social security number, correct classification(s) of work actually performed; hourly rates of wages paid, daily and weekly number of hours actually worked, deductions made, and actual wages paid.

1.6.2 The Contractor and its subcontractors shall allow authorized representatives of the Contracting Officer or the Department of Labor to inspect, copy, or transcribe records maintained under paragraph 1.4.1 of this clause. The Contractor or subcontractor also shall allow authorized representatives of the Contracting Officer or Department of Labor to interview employees in the workplace during working hours.

FEDERAL PROVISIONS

The following federal laws and regulations apply to this contract.

EQUAL EMPLOYMENT OPPORTUNITY

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

(1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:

Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

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

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

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

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

(6) The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor

for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(7) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(8) The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontract or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance:

Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

NONDISCRIMINATION

The Contractor agrees that no person shall be subject to discrimination or denied benefits in connection with the Contractor's performance under this Contract. Accordingly, and to the extent applicable, the Contractor covenants and agrees to comply with the following national policies on discrimination:

(1) On the basis of race, color, or national origin, in Title VI of the Civil Rights Act of 1964 (42 U.S.C. 2000d et seq.), as implemented by Department of Defense (DoD) regulations at 32 CFR part 195.

(2) On the basis of gender, blindness, or visual impairment, in Title IX of the Education Amendments of 1972 (20 U.S.C. 1681 et seq.), as implemented by DoD regulations at 32 CFR part 196.

(3) On the basis of age, in the Age Discrimination Act of 1975 (42 U.S.C. 6101 et seq.), as implemented by Department of Health and Human Services regulations at 45 CFR part 90.

(4) On the basis of disability, in the Rehabilitation Act of 1973 (29 U.S.C. 794), as implemented by Department of Justice regulations at 28 CFR part 41 and DoD regulations at 32 CFR part 56.

(5) On the basis of disability in the Architectural Barriers Act of 1968 (42 U.S.C. 4151 et seq.) related to physically handicapped persons' ready access to, and use of, buildings and

facilities for which federal funds are used in design, construction, or alteration.

LOBBYING

(1) The contractor covenants and agrees to comply with the restrictions on lobbying in 31 U.S.C. 1352, as implemented by DoD at 32 CFR part 28, and submit all disclosures required by that statute and regulation.

(2) The contractor covenants and agrees to comply with the prohibition in 18 U.S.C. 1913 on the use of federal funds, absent express Congressional authorization, to pay directly or indirectly for any service, advertisement or other written matter, telephone communication, or other device intended to influence at any time a Member of Congress or official of any government concerning any legislation, law, policy, appropriation, or ratification.

(3) If the contractor is a nonprofit organization described in section 501(c)(4) of title 26, United States Code (the Internal Revenue Code of 1968), you may not engage in lobbying activities as defined in the Lobbying Disclosure Act of 1995 (2 U.S.C., chapter 26). If we determine that you have engaged in lobbying activities, we will cease all payments to you under this and other contracts and terminate the contracts unilaterally for material failure to comply with the contract terms and conditions.

OFFICIALS NOT TO BENEFIT

The contractor covenants and agrees to comply with the requirements that no member of Congress shall be admitted to any share or part of this contract, or to any benefit arising from it, in accordance with 41 U.S.C. 6306.

HATCH ACT

The contractor agrees to comply with the provisions of the Hatch Act (5 U.S.C. 1501-1508) concerning political activities of certain state and local government employees, as implemented by the Office of Personnel Management at 5 CFR part 151, which limits political activity of employees or officers of state or local governments whose employment is connected to an activity financed in whole or part with federal funds.

DRUG-FREE WORKPLACE

The Contractor covenants and agrees to comply with the requirements regarding drug-free workplace requirements in Subpart B of 2 CFR part 182.

ENVIRONMENTAL PROTECTION

The Contractor covenants and agrees to comply with all following applicable federal environmental laws and regulations. The laws and regulations identified in this section are not intended to be a complete list.

(1) Comply with applicable provisions of the Clean Air Act (42 U.S.C. 7401, et seq.), Federal Water Pollution Control Act (33 U.S.C. 1251-1387, Clean Water Act (33 U.S.C. 1251, et seq.), and standards, orders, or regulations issued under those acts.

(2) Report any violations of the Acts, standards, orders or

regulations to both the award administration office and the appropriate regional office of the EPA.

(3) Comply with applicable provisions of the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. 4821-4846), as implemented by the Department of Housing and Urban Development at 24 CFR part 35. The requirements concern lead-based paint in buildings owned by the Federal Government or housing receiving federal assistance.

(4) Immediately identify to us, any potential impact that you find this contract may have on:

a. The quality of the “human environment”, as defined in 40 CFR 1508.14, including wetlands; and provide any help we may need to comply with the National Environmental Policy Act (NEPA, at 42 U.S.C. 4321 et seq.), the regulations at 40 CFR 1500-1508, and Executive Order 12114, if applicable; and assist us to prepare Environmental Impact Statements or other environmental documentation. In such cases, you may take no action that will have an environmental impact (e.g., physical disturbance of a site such as breaking of ground) or limit the choice of reasonable alternatives to the proposed action until we provide written notification of federal compliance with NEPA or Executive Order 12114.

b. Flood-prone areas and provide any help we may need to comply with the National Flood Insurance Act of 1968, as amended by the Flood Disaster Protection Act of 1973 (42 U.S.C. 4001 et seq.), which require flood insurance, when available, for federally assisted construction or acquisition in flood-prone areas.

c. A land or water use or natural resource of a coastal zone that is part of a federally approved state coastal zone management plan and provide any help we may need to comply with the Coastal Zone Management Act of 1972 (16 U.S.C. 1451, et seq.) including preparation of a Federal agency Coastal Consistency Determination.

d. Coastal barriers along the Atlantic and Gulf coasts and Great Lakes’ shores and provide help we may need to comply with the Coastal Barrier Resources Act (16 U.S.C. 3501 et seq.), concerning preservation of barrier resources.

e. Any existing or proposed component of the National Wild and Scenic Rivers system and provide any help we may need to comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. 1271 et seq.).

f. Underground sources of drinking water in areas that have an aquifer that is the sole or principal drinking water source and in wellhead protection areas and provide any help we may need to comply with the Safe Drinking Water Act (42 U.S.C. 300f et seq.).

(5) Comply fully with the Endangered Species Act of 1973, as amended (ESA, at 16 U.S.C. 1531 et seq.) and implementing regulations of the Departments of the Interior (50 CFR parts 10-24) and Commerce (50 CFR parts 217-227). You also must provide any help we may need in complying with the consultation requirements of ESA section 7 (16 U.S.C. 1536) applicable to federal agencies or any regulatory authorization we may need resulting from performance under this contract. This is not in lieu of responsibilities you have to comply with provisions of the Act that apply directly to you as a U.S. entity, independent of receiving this contract.

(6) Comply with the Marine Mammal Protection Act of 1972, as amended (MMPA, at 16 U.S.C. 1361 et seq.) and provide any assistance we may need in obtaining any required MMPA

permit resulting from performance under this contract.

PURCHASE OF RECOVERED MATERIALS

The Contractor agrees to comply with applicable requirements in EPA regulations (40 CFR part 247, Subpart B) which implement section 6002 of the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6962).

NATIVE AMERICAN GRAVES PROTECTION AND REPATRIATION

The Contractor agrees to comply with the requirements of 43 CFR part 10, the Department of the Interior implementation of the Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C., chapter 32), if applicable.

USE OF UNITED STATES FLAG CARRIERS

The Contractor covenants and agrees that travel supported by U. S. Government funds under this agreement shall:

(1) Comply with the International Air Transportation Fair Competitive Practices Act of 1974 (49 U.S.C. 40118, also known as the "Fly America" Act), as implemented at 41 CFR 301-10.131 through 301-10.143. The law and regulations provide that U.S. Government-financed international air travel of passengers and transportation of personal effects or property must use a U.S. Flag air carrier or be performed under a cost-sharing arrangement with a U.S. carrier, if such service is available.

(2) Include the requirements of the Fly America Act in all subcontracts that might involve international air transportation.

(3) Comply with the following requirements of the Department of Transportation at 46 CFR 381.7, in regulations implementing the Cargo Preference Act of 1954:

a. Pursuant to Public Law 83-664 (46 U.S.C. 55305), at least 50 percent of any equipment, materials or commodities procured, contracted for, or otherwise obtained with funds under this contract, and which may be transported by ocean vessel, must be transported on privately owned United States flag commercial vessels, if available.

b. Within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, "on-board" commercial ocean bill-of-lading in English for each shipment of cargo described in section 8.a of this section must be furnished to both our award administrator (through you in the case of your contractor's bill-of-lading) and to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590.

NONPROCUREMENT SUSPENSION AND DEBARMENT

The Contractor is subject to the nonprocurement debarment and suspension regulations. These regulations restrict awards, subawards, and contracts with certain parties that are debarred, suspended, or otherwise excluded from or ineligible for

participation in Federal assistance programs or activities. The Contractor agrees to comply with the DOD implementation of 2 CFR Part 180 (at 2 CFR Part 1125) by checking the Excluded Parties List System (EPLS) at www.sam.gov to verify contractor eligibility to receive contracts and subcontracts resulting from this Agreement. The Contractor shall not solicit offers from, nor award contracts or subcontracts to contractors listed in EPLS. This verification shall be documented in the contractor's contract files and shall be subject to audit by the Federal/State audit agencies.

HISTORIC PRESERVATION

The Contractor agrees to identify to us any:

(1) Property listed or eligible for listing on the National Register of Historic Places that will be affected by this contract, and provide any help we may need, to comply with section 106 of the National Historic Preservation Act of 1966 (54 U.S.C. 306108), as implemented by the Advisory Council on Historic Preservation regulations at 36 CFR part 800 and Executive Order 11593, "Identification and Protection of Historic Properties," [3 CFR, 1971- 1975 Comp., p. 559]. Impacts to historical properties are included in the definition of "human environment" that require impact assessment under NEPA.

(2) Potential for irreparable loss or destruction of significant scientific, prehistorical, historical, or archeological data, and provide any help needed, to comply with the Archaeological and Historic Preservation Act of 1974 (54 U.S.C. chapter 3125).

WHISTLEBLOWER PROTECTIONS

Contractor agrees to comply with 10 U.S.C. 2409, including the:

(1) Prohibition on reprisals against employees disclosing certain types of information to specified persons or bodies.

(2) Requirement to notify your employees in writing, in the predominant native language of the workforce, of their rights and protections under that statute.

PROHIBITION ON CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT

Section 889 of the National Defense Authorization Act (NDAA) for Fiscal Year (FY) 2019 (Public Law 115-232):

(1) Prohibits the head of an executive agency from obligating or expending loan or grant funds to procure or obtain, extend, or renew a contract to procure or obtain, or enter into a contract (or extend or renew a contract) to procure or obtain the equipment, services, or systems prohibited systems as identified in section 889 of the NDAA for FY 2019.

(2) In accordance with 2 CFR 200.216 and 200.471, all awards that are issued on or after August 13, 2020, recipients and subrecipients are prohibited from obligating or expending loan or grant funds to:

a. Procure or obtain;

b. Extend or renew a contract to procure or obtain; or

c. Enter into a contract (or extend or renew a contract) to procure or obtain equipment, services, or systems that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. As described in Public Law 115-232, section 889, covered

telecommunications equipment is telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).

i. For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).

ii. Telecommunications or video surveillance services provided by such entities or using such equipment.

iii. Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

(3) In implementing the prohibition under Public Law 115-232, section 889, subsection (f), section (1), heads of executive agencies administering loan, grant, or subsidy programs shall prioritize available funding and technical support to assist affected businesses, institutions and organizations as is reasonably necessary for those affected entities to transition from covered communications equipment and services, to procure replacement equipment and services, and to ensure that communications service to users and customers is sustained.

(4) See Public Law 115-232, section 889 for additional information.

(5) Covered Foreign Country means the People's Republic of China.

(6) Telecommunications Cost means the cost of using communication and telephony technologies such as mobile phones, land lines, and internet.

(7) Do Not Contract with the Enemy (2 CFR 183).

TRAFFICKING IN PERSONS

The Contractor agrees to comply with requirements concerning trafficking in persons specified in the award term at 2 CFR 175.15(b), as applicable.

ADDITIONAL REQUIREMENTS

(1) Prohibition on Using Funds under Grants and Cooperative Agreements with Entities that Require Certain Internal Confidentiality Agreements.

(2) You may not require your employees, contractors, or subrecipients seeking to report fraud, waste, or abuse to sign or comply with internal confidentiality agreements or statements prohibiting or otherwise restricting them from lawfully reporting that waste, fraud, or abuse to a designated investigative or law enforcement representative of a federal department or agency authorized to receive such information.

(3) You must notify your employees, contractors, and subrecipients that the prohibitions and restrictions of any internal confidentiality agreements inconsistent with this contract, inclusive of these general terms and conditions are no longer in effect.

(4) The prohibition in paragraph 1.a. of this section does not contravene requirements applicable to Standard Form 312, Form 4414, or any other form issued by a federal department or agency governing the nondisclosure of classified information.

(5) If the Federal Government determines that you are not in compliance with these provisions, it:

a. Will prohibit your use of funds under this contract, in accordance with section 743 of Division E of the Consolidated and Further Continuing Resolution Appropriations Act, 2015, (Public Law 113-235) or any successor provision of law.

b. May pursue other remedies available for your material failure to comply with award terms and conditions.

THE INFRASTRUCTURE INVESTMENT AND JOBS ACT

The Contractor covenants and agrees that it will comply with Pub. L. No. 117-58, which includes the Build America, Buy America Act ("the Act"). Pub. L. No. 117-58, §§ 70901-52. The Act strengthens Made in America Laws and will bolster America's industrial base, protect national security, and support high-paying jobs. The Act requires that the head of each Federal agency shall ensure that "none of the funds made available for a Federal financial assistance program for infrastructure may be obligated for a project unless all of the iron, steel, manufactured products, and construction materials used in the project are produced in the United States."

UNIFORM RELOCATION ASSISTANCE AND REAL PROPERTY ACQUISITION POLICIES ACT

The Contractor covenants and agrees that it will comply with 49 CFR part 24, which implements the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (42 U.S.C. Section 4601 et seq.) and provides for fair and equitable treatment of persons displaced by federally assisted programs or persons whose property is acquired as a result of such programs.

CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The Contractor covenants and agrees that it will comply with the Contract Work Hours and Safety Standards Act (40 CFR, Subtitle II, Part A, Chapter 37), as implemented by the Department of Labor regulations (29 CFR Part 5). See AGND Document 418, Labor Standards Provisions.

SPECIFICATIONS
FOR

**INDOOR FIRING RANGE
ABATEMENT AND CLOSURE
AFRC Bldg. 3420
Minot, North Dakota**

I hereby certify that these plans and specifications were prepared by me or under my direct supervision and that I am a duly Registered Professional Architect under the laws of the State of North Dakota.



KEVIN J. BARTRAM

North Dakota Registration No. 944

Date: 19 August 2026

MUTCHLER BARTRAM ARCHITECTS, P.C.
505 N Broadway, Ste 201
Fargo, North Dakota 58102
Telephone: (701) 235-5563

.01 SECTION INCLUDES

- a. Project Description.
- b. Construction Schedule.
- c. Scope of Work.
- d. Site Layout and Measurements.
- e. Location of Utilities.
- f. Contractor Coordination.
- g. Public Convenience.
- h. Environmental Management System.

.02 PROJECT DESCRIPTION

a. Project Name: Indoor Firing Range Abatement and Closure, Armed Forces Reserve Center, Building 3420, Minot, North Dakota.

b. Owner Name: The Adjutant General, State of North Dakota

c. Architect's Name: Mutchler Bartram Architects, P.C., Fargo, North Dakota.

d. The Project scope is: Lead Abatement, Encapsulation, and Remodeling the area to close the indoor range for use as a storage area. After Lead Abatement and removal of lead containing materials, the area is to be remodeled into storage space including lead encapsulation; remove, patch, and replace masonry walls; remove bathroom fixtures and equipment; remove and salvage cabinets; remove acoustic ceiling tile system; Install new exterior overhead door; finishes; replace mechanical systems as needed; modify BAS controls; fire sprinkler modifications as needed, electrical system modification including outlets, light fixtures, fire alarm, and light controls; fiber optic service relocation, and miscellaneous related work.

.03 CONSTRUCTION SCHEDULE:

- a. All material shall be ordered immediately upon award of respective contracts.
- b. The Owner will occupy the building during the project. Close coordination will be required with occupants of the building. Construction work shall start commensurate with material delivery schedule and shall be diligently pursued to the end that all construction is totally completed on or before **May 21, 2027**. The time stated for completion shall include final cleanup of the premises.

c. The foregoing completion date is based on the assumption that the successful bidders will receive the notice to proceed by **September 30, 2026**. The State will not extend the completion date based on when the Contractor receives the notice to proceed. Also, the completion date will not be extended due to failure of the Contractor to execute the contract and give the required performance and payment bonds and other data required for contract award within the time specified in the bid.

d. NOTE: Contractors must consider that once project construction is initiated after receipt of notice to proceed, all general requirement responsibilities (i.e., project superintendence, contractor coordination, scheduling, utilities, temporary field office facilities/controls, etc.) will continue for the duration of the entire construction period.

e. Scheduled completion date carries a liquidated damages clause (see Article 13 of General Conditions of the Contract for Construction - AIA Document A201). Contractor and subcontractors shall recognize the importance of their responsibilities in completing their work on or ahead of schedule and in strict cooperation with each other.

f. The Contractor shall furnish not less than forty-eight (48) hours notice prior to starting work. Notice shall be furnished to the G9 Director of Installations and Environment – LTC Kristopher Elijah, Fraine Barracks, Bismarck, ND – email: kristopher.p.elijah.mil@army.mil; Telephone: (701) 791-3077 and to Mr. Greg Oakland, AIA, Mutchler Bartram Architects, 505 North Broadway, Suite 201, Fargo, North Dakota – email: goakland@mbapc.com; Telephone: (701) 235-5563.

g. In order to complete the work in the stipulated time, the Contractor may elect to work longer than eight (8) hours in any one day, or forty (40) hours in any one (1) week. However, he must notify the Office of the Adjutant General's field representative of his intentions to do so not less than twenty-four (24) hours before the scheduled overtime. The Contractor's Project Superintendent/Foreman MUST BE on the job site supervising ALL scheduled overtime work.

.04 SCOPE OF WORK:

a. **All Contractors shall take care to not disturb or damage encapsulant or encapsulated areas in the process of their work. All work that may impact encapsulant or encapsulated areas must be approved by the Architect/Engineer and Owner before onset of work.**

b. The General Contractor shall be responsible for Lead Abatement Clearance Sampling. Maintain a complete and accurate record of sampling as it progresses.

(1) Only the Abatement Consultant for this project, LEGEND Technical Services, under contract to the General Contractor, shall be permitted to execute this task. The General Contractor shall be solely responsible to retain LEGEND Technical Services for said services and pay for services when complete. The General Contractor shall include in his BID ITEM NO. G-1 or TC-1 all costs for these services.

Direct all correspondence concerning Clearance Sampling services to:

Mike Molstre or Jesse Molstre
LEGEND Technical Services

1126 Westrac Drive South

Fargo, ND 58103

Telephone: 701.271.6779

Mike Molstre

Cell: 701-541-0477

Email: mmolstre@legend-group.com

Jesse Molstre

Cell: 701-799-5095

Email: jmolstre@legend-group.com

c. Extent of drawings and specifications defining all work to be performed under this contract are listed on cover sheet of specification book. It is the bidding Contractor's sole responsibility to verify that he has received all sheets of plans and specifications as no claim for extra cost will be allowed due to the lack of complete information at the time of bid.

d. Equipment or work indicated on plans to be "By Owner" or "N.I.C." is not to be included in bid proposal or construction contract.

.05 SITE LAYOUT AND MEASUREMENTS:

a. The General Contractor shall be responsible for setting reference points, site layout, construction verification, and establishing building lines, elevations, grading, and utilities. Maintain a complete and accurate log of control and survey work as it progresses.

b. Each Contractor shall, upon entering project site for purposes of beginning work, locate all general reference points and take such action as is necessary to prevent their destruction; lay out his own work and be responsible for all lines, elevations, and measurements of buildings, grading, utilities, and other work executed by him under contract. Such building lines thus established shall be maintained for use of all Contractors and subcontractors. All Contractors must exercise proper precaution to verify figures shown on drawings before layout work as they will be held responsible for any error resulting from failure to exercise such precaution.

c. Figured dimensions shall be followed in preference to measurements by scale; large scale drawings shall take precedence over those of a small scale. Figures on all drawings, as detail drawings themselves are, in every case, subject to measurements of adjacent or incorporated completed work. All such necessary measurements shall be taken before undertaking any work dependent upon such data. Report any discrepancies to Architect/Engineer for clarification before proceeding with work.

d. Where, on any drawings, a portion of work is drawn out and remainder is indicated in outline, parts drawn out or indicated by symbols or instructions by word description shall apply also to all other like portions of the work.

e. Where existing work is added to or modified, the Contractors shall be responsible to verify existing dimensions and conditions. Any existing condition which affects a Contractors new work should be verified for accuracy. This includes, but is not limited to, such items as clearances, dimensions, existing equipment, existing services, working conditions, etc.

f. Where a clear understanding of the work is prevented, due to discrepancies, contradictions, or omissions on contract documents or subsequently issued instructions (regardless of source), Contractor shall not proceed with work and Architect/Engineer should be consulted for clarification of the uncertainty. Should any mistake result due to pursuit of work without this clarification, Contractor must make necessary corrections at his expense and as directed by Architect/Engineer.

.06 LOCATION OF UTILITIES:

a. It shall be each Contractor's responsibility to familiarize himself with location of all existing sewer mains, storm mains, water mains, gas mains, telephone cables, cable TV, power lines, street light wiring, and all of their associated service lines, and appurtenances such as poles, guy wires, supports, pads, valve boxes, stop boxes, manholes, and clean-outs pertaining to utility service. Each respective Contractor shall be responsible for notifying North Dakota One-Call at 1-800-795-0555 at least 48 hours before beginning any excavation, excluding Saturdays, Sundays, and holidays, and shall comply with all requirements of Section 49-23 of the North Dakota Century Code. The respective Contractor shall hire a qualified technician to locate those underground utility lines that are not covered by the North Dakota One-Call system. All costs associated with locating all utilities shall be the responsibility of the respective Contractor.

b. Each respective Contractor for the project will be held responsible for damage to any underground or overhead piping, wiring, or other utility property, occurring during any excavation or construction by the respective Contractor or his subcontractors.

.07 CONTRACTOR COORDINATION:

a. General Contractor shall employ a full-time, on site Project Superintendent(s) who will be responsible for continuous overall coordination between general, mechanical, and electrical phases of work and he shall be the Contractor's liaison with Architect/Engineer and Owner's on site representative. Project Superintendent shall have a minimum of five (5) years' experience in the field, and be approved by the Architect/Engineer and Owner before onset of work. He shall be maintained by the General Contractor throughout the project and not be replaced without approval of the Architect/Engineer and Owner.

b. Mechanical Contractor shall each employ a Project Foreman who will be responsible for continuous coordination with all phases of Contractor work. He shall be the Contractors liaison with Architect/Engineer, Owner's representative, and General Contractor's Project Superintendent. Project Foreman shall have a minimum of five (5) years' experience in the field, and be approved by the Architect/Engineer, and Owner before onset of work. He shall be maintained by the Contractor throughout the project and not be replaced without approval of the Architect/Engineer and Owner. Refer to Divisions 21, 22, and 23 for other required qualifications.

d. The General Contractor's Project Superintendent(s) responsibilities shall include, but not be limited to:

- (1) Consult the contract drawings and specifications of all trades to verify and coordinate the location of the various building components and items to be installed by all Contractors. Review the daily work schedules of all Contractors for a minimum of

interferences to the work of other Contractors. This work includes (but is not limited to) installation of sleeves in wood, masonry, and concrete walls for mechanical and electrical items.

- (2) Consult and cooperate with all Contractors and their subcontractors/installers for all work to determine space requirements and adequate clearances with respect to other equipment in the building. Architect/Engineer reserves the right to determine space priority in the event of interference between piping, conduit, equipment, furnishings, etc., of various trades.
 - (3) Inspect, report to the Architect/Engineer and coordinate the removal, relocation and reconnection of any installed work which interferes with the work of other trades. All work, as directed, shall be at the expense of the installing Contractor.
 - (4) Hold specific daily coordination meetings for each element of the work, maintain written documentation of events, report to Architect/Engineer at regular (weekly) project meetings.
 - (5) Keep the Architect/Engineer and Owner's Representative fully informed of the progress of the work and endeavor to safeguard the Owner against any defects and deficiencies in all the Work.
- d. The General Contractor will not be responsible for construction means, methods, techniques, procedures, or for safety precautions and programs, or for the safety of workmen of Mechanical Contractor in connection with the work, all of which shall be the responsibility of the Mechanical Contractor. He will not be responsible for Mechanical Contractor's failure to carry out the work in accordance with the contract documents.
- e. General Contractor shall provide lintels, bucks, openings and recesses required for installation of all work unless specified to the contrary. He/She shall notify the Mechanical Contractor of work schedules sufficiently in advance to cooperate with him and be responsible for proper location and sizes of openings required for their work.
- f. Mechanical Contractor shall furnish and properly install all bucks, sleeves, conduit hanging devices, backing for hanging devices, etc., pertinent to their work. Failure on part of the Contractor to properly work with General Contractor in providing and placing of openings, recesses, etc., for their work as outlined above will not relieve them of the expense of putting these openings, recesses, etc. in later and repairing such cut construction to the satisfaction of the Architect/Engineer.
- g. Contractors and subcontractors shall:
- (1) Be mutually responsible, one to another, to prevent any delays in construction schedule. No one shall erect any portion of his work where it is necessary that work of others shall be erected first or carried on simultaneously without having first given other superintendents reasonable notice of his intentions.

- (2) Coordinate scheduling, submittals, and work of the various sections of specifications to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
 - (3) Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various contractors, subcontractors, installers and/or suppliers having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
 - (4) Coordinate space requirements and installation of electrical work which is indicated diagrammatically on drawings. Follow routing shown for pipes and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
 - (5) In finished areas (except as otherwise indicated), conceal pipes and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- h. Limitations on site usage as well as specific requirements that impact site utilization are indicated on the drawings and by other contract documents. General Contractor shall administer allocation of available space equally among entities needing both access and space so as to produce the best overall efficiency in performance of the total work of the project. Each Contractor shall schedule deliveries so as to minimize space and time requirements for storage of materials and equipment on site. Architect/Engineer shall be sole judge as to allocation of available space in case of dispute.

.08 PUBLIC CONVENIENCE:

- a. Each Contractor shall, at all times, so conduct his work as to insure the least possible obstruction to traffic and inconvenience to National Guard operational activities, the general public, and the residents in the vicinity of the work, and to insure the protection of persons and property. No road or street shall be closed to the public except with the permission of the proper authorities. Fire hydrants on or adjacent to the work shall be kept accessible to fire fighting equipment at all times.
- b. The Contractors shall cooperate and coordinate with the Owner in scheduling the work to accommodate National Guard operation and other construction activities occurring simultaneously.

.09 ENVIRONMENTAL MANAGEMENT SYSTEM:

- a. The North Dakota National Guard (NDNG) has implemented an environmental Management System (eMS) per guidance published by the Department of Defense. As part of the NDNG's eMS, it shall be the Contractor's responsibility to be informed that some activities associated with certain construction projects may have a significant impact on the environment. Those activities include but are not limited to:

- Fueling Operations
- Dust Control Measures

- Ozone Depleting Chemicals
- Operational Noise

b. It shall be the Contractor's responsibility to familiarize himself with the requirements of the NDNG's plans for the project location.

c. It shall be the Contractor's responsibility to report spills, releases or other environmental issues to the Office of the Adjutant General's field representative upon discovery within a reasonable amount of time (same day/24 hour period). Spills or releases which leave NDNG property must be reported immediately upon discovery.

d. The Contractor will be held responsible for damage to the environment resulting from a spill, release or other environmental violation to include environmental cleanup activities, disposal costs and fines or penalties levied by environmental regulatory agencies.

END OF SECTION 01 1100

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.01 SECTION INCLUDES

- a. Procedures for Preparation and Submittal of Bids.
- b. General Information.
- c. Bid Items.

.02 GENERAL INFORMATION:

- a. Bidders may ONLY submit separate bids for General Construction work, Mechanical Construction work; or Total Combined Construction Work. No other types of bids for other portions of the project or combinations of the separate bids will be accepted.
- b. The determination of lowest and best Bidder and respective single contract amount for all work required for each type of bid will be the sum of selected Bid Item(s), and respective Alternates (if any) as determined by the Owner.
- c. Bidders must bid on all Bid Item(s) and Alternates (if any) specified within the type bid being submitted. Bidder may state his refusal to accept award of less than the combination of Bid Item(s) and Alternates (if any) he so stipulates. The submission of a Total Combined Construction Bid (single prime) for the complete project, in compliance with NDCC 48-01.2-06, will not be accepted unless that bid is lower than the combined total of the lowest responsible multiple bids for the project. The Bidder shall make no additional stipulations on the Bid Form nor qualify his bid in any other manner.
- d. In preparing his bid, Bidder is instructed to thoroughly familiarize himself with requirements herein so that his bid will be properly assembled and presented for Owner consideration.
- e. Refer to "Invitation to Bid"; Article 4 of AIA Document A701 regarding procedures for submission of bids.
- f. Prior to the award of the Contract, to enable the Owner to separate costs for funding purposes and as a condition of contract approval, the low bidder(s) may be required to clearly identify cost breakouts of specific items as required by the Owner.

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.03 BID ITEMS:

a. General/Electrical Construction - Separate Bid for ALL General/Electrical Work:

BID ITEM NO. G-1
(Indoor Firing Range
Abatement & Closure –
General / Electrical
Construction)

State the total cost for all work in connection with the complete General/Electrical Construction of the **Indoor Firing Range Abatement & Closure – General / Electrical Construction**, as shown on the drawings and as herein specified (Specification Divisions 02 through 12, 26, and 27); including all work associated with lead abatement, cleaning, and encapsulation; demolition; new general and electrical construction; miscellaneous; and ALL costs associated with general requirements (Specification Division 01000) TO INCLUDE Testing Laboratory Services and other related general requirements shall be included in this bid item.

b. Mechanical Construction - Separate Bid for ALL Mechanical Work:

BID ITEM NO. M-1:
(Indoor Firing Range
Abatement & Closure –
Mechanical Construction)

State the total cost for all work in connection with the complete Mechanical Construction of the **Indoor Firing Range Abatement & Closure – Mechanical Construction**, as shown on the drawings and as herein specified (Specification Section 02 4100, and Divisions 21 through 23); including all work associated with mechanical demolition and replacement; mechanical construction; miscellaneous; and ALL costs associated with general requirements (Specification Division 01000) TO INCLUDE Testing Laboratory Services and other related general requirements shall be included in this bid item.

c. Total Combined Construction - Separate Bid for ALL Work Combined Single Prime:

BID ITEM NO. TC-1:
(Indoor Firing Range
Abatement & Closure –
Total Combined
Construction)

This bid item is the same scope as bid items G-1 and M-1 Combined. State the total cost for all work in connection with the complete Total Combined Construction of the **Indoor Firing Range Abatement & Closure – Total Combined Construction** as shown on the drawings and as herein specified (Specification Divisions 02 through 27); including all work associated with lead abatement, cleaning, and encapsulation; demolition; new general, mechanical, and electrical construction; miscellaneous;; and ALL costs associated with general requirements (Specification Division 01000) TO INCLUDE Testing Laboratory Services and other related general requirements shall be included in this bid item.

.01 SECTION INCLUDES

- a. Preconstruction Meeting.
- b. Construction Progress Schedule.
- c. Progress Meetings.
- d. ASTM Designations.
- e. Terminology.
- f. Submittals Overview.
- g. Identification of Submittals.
- h. Coordination of Submittals.
- i. Timing of Submittals.
- j. Number of Copies of Submittals.
- k. Shop Drawings.
- l. Building Permit.

.02 PRE-CONSTRUCTION MEETING:

After date of notice to proceed, and upon coordination with all parties, the Architect/Engineer/Owner shall call a pre-construction meeting. Required in attendance shall be Architect/Engineer, Owner's representative(s), Contractors, and the Superintendent/Foremen together with the major subcontractors and suppliers. The general purpose of meeting will be to: review contract documents; review Owner procedures, documentation requirements, and general project overview agenda; procedures for processing of subcontractors approval, product approval, schedule of values and progress schedule; designation of personnel representing the Architect/Engineer, Owner, and Contractor; procedures for processing field decisions, submittals, applications for payment, proposal requests and change orders; coordinate temporary facilities and controls; and discuss any other items of concern which relate to the Work.

.03 CONSTRUCTION PROGRESS SCHEDULE.

- a. The General Contractor shall, upon conferring with the Mechanical Contractor and subcontractors, prepare and submit to the Architect/Engineer, within ten (10) days of contract award, three (3) copies of the proposed construction progress schedule for approval, all in accordance with Para. 3.10, Article 3 of General Conditions of the Contract for Construction (AIA Document A201). Upon written approval of the proposed schedule by all parties concerned (i.e., Architect/Engineer, Owner, and Mechanical Contractor, the General Contractor shall furnish three (3) copies to

Mechanical Contractor, and one (1) copy each to its testing company and general subcontractors. Mechanical Contractor shall furnish one (1) copy to their testing company and subcontractors. This shall serve as advance notice for their scheduling of materials, deliveries and installations to conform with the overall construction network plan.

- (1) The construction schedule shall consist of a bar chart showing the order and interdependence of activities and the sequence in which the work is to be accomplished as agreed to by ALL Contractors. The project completion date (May 21, 2027) WILL BE shown on the chart as the latest completion date of ALL activities.
- (2) The bar chart shall be scaled using units of approximately one-half inch equals one week or other suitable scale approved by Architect/Engineer. Weekends and holidays shall be indicated. The chart shall show the principal categories of work corresponding with those used in the breakdown on which the progress payments are based.
- (3) The chart shall indicate ALL key building phases (i.e., completion dates of Owner construction sequence items, sitework, building completely enclosed, delivery and installation of key items of equipment, etc.) to include other phases and sequences as required by Architect/Engineer and Owner.

.04 PROGRESS MEETINGS

a. The General Contractor's Project Superintendent shall coordinate all arrangements for project progress meetings which shall be held at maximum weekly. Attendance shall include Architect/Engineer, Owner's Representative(s), Mechanical Contractor, and the Superintendents/Foremen. All subcontractors and suppliers involved in current major phases of work shall also be in attendance.

- (1) The General Contractor's Project Superintendent shall, after consultation with Architect/Engineer, Owner's Representative and other Prime Contractors, prepare and furnish agenda with copies for participants.
- (2) The Architect/Engineer shall preside at the meetings, record minutes, and distribute copies within two (2) working days to Engineers, Owner, Prime Contractors, and Project Superintendent. It shall be each Contractors responsibility to immediately distribute copies to respective subcontractors, suppliers and installers who were participants and/or affected by the decisions made
- (3) The general purpose of the progress meeting shall be to: review previous meeting minutes; review work progress as it relates to each entities present and future needs including interface requirements; identify problems which are or may impede planned progress; review submittal schedules, delivery schedules, site access and utilization, temporary facilities and controls and progress cleaning requirements; review of progress schedule and determination of corrective measures to regain projected schedule to include firm commitments from responsible entities; review and coordinate planned progress for succeeding work period; review and coordinate

change orders; update progress schedule as required; and conduct any other business relating to the Work.

- (4) Immediately following the progress meeting, the Project Superintendent shall review and coordinate all items listed in the minutes.
- (5) When revisions to project schedule have been made, to include all necessary approvals, the General Contractor shall reissue revised schedules in accordance with previous paragraph .03.a.

.05 ASTM DESIGNATIONS:

Shall be latest edition for all sections of specifications. Materials specified to comply to a certain standard (ASTM or other) shall be delivered to job properly labeled and identified. If material is not labeled, Contractor shall furnish a certificate of compliance from manufacturer.

.06 TERMINOLOGY:

- a. Requirements of all Specification Sections A through J and Division 01 extend and apply to all work required of Contractors, subcontractors, material suppliers, etc., set forth in other divisions of the specifications.
- b. Where the term “include” is used under Scope of Work paragraphs of subsequent specification sections, this shall be interpreted to mean items of work therein listed may be a part, but not necessarily the total limit, of the work required by such section. Contractor shall examine drawings and specification documents.
- c. Where specifications are abbreviated type, they indicate complete sentences in the same manner as when a note occurs in the Drawings. Omissions of words such as “the Contractor shall” or “as shown on Drawings” is intentional. The words “shall” or “shall be” are to be supplied by inference. The term “provide” shall mean “furnish and install in place”.
- d. Where a number is listed in the specifications (as for gauges, weights, temperatures, amount of time, etc.), the number shall be interpreted as that or better.

.07 SUBMITTALS OVERVIEW:

- a. Wherever possible throughout the contract documents, the minimum acceptable quality of workmanship and material has been defined by manufacturer’s name and catalog number or by reference to recognized industry standards.
- b. To ensure that the specified products are furnished and installed in accordance with design intent, procedures have been established for advance submittal of design data and for its review and approval or rejection by the Architect/Engineer.

c. Related Work Described Elsewhere:

- (1) Contractual requirements for submittals: General Conditions of the Contract for Construction (AIA Document A201).
- (2) Individual submittals required: Pertinent sections of these specifications.

.08 IDENTIFICATION OF SUBMITTALS:

Completely identify each submittal and resubmittal by showing at least the following information:

- a. Name and address of submitter, plus name and telephone number of the individual who may be contacted for further information.
- b. Name of project as it appears on each page of these Specifications.
- c. Pertinent drawing sheet and detail number(s), and specification section number, as appropriate, to which the submittal applies.
- d. Whether this is an original submittal or resubmittal.

.09 COORDINATION OF SUBMITTALS:

a. General: Prior to submittal for Architect/Engineer's review, use all means necessary to fully coordinate all materials, including the following procedures:

- (1) Determine and verify all field dimensions and conditions, materials, catalog number and similar data.
- (2) Coordinate, as required, with all trades and with all public agencies involved. Secure all necessary approvals from public agencies and others and signify by stamp, or other means, that they have been secured.
- (3) Clearly indicate all deviations from the Contract Documents.

b. Grouping of Submittals: Unless otherwise specifically permitted by the Architect/Engineer, make all submittals in groups containing all associated items; the Architect/Engineer may reject partial submittals as not complying with the provisions of the Contract Documents.

c. Prior to submittal, Contractor shall apply Contractor's stamp, signed or initialed certifying that review, 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.

d. Provide space for Contractor, Architect/Engineer and Owner review stamps.

- e. Revise and resubmit submittals as required, identify all changes made since previous submittal.
- f. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

.10 TIMING OF SUBMITTALS:

a. General:

- (1) Make all submittals far enough in advance of scheduled dates of installation to provide all required time for review, for securing necessary approvals, for possible revision and resubmittal, and for placing orders and securing delivery.
 - (2) In scheduling, allow at least ten (10) full working days for the Architect/Engineer's review following his receipt of the submittal.
- b. Delays: Costs of delays occasioned by tardiness of submittals may be back charged to the Contractor and shall not be borne by the Owner.

.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.

.12 SHOP DRAWINGS:

- a. Unless otherwise specifically directed by the Architect/Engineer, submit newly prepared information drawn accurately to scale. Highlight, encircle, or otherwise indicate deviations from the contract documents. Do not reproduce contract documents or copy standard information as the basis of shop drawings. Standard information prepared without specific reference to the project is not a shop drawing. Contractor shall indicate on the shop drawing submittal that they have reviewed and approved it prior to forwarding it to the Architect/Engineer for review.
- b. Shop drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:
- (1) Dimensions.
 - (2) Identification of products and materials included by sheet and detail number.

- (3) Compliance with specified standards.
 - (4) Notation of coordination requirements.
 - (5) Notation of dimensions established by field measurement.
- c. Type of Prints Required: Unless otherwise specifically directed by the Architect/Engineer, submit all shop drawings in electronic PDF format.
- d. Distribution: After review and approval by Architect/Engineer, Contractor shall provide and distribute all copies required for this purpose and as required by subcontractors, suppliers, manufacturers, installers, etc.

.13 BUILDING PERMIT:

- a. If a building permit is required, The General Contractor shall arrange and pay any costs associated with the actual building permit itself for the total project after the issuance of Notice to Proceed. The General Contractor shall include in their bid the building permit costs for their work only. Upon determination of the total actual construction cost after all contracts have been awarded, the additional building permit costs for the other categories of work (Mechanical and/or Electrical) shall be credited to the General Contractor by Change Order, accordingly. The Total Combined Construction Contractor shall include in their bid the building permit cost for the value of their bid. No allowance will be considered regarding any overhead and profit factors when issuing this Change Order. All other fees, permits, licenses, bonds, etc., are the individual responsibility of the respective Contractors in accordance with other pertinent sections of these specifications and should be included in their bids.
- b. This facility is subject to inspection by state building code officials. Any costs that will be incurred by the Contactor for inspections by state building code officials shall be included in that Contractors bid.

END OF SECTION 01 3000

.01 SECTION INCLUDES

- a. Scope of Work.
- b. Approved Testing Laboratories.
- c. Testing Laboratory Requirements.
- d. Payment for Testing Services.
- e. Taking Specimens.
- f. Schedules for Testing.
- g. Code Compliance Testing.
- h. Contractor's Convenience Testing.
- i. Individual Testing Procedures and Requirements

.02 SCOPE OF WORK:

- a. Extent of work of this section includes all labor, material, equipment, and services necessary for and reasonably incidental to the testing of material as shown on the drawings and specified herein.
- b. Employment of testing laboratory shall in no way relieve Contractor of obligation to perform work in accordance with requirements of Contract Documents.
- c. The Testing Laboratory shall be retained by the Contractor, at no additional expense to the Owner. The Testing Laboratory shall act as the Owner's agent in all matters relating to material testing, and shall report to the Owner and take instructions from the Contractor after Owner and Engineer approval of instructions has been granted.
- d. It shall be the responsibility of all Contractors to familiarize themselves with all sections of these specifications to allow the Testing Laboratory to perform their duties at the proper sequence of construction without any hindrance or delays.
- e. Additional requirements for testing are described in various sections of these specifications.
- f. General and Mechanical Contractors shall EACH be responsible for retaining a prior approved single testing laboratory to perform all services for their respective work responsibility under this section.

g. NOTE: The quality control testing required on this project is a significant part of the overall project. Bidder is CAUTIONED to thoroughly familiarize himself with the testing requirements and the costs to provide them.

.03 APPROVED TESTING LABORATORIES:

The following laboratories are approved: American Engineering Testing, Inc. – AET; Braun Intertec Testing Services, Inc.; Geoserve, Inc.; Materials Testing Services, Inc.; Terracon; and Veteran Testing and Inspecting, LLC – VTI.

For Lead Abatement Clearance Sampling, only LEGEND Technical Services is approved. See Specification Section 01 1100.04.

.04 TESTING LABORATORY REQUIREMENTS:

a. Each person in charge of laboratory testing, field testing, and inspection must have not less than one (1) year of full-time experience in the duties required to be performed under this Contract and shall perform such duties only under the direct supervision of a registered engineer.

b. The Testing Laboratory shall perform all tests described herein and any additional tests requested by Owner. When it appears that the material furnished, or work performed by the Contractor, fails to meet the construction contract requirements, the Testing Laboratory shall direct the attention of the Owner and Engineers to such failure.

c. Meetings: Representatives of the **Testing Laboratory shall** attend pre-construction conferences and all project progress meetings when so directed by Owner, Engineers and/or Contractor, at no additional cost to the Owner.

d. Written Reports: Submit all test reports to Owner, Engineer (if applicable), Contractor and respective subcontractor (if applicable) within seventy-two (72) hours after each test is completed unless specified otherwise in these specifications.

e. Verbal Reports: Testing Laboratory is to give verbal notification, to Owner and Engineers, immediately, of any irregularity to ensure all necessary retesting and/or replacement of material with the least possible delay in progress of the Work.

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

.05 PAYMENT FOR TESTING SERVICES:

a. Initial Services:

- (1) The Contractor will pay for all initial testing services requested by these specifications. Costs for all such testing services shall be included in Contractor's proposal.

- (2) The Contractor will pay for all initial testing services requested by the Owner which are not specifically required by these specifications, and upon completion and acceptance of all work, an equitable adjustment shall be effected thereof by appropriate Change Order in accordance with paragraph 7.2.2 of General Conditions of the Contract for Construction (AIA Documents A201) EXCEPT that, if such initial tests indicate noncompliance with the Contract Documents, the costs of initial tests associated with that noncompliance shall be borne entirely by the Contractor.
- b. Retesting: When initial tests indicate noncompliance with the Contract Documents, all subsequent retesting occasioned by the noncompliance shall be performed by the same Testing Laboratory and the costs thereof will be borne entirely by the Contractor.

.06 TAKING SPECIMENS:

- a. All specimens and samples for testing will be taken only by the Testing Laboratory; all sampling equipment and personnel will be provided by the Testing Laboratory; and all deliveries of specimens and samples to the Testing Laboratory will be performed only by the Testing Laboratory.
- b. Contractor shall provide representatives of the Testing Laboratory access to the work at all times in order that the Laboratory may properly perform its functions.

.07 SCHEDULES FOR TESTING:

- a. Establishing Schedule: By advance discussion with the Testing Laboratory, the Contractor shall determine the time required for the Laboratory to perform its tests and to issue each of its findings.
- b. When changes of construction schedule are necessary during construction, the Contractor shall coordinate all such changes of schedule with the Testing Laboratory.
- c. When the Testing Laboratory is ready to test specimens but cannot due to incompleteness of the work, all extra costs for testing attributable to the delay will be back charged to the Contractor and shall not be borne by the Owner.

.08 CODE COMPLIANCE TESTING:

Inspections and tests required by codes or ordinances, or by a plan approval authority, and made by a legally constituted authority, shall be the responsibility of and shall be paid for by the Contractor, unless otherwise provided in the Contract Documents.

.09 CONTRACTOR'S CONVENIENCE TESTING:

Inspection or testing performed exclusively for Contractor's convenience shall be the sole responsibility of the Contractor.

.10 EARTHWORK

- a. See Specification Section 02 2300.
- b. The Testing Laboratory shall test and approve each fill lift placed prior to the placement of any additional lifts. Maximum depth of clay engineered fill - 12 inches. Maximum depth of granular engineered fill - 1 foot.
 - (1) Determine maximum density and optimum moisture content of each type of fill, backfill and subgrade material using ASTM D1557, "Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort".
 - (a) Testing frequency as indicated in the specifications.
 - (b) For each isolated parcel less than 250 square yards, 200 linear feet and 100-foot intervals per 18-inch lift (or 3-foot lift if applicable), take at least one test.
- c. The Soils Engineer shall observe and approve the final excavated subgrade elevations prior to the placement of any sub-base, base, and pavement materials.
- d. The Testing Laboratory shall observe and approve of all dewatering procedures during construction operations. Testing Laboratory shall make a written report concerning conditions of site during every site visitation. This shall include any observed items which might affect the project quality (including but not limited to the following: site dewatering, covering partially completed masonry walls at days end, curing of concrete slabs, and protection of equipment and materials).
- e. The Testing Laboratory shall test and approve each gravel / aggregate lift placed prior to the placement of any additional lifts. Maximum depth of layers - 6 inches. Maximum depth of granular engineered fill - 6 inches.
 - (1) Determine maximum density and optimum moisture content of each type of fill, backfill and subgrade material using ASTM D1557, "Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort".
 - (a) Testing frequency as indicated in the specifications.
- f. Furnish test reports in accordance with paragraph .03d.

.11 LEAD ABATEMENT

- a. See Specification Section 02 8300.

.12 CAST-IN-PLACE CONCRETE:

- a. See Specification Section 03 3000. See Concrete Notes on Drawings.

- b. The Testing Laboratory shall prepare the concrete mix design for each type of concrete used on the job.
- c. The Testing Laboratory shall perform batch plant inspections to verify that the ready mix producer is in compliance with the requirements as established by the National Ready Mix Concrete Association for Batch Plant Certification, and until concrete quality is established to the satisfaction of the Owner and Engineer. Periodic inspections shall be performed thereafter as determined by the Testing Laboratory and with the concurrence of the Owner and Engineer. Periodically inspect and test batch proportioning equipment for accuracy.
- d. The Testing Laboratory shall run a laboratory trial batch mix for each type of concrete proposed for use on the site to determine proper mix proportions, to include gradation and quality of coarse and fine aggregates.
- e. The Testing Laboratory shall sample and test aggregates and mix ingredients as necessary to insure compliance with specifications.
- f. The Testing Laboratory shall sample and test aggregates as necessary for moisture content. Request that adjustments be made in quantities of mixing water and aggregates as necessary to maintain water-cement ratio of approved design mixes.
- g. The Testing Laboratory shall certify, in duplicate, that ingredients and proportions and amount of ingredients in concrete conform with approved trial mixes. When concrete is batched or mixed off immediate building site, the Ready-Mix supplier shall certify (by signing, initialing, or stamping thereon) on delivery slips (duplicate) that ingredients in truck load mixes conform to proportions of aggregate weight, cement factor and water-cement ratio of approved trial mixes.
- h. The Testing Laboratory shall:
 - (1) Provide a field representative at site during placement of concrete to perform concrete sampling and testing.
 - (2) Take concrete samplings in accordance with ASTM C172. Mold and cure four compression test cylinders for each 50 cubic yards or fraction thereof for each concrete type per day. After good concrete quality control has been established and maintained, make four cylinders for each 100 cubic yards or fraction thereof for each concrete type per day. Label each cylinder with an identification number. Owner may require additional cylinders to be molded and cured under job conditions.
 - (3) Test slump of concrete periodically and during making of concrete test cylinders. Method of making slump test shall be described in ASTM C143.
 - (4) When air-entrained concrete is being placed, determine air content at least daily during progress of such work and during making of concrete test cylinders. Determine air content by either ASTM C173 or ASTM C231.

- (5) If slump of air content falls outside specified limits, another test shall be made immediately from another portion of same batch.
 - (6) Insure maintenance of water-cement ratio established by approved trial mix.
 - (7) Notify batch plant of mix irregularities and request materials and proportioning check.
 - (8) Verify that specified mixing has been accomplished.
- i. Laboratory Tests of Field Samples:
- (1) Test compression test cylinders for strength in accordance with ASTM C39. For each test series, test one (1) cylinder at seven (7) days, one (1) cylinder at fourteen (14) days and one (1) cylinder at twenty eight (28) days. The remaining cylinder will be used as a spare to be tested at either 7, 28, 56 or 90 day test as required. No further compression tests on each test series are required after specified strengths have been met.
 - (2) Furnish compression test reports in accordance with paragraph .03d. On test reports indicate following information:
 - (a) Cylinder identification number and date cast.
 - (b) Specific location at which test samples were taken.
 - (c) Type of concrete, slump and percent air.
 - (d) Compressive strength of concrete in psi.
 - (e) Weather conditions during placing.
 - (f) Temperature of concrete.
 - (g) Maximum and minimum ambient temperature during placing.
 - (h) Ambient temperature when concrete sample in test cylinder was taken.
 - (i) Date delivered to laboratory and date tested.

.13 UNIT MASONRY

- a. See Specification Section 04 2000. See Masonry Notes on Drawings
- b. Prior to commencing any work, the masonry suppliers shall submit to the Testing Laboratory documentation which will verify that each variety of masonry units will meet with the requirements of ASTM C140 and ASTM C90. This shall include absorption testing, compressive strength testing, and dimensional characteristics.

- c. Submit certified written reports in accordance with paragraph .03d.

.14 MORTAR AND GROUT:

- a. See Specification Section 04 2000. See Mortar and Grout Notes on Drawings
- b. The Testing Laboratory shall prepare a mortar mix design for each type of mortar and grout used on the job.
- c. The Testing Laboratory shall take mortar and grout test specimens as directed by Owner and/or Architect.
- d. Four cubes or cylinders will be taken for each mortar test specimen. For each test series, under the provisions of ASTM C780, test one (1) cube/cylinder at seven (7) days, one (1) cube/cylinder at fourteen (14) days and one (1) cube/cylinder at twenty eight (28) days. The remaining cube/cylinder will be used as a spare to be tested at either 7, 28 or 56 day test as required. No further compression tests on each test series are required after specified strengths have been met. ASTM C780 tests shall include field strength and water absorption and mortar flow. Laboratory standards for strength are 40 to 50% higher than actual field tests. Field-tests for strength shall only be concerned with a 20% overall testing consistency of the total of samples. Field flow test results should be 130 to 150 and water absorption tests shall be 75% +/- 15%.
- e. The testing agency shall sample all types of grout referenced in the contract documents and used on the project in accordance with ASTM C476, C143, and C1019. Three rectangular prism molds, constructed from the same type of masonry unit in contact with the grout being sampled, will be taken for each grout test specimen. For each test series, under the provisions of ASTM C39, test one (1) rectangular prism at seven (7) days, one (1) rectangular prism at fourteen (14) days and one (1) rectangular prism at twenty eight (28) days. No further compression tests on each test series are required after specified strengths have been met.
- f. Furnish compression test reports in accordance with paragraph .03d.

END OF SECTION 01 4000

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.01 SECTION INCLUDES

- a. Scope of Work.
- b. Job Conditions.
- c. Temporary Utilities.
- d. Field Office and Storage.
- e. Temporary Sanitary Facilities.
- f. Enclosures.
- g. Access Roads and Parking Areas.
- h. Waste Removal.
- i. Maintenance and Removal.
- j. Land and Rights-of-Way.

.02 SCOPE OF WORK:

- a. Work Included: Temporary facilities and controls required for this Work include, but are not necessarily limited to:
 - (1) Temporary utilities such as heat, water, lighting and power and telephone.
 - (2) Field office and storage sheds.
 - (3) Sanitary facilities.
 - (4) Enclosures such as tarpaulins, barricades and canopies.
 - (5) Access roads and parking areas.
- b. Except that all equipment furnished by subcontractors shall comply with all requirements of pertinent safety regulations, the ladders, planks, hoists, and similar items normally furnished by the individual trades in execution of their own portions of the Work are not part of this section.
- c. Permanent installation and hook-up of the various utility lines are described in the pertinent other sections of these specifications.
- d. Use all means necessary to maintain temporary facilities and controls in proper and safe condition throughout progress of the Work.

.03 JOB CONDITIONS:

Make all required connections to existing utility systems with minimum disruption to the existing utility systems. When disruption of the existing service is required, do not proceed without the Architect/Engineer's or Owner's authorized representative's approval and, when required, provide alternate temporary service(s) at no additional cost to the Owner.

.04 TEMPORARY UTILITIES:a. General:

- (1) All temporary facilities shall be subject to the Owner Representative's approval and shall be confined to areas authorized or approved by Owner Representative or Owner. Each respective Contractor shall hold and save the Owner, its officers, and agents, free and harmless from liability of any nature occasioned by his temporary facilities.
- (2) Maintain all temporary facilities and controls as long as needed for the safe and proper completion of the Work; remove all such temporary facilities and controls as rapidly as progress of the Work will permit or as directed by the Architect/Engineer.

b. Water: Owner shall make all reasonably required amounts of water available to the Contractors from existing outlets and supplies unless otherwise specified herein, without cost to the Contractors. Water in excess of what can be supplied from existing system will be furnished by the respective Contractor in a manner of his own choosing all at his cost. Hoses for water distribution around the building will be furnished by Contractor requiring the same.

c. Light & Power:

- (1) Owner shall make all reasonably required amounts of electricity available to the Contractors from existing outlets and supplies unless otherwise specified herein, without cost to the Contractors. Electricity in excess of what can be supplied from existing system will be furnished by the respective Contractor in a manner of his own choosing all at his cost.
- (2) Each Contractor shall be held responsible for diligently supervising the use of electrical power and lighting, as abuse and waste of these items may be cause for backcharge against the respective Contractor as directed by the Owner.
- (3) Electrical power SHALL NOT be used for heating EXCEPT when all costs associated therewith, to include energy and demand charges, are borne entirely by the respective Contractor (all at no additional cost to the Owner).
- (4) The General Contractor shall furnish and maintain a separate power service for all heating devices.

d. Telephone: General and Mechanical Contractors shall provide separate temporary telephones during construction period, to be located in respective temporary field offices and elsewhere within the area as required by Owner Representative. Cell Phones are acceptable.

e. Heat:

- (1) The General Contractor shall be responsible for providing all heat sufficient to protect all work and materials prior to Owner's acceptance of Work. A minimum temperature of 50 degrees F. shall be maintained in spaces (construction shelters, building enclosures, etc.) involved at all times during placing, setting and curing of concrete and masonry materials. For a period of at least two (2) weeks prior to installation of millwork items and other interior finishing, floor covering and painting work, and continuously thereafter until acceptance of building by Owner, a minimum temperature of 65 degrees F. shall be maintained throughout entire building (see individual specification section for additional heating requirements). These temperature levels shall be monitored by a minimum of one (1) thermostat. Under no conditions shall temperatures of enclosed units of construction be allowed to be less than 50 degrees F., whether or not any construction operations are being performed in those areas; and it will be the responsibility of the Contractor to furnish all heating devices to maintain these temperatures.
- (2) General Contractor shall furnish, place, connect & ventilate all temp. heating devices required to maintain a uniform tempered construction environment. Cost of service for lines and for fuel and power used for this service is to be borne by Contractor.
- (3) Gas: Contractor shall furnish and install a single temporary gas connection from service to building as soon as possible and remove same when no longer needed (cost of work shall be borne by Contractor). Contractor shall furnish and install all temporary piping for temporary heat. Cost of natural gas used for temporary heating is to be borne by General Contractor.
- (4) All temporary heating devices in or adjacent to the building are subject to Architect/Engineer's approval. Portable units must be vented. Smokeless units must be provided at times and locations necessary to prevent smoke damage or stains to building or materials. Temporary devices used inside building, when fully or partially enclosed, shall be acceptable smokeless and vented natural gas fired or electric heaters with motor-driven fan. Use of propane fired devices is prohibited.
- (5) The use of permanent heating system to include any portion thereof is NOT permitted UNLESS specifically agreed to in writing by Owner, Architect, Mechanical Engineer, and Contractor. NOTE: Specific conditions regarding protection, maintenance, adjustment, service, cleaning and warranty will have to be addressed.
- (6) Remove any and all non-permanent heating devices, etc., used for temporary heat when they are no longer needed.

- (7) Architect/Engineer shall be sole judge as to amount of temporary heat and enclosures needed in case of dispute. The Contractor must provide adequate personnel and mechanical surveillance of heating devices to prevent over or under heating whenever heating devices are in operation.
- f. Ventilation: Contractor shall provide and maintain all ventilation necessary in enclosed areas to assist cure of materials, to dissipate humidity and to prevent accumulation of dust, fumes, vapors, or gasses. All costs for these services shall be borne by the Contractor.

.05 FIELD OFFICE AND STORAGE:

- a. Temporary field office trailers/buildings are not a requirement for this project, however the Owner has no objection to Contractors providing and maintaining such offices on the building site. Expenses for all utilities, services, equipment and furnishings for each temporary field office shall be the responsibility of the respective Contractor.
- b. Each Contractor shall provide storage buildings as required for storage of materials requiring protection from elements. Remove same when work is complete.
- c. Subcontractors shall provide storage buildings for their own use on job, or shall arrange, at their expense, with the respective Contractor to provide such space for them. Such storage structures shall be removed when construction is complete.

.06 TEMPORARY SANITARY FACILITIES:

- a. General Contractor shall provide and maintain field toilet(s) as necessary for use of all workers and in sufficient numbers for each sex. These shall be located where expedient and maintained in strict sanitary condition.
- b. Remove all temporary toilet facilities when they are no longer needed. Permanent fixtures may not be used by construction personnel without Architect/Engineer and Owner approval.

.07 ENCLOSURES:

Furnish, install and maintain for the duration of construction all required scaffolds, tarpaulins, barricades, canopies, warning signs, steps, bridges, platforms, safety nets and all other temporary construction or devices necessary for proper completion of the Work in compliance with all safety and other regulations.

.08 ACCESS ROADS AND PARKING AREAS:

- a. The General Contractor, in strict accordance with all regulations governing use of site, will provide and maintain access to the work site.
- b. The General Contractor shall provide and maintain access to the building by placing sufficient gravel (minimum 4 inches) over the access to this area to allow for all-weather uninterrupted use, to include snow removal.

.09 WASTE REMOVAL

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

.10 MAINTENANCE AND REMOVAL:

Maintain all temporary facilities and controls as long as needed for the safe and proper completion of the Work. Remove all such temporary facilities and controls as rapidly as progress of the Work will permit, or as directed by the Architect/Engineer. Restore permanent facilities used during construction to specified condition.

.11 LAND AND RIGHTS-OF-WAY:

The Owner shall furnish all land and rights-of-way required for completion of all construction under this Contract. The Contractor shall not enter onto private property during the completion of this Contract. If the Contractor requires additional area over and above the rights-of-way and easements as shown on the plans, he shall make these arrangements at his own expense. If such additional areas are acquired by the Contractor for his use, the Owner will in no way be responsible for any accidents or claims arising out of such arrangement.

END OF SECTION 01 5000

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.01 SECTION INCLUDES

- a. Scope of Work.
- b. Product Handling.
- c. Substitutions.
- d. Samples.
- e. Colors.
- f. Maintenance Materials, Including Extra Materials, Spare Parts, Tools, and Software.
- g. Product Warranties.

.02 SCOPE OF WORK:

- a. Wherever possible throughout the contract documents, the minimum acceptable quality of workmanship and material has been defined by manufacturer's name and catalog number or by reference to recognized industry standards.
- b. To ensure that the specified products are furnished and installed in accordance with design intent, procedures have been established for advance submittal of design data and for its review and approval or rejection by the Architect/Engineer.
- c. Related Work Described Elsewhere:
 - (1) Contractual requirements for submittals: General Conditions of the Contract for Construction (AIA Document A201).
 - (2) Individual submittals required: Pertinent sections of these specifications.

.03 PRODUCT HANDLING:

Make all submittals of Shop Drawings, samples, requests for substitutions, and other items in strict accordance with the provisions of this section of these specifications.

.04 SUBSTITUTIONS:

- a. Prior Approval Required:
 - (1) The Contract is based on the material and methods described in the Contract Documents. The material and products described in the bidding documents establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution.

- (2) No substitution will be considered unless written request for approval has been received by the Architect/Engineer at least **ten (10) days** prior to the date of receipt of Bids. Such requests shall include the name of the material for which it is to be substituted and a complete description of the proposed substitution including drawings, performance and test data, and other information necessary for an evaluation. A statement setting forth changes in other materials or other portions of the work including changes in the work of other contracts that incorporation of the proposed substitution would require shall be included. The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect/Engineer's decision of approval or disapproval of a proposed substitution shall be final.
 - (3) Those requesting Architect/Engineer consideration of their products "equals" shall make such request in electronic PDF format providing space for Architect/Engineer approval and/or comments on each item requested. An electronic PDF copy of the request form, with Architect/Engineer action on same, will be returned to the proposer.
 - (4) If the Architect/Engineer approves a proposed substitution prior to receipt of Bids, such approval will be set forth in an Addendum. Bidders shall not rely upon approvals made in any other manner.
 - (5) No substitutions will be considered after the Contract award unless specifically provided in the Contract Documents. Under no condition shall Bids be submitted on work or materials not approved by the Architect/Engineer for this specific project, even though approval might have been given on other projects previously.
- b. Or Equal:
- (1) Where the phrase "or equal" or "or approved equal" or "or equal as approved by the Architect/Engineer" occurs in the Contract Documents, do not assume that material, equipment, or methods will be approved as equal by the Architect/Engineer unless the item has been specifically approved for this work by the Architect/Engineer in electronic PDF format prior to receipt of Bids by Addendum, all in accordance with procedure outlined in above paragraph .04a "Prior Approval Required".
 - (2) The decision of the Architect/Engineer shall be final.
- c. Availability of Specified Items:
- (1) Verify, prior to bidding, that all specified items will be available in time for installation during orderly and timely progress of the work.
 - (2) In the event specified item or items will not be available, so notify the Architect/Engineer prior to receipt of bids.
 - (3) Costs of delays because of non-availability of specified items, when such delays could have been avoided by the Contractor, will be back charged as necessary and shall not be borne by the Owner.

.05 SAMPLES:

- a. Accuracy of Sample: Unless otherwise specifically directed by the Architect/Engineer, all samples shall be of the precise article proposed to be furnished and shall illustrate the functional and aesthetic characteristics of the product.
- b. Number of Samples Required: Submit all samples in the quantity which is required to be returned plus three (3) which will be retained by the Architect/Engineer.

.06 COLORS:

- a. General: Unless the precise color and pattern is specifically described in the Contract Documents, whenever a choice of color or pattern is available in a specified product, submit accurate color charts and pattern charts from the full range of manufacturer's standards to the Architect/Engineer for his review and selection.
- b. Comparative Analysis: Unless all available colors and patterns have identical costs and identical wearing capabilities, and are identically suited for the installation, completely describe the relative costs and capabilities of each.

.07 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.

.08 PRODUCT WARRANTIES:

- a. The date of Substantial Completion of the project is also date of commencement of applicable warranties required by contract documents.
- b. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within ten (10) days after acceptance, listing date of acceptance as start of warranty period.
- c. Submit warranty information. See Specification Section 01 7800.

END OF SECTION 01 6000

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.01 SECTION INCLUDES

- a. Scope of Work.
- b. Cutting and Patching.
- c. Protection of Installed Work.
- d. Workmanship.
- e. Starting of Systems and Equipment.
- f. General Operating and Maintenance Instruction.
- g. Cleaning Materials and Equipment.
- h. Progress Cleaning and Protection.
- i. Final Cleaning and Protection.
- j. Closeout Description.
- k. Closeout Procedures.
- l. Final Payment.

.02 SCOPE OF WORK:

- a. Throughout the construction period, maintain the site in a standard of cleanliness as described in this Section.
- b. In addition to standards described in this Section, comply with requirements for cleaning as described in pertinent other sections of these specifications.
- c. Hazardous Materials: After Lead Abatement is complete, it is not expected that hazardous materials will be encountered in the Work. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- d. Prior to requesting inspection by the Architect/Engineer, use adequate means to assure that the Work is completed in accordance with the specified requirements and is ready for the requested inspection.

.03 CUTTING AND PATCHING:

- a. Contractors shall be responsible to 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.
- b. Whenever possible, execute the work by methods that avoid cutting or patching.
- c. 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.
- d. 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 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.
- e. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- f. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- g. Restore work with new products in accordance with requirements of Contract Documents.
- h. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- i. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material to full thickness of the penetrated element.

j. Patching:

- (1) Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- (2) 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.
- (3) Match color, texture, and appearance.
- (4) 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.

.04 PROTECTION OF INSTALLED WORK:

a. Contractors shall be responsible to Protect installed work from damage by construction operations.

- (1) Provide special protection where specified in individual specification sections.
- (2) Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- (3) Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- (4) Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- (5) 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.
- (6) Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

.05 WORKMANSHIP:

a. Manufacturer's printed instructions covering details of installation shall be followed where not in conflict with these specifications. If there is a conflict, notify the Architect/Engineer and obtain his approval before proceeding.

b. Completed work shall be left plumb, level, true to line or plane, anchored securely in place, and free from damage.

c. Unless otherwise called for, all pieces of material shall be as large a stock size as is in conformity with standard good practice of the trade.

d. Except where in conflict with these specifications, current manufacturers' printed specifications of herein specified proprietary products are made part of these specifications.

.06 STARTING OF SYSTEMS AND EQUIPMENT

a. Coordinate schedule for start-up of various equipment and systems.

b. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

c. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

d. Verify that wiring and support components for equipment are complete and tested.

.07 GENERAL OPERATING AND MAINTENANCE INSTRUCTION:

a. Respective Contractors shall arrange for each installer of operating equipment and other work that requires operational instruction and/or regular or continuing maintenance, to meet at the site with the Owner's personnel to provide necessary basic instruction in the proper operation and maintenance of the entire work. Such arrangements must be coordinated well in advance with the Owner, Architect, and respective Engineer.

b. Where installers are not experienced in the required procedures, include instructions by manufacturer's representatives.

c. As part of this instruction, provide a detailed review of the following items:

- (1) Maintenance manuals.
- (2) Record documents.
- (3) Tools.
- (4) Spare parts and materials.
- (5) Lubricants.
- (6) Fuels.
- (7) Identification systems.
- (8) Control sequences.

- (9) Hazards.
- (10) Cleaning.
- (11) Warranties, bonds, maintenance agreements and similar continuing commitments.
- d. As part of this instruction for operating equipment, demonstrate the following procedures:
 - (1) Start-up.
 - (2) Shut-down.
 - (3) Emergency operations.
 - (4) Noise and vibration adjustments.
 - (5) Safety procedures.
 - (6) Economy and efficiency adjustments.
 - (7) Effective energy utilization.
- e. Contractors shall also comply with specific requirements as discussed in other sections of these specifications.

.08 CLEANING MATERIALS AND EQUIPMENT:

- a. Provide required personnel, equipment and material needed to maintain the specified standard of cleanliness.
- b. Use only the cleaning materials and equipment which are compatible with the surface being cleaned as recommended by the manufacturer of the material.

.09 PROGRESS CLEANING AND PROTECTION:

- a. Conduct daily inspection, and more often if necessary, to verify that requirements for cleanliness are being met.
- b. In addition to the standards described in this Section, comply with pertinent requirements of governmental agencies having jurisdiction.
- c. General:
 - (1) Retain stored items in an orderly arrangement allowing maximum access, not impeding traffic or drainage and providing required protection of material.

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- (2) Do not allow accumulation of scrap, debris, waste material and other items not required for construction of this Work.
 - (3) At least once each week, and more often if necessary, completely remove all scrap, debris and waste material from the job site.
 - (4) Provide adequate storage for all items awaiting removal from the job site, observing requirements for fire protection and protection of the ecology.
- d. Site:
- (1) Daily, and more often if necessary, inspect the site and pick up all scrap, debris and waste material. Remove such items to the place designated for their storage.
 - (2) Weekly, and more often if necessary, inspect all arrangement of material stored on the site. Restack, tidy, or otherwise service arrangements to meet the requirements of subparagraph .04.a.(1) above.
 - (3) Maintain the site in a neat and orderly condition at all times. Weekly, and more often if necessary, remove waste materials, debris and rubbish from site and dispose of in an acceptable manner.
- e. Building:
- (1) Daily, and more often if necessary, inspect the structure and pick up all scrap, debris and waste material. Remove such items to the place designated for their storage.
 - (2) Weekly, and more often if necessary, sweep interior spaces clean. "Clean", for the purpose of this subparagraph, shall be interpreted as meaning free from dust and other material capable of being removed by use of reasonable effort and hand-held broom.
 - (3) As required, preparatory to installation of succeeding material, clean the structure or pertinent portions to the degree of cleanliness recommended by the manufacturer of the succeeding material, using equipment and material required to achieve the necessary cleanliness.
 - (4) Remove debris and rubbish from pipe chases, plenums, crawl spaces, and other closed and remote spaces prior to enclosing the space.
 - (5) Following the installation of floor materials, clean the floor daily (and more often if necessary) at all times while work is being performed in the space in which installed. "Clean", for the purpose of this subparagraph, shall be interpreted as meaning free from foreign material which, in the opinion of the Architect/Engineer, may be injurious to the floor material.
- f. Architect/Engineer shall be sole judge as to cleaning responsibility in case of dispute.

.10 FINAL CLEANING AND PROTECTION:

a. The Contractor shall have overall responsibility for all final cleaning requirements unless otherwise specifically indicated.

b. "Clean", for the purpose of this Article, and except as may be specifically provided otherwise, shall be interpreted as meaning the level of cleanliness generally provided by skilled cleaners using commercial quality building maintenance equipment and material. Comply with all manufacturer's instructions/recommendations regarding cleaning operations.

c. Prior to completion of the Work, Contractor shall remove from the job site all tools, surplus material, equipment, scrap, debris and waste; and conduct final progress cleaning as described in paragraph .04 above.

d. Site:

- (1) Unless otherwise specifically directed by the Architect/Engineer, broom clean paved areas on the site and public paved areas adjacent to the site.
- (2) Completely remove resultant debris.
- (3) Rake grounds that are neither paved nor planted, to a smooth, even-textured surface.
- (4) Concrete: Remove all rough surfaces resulting from form marks, ties, patching, etc. Fill large voids and where surface is to be coated with a separate finish material, fill all voids including air pockets, etc. Fill material to be of type best suited to job condition and as approved by the Engineer.

e. Building:

(1) Exterior:

- (a) Visually inspect exterior surfaces and remove all traces of soil, waste material, smudges and other foreign matter.
- (b) Remove all traces of splashed material from adjacent surfaces.
- (c) If necessary to achieve a uniform degree of cleanliness, hose down the exterior of the structure.
- (d) In the event of stubborn stains not removable with water, the Owner Representative may require light sandblasting or other cleaning at no additional cost to the Owner.

(2) Interior:

- (a) Visually inspect interior surfaces and remove all traces of soil, waste material, smudges, and other foreign matter.

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- (b) Remove all traces of splashed material from adjacent surfaces.
 - (c) Remove spots, stains, films, dust, dirt, and similar noticeable distracting substances from finished surfaces.
 - (d) Restore reflective surfaces to original reflective condition.
 - (e) Leave concrete floors broom clean.
 - (f) Remove labels which are not required as permanent labels.
- (3) Concrete: Remove all rough surfaces resulting from form marks, ties, patching, etc. Fill large voids and, where surface is to be coated with a separate finish material, fill all voids including air pockets, etc. Fill material to be of type best suited to job condition and as approved by the Architect/Engineer.
- (4) Masonry: Check that all mortar joints are hard, dense and true surfaces. Touch up voids in mortar and tool to match original. Dampen adjacent area prior to filling. Cut off excess mortar, point up around other materials, rub off over-run of mortar from tooling process to prevent any shadow line after painting. Fill any voids in masonry with a dry mix of same material as original masonry, dampen sufficiently to make bond and achieve set and hand tamp into place. Do not patch concrete block with mortar. Vacuum all surfaces before and after painting to remove dust.
- (5) Painted and Decorated Work: Remove all foreign marks, stains, fingerprints, scuffs and other soil or dirt. If paint surface appearance is altered by cleaning process, refinish spot or area as required to match with overall adjacent surface. Vacuum or wipe down all surfaces to remove dust just prior to Owner occupancy.
- (6) Hardware: Remove all stains, paint, fingerprints and other foreign matter; wash and polish to original finish. If any factory applied lacquer is damaged by job materials resulting in a permanent stain, hardware item must be replaced at General Contractor's expense.
- (7) Glass and Tile: Remove all putty, mortar, paint, fingermarks and other foreign surface blemishes; wash clean and polish. Replace chipped, damaged or broken glass.
- (8) Epoxy Flooring: General Contractor shall clean all epoxy surfacing to a sanitary condition.
- (9) Building Equipment: General Contractor shall wipe surfaces of all General Contractor installed building equipment clean, including all accessible interior spaces. Remove excess lubrication and other substances.
- (10) Mechanical and Electrical Equipment: Respective Mechanical and Electrical Contractors shall wipe surfaces of mechanical and electrical equipment clean,

including all accessible interior spaces. Remove excess lubrication and other substances.

- (11) Plumbing Fixtures: Mechanical Contractor shall clean all plumbing fixtures to a sanitary condition.
 - (12) Light Fixtures: Electrical Contractor shall clean all light fixtures and lamps. Replace lamps as necessary.
 - (13) Ventilation Systems: Mechanical Contractor is to clean out any debris in ductwork and vacuum entire duct system prior to final inspection. Clean ventilating units and replace any soiled filter elements.
 - (14) Mechanical Rooms: Mechanical Contractor shall sweep and vacuum debris and dust from all such spaces just prior to final inspection.
 - (15) Electrical Rooms: Electrical Contractor shall sweep and vacuum debris and dust from all such spaces just prior to final inspection.
 - (16) Special Areas: Where any portion of completed building was used for shop, storage, material preparation, etc., the respective Contractor must restore all material to original condition. If surface is not scheduled for any applied finish, stains must be completely removed or surface must be finished at respective Contractor's expense and as directed by Architect. Any scheduled unfinished concrete floors that are patched or leveled, resulting in unmatched appearance, must be finished at General Contractor's expense and as directed by Architect.
- f. Schedule final cleaning as approved by the Architect/Engineer to enable the Owner to accept a completely clean Work.
- g. Architect/Engineer shall be sole judge as to final cleaning responsibilities in case of dispute.

.11 CLOSEOUT DESCRIPTION:

Closeout is hereby defined to include general requirements of respective Prime Contractors near the end of Contract Time in preparation for final acceptance, final payment, normal termination of contract, occupancy by Owner, and similar actions evidencing completion of the Work. Specific requirements for individual units of work are specified in relative sections of these specifications. Time of closeout is directly related to "Substantial Completion" and, therefore, may be either a single time period for entire work or a series of time periods for individual parts of the work which have been certified as substantially complete at different dates. That time variation shall be applicable to other provisions of this section.

.12 CLOSEOUT PROCEDURES:

a. Substantial Completion:

- (1) Contractor will submit a written request to the Architect/Engineer along with a list of ALL items to be completed and/or corrected.
- (2) Within a reasonable time after receipt of the list, the Architect/Engineer will either proceed with inspection or advise Contractor of prerequisites not fulfilled.
- (3) Following the initial inspection, should the Architect/Engineer determine that the Work is not substantially complete:
 - (a) The Architect/Engineer will promptly notify the Contractor, in writing, giving the reasons therefore.
 - (b) The Contractor will remedy the deficiencies and notify the Architect/ Engineer when ready for reinspection.
 - (c) The Architect/Engineer will reinspect the Work when assured that the work has been substantially completed.
- (4) When the Architect/Engineer concurs that the Work is substantially complete:
 - (a) The Owner will prepare a "Certificate of Substantial Completion" on AIA Document G704, accompanied by the Architect/Engineer's final inspection report and submit to all parties concerned for their written acceptance of the responsibilities assigned to them in the Certificate.
- (5) Certificate of Substantial Completion will identify initial "punchlist" for final acceptance.
- (6) Deliver tools, spare parts, extra stocks of materials and similar physical items to Owner.
- (7) Complete start-up testing of systems and instructions of Owner's operating/maintenance personnel.
- (8) Complete final cleaning-up requirements, including touch-up, repair and/or restoration of marred surfaces. See Paragraph .10.
- (9) Discontinue (or change over) and remove from project site temporary facilities and services, along with construction tools and facilities and similar elements.

b. Contractors shall also comply with specific requirements as discussed in other sections of these specifications.

c. Final Completion:

- (1) Prior to requesting Architect/Engineer's final re-inspection for certification of final acceptance, assure that all items on Architect/Engineer's final "punchlist" have been completed, corrected, or otherwise resolved for acceptance.
- (2) Submit copy of Architect/Engineer's final punchlist of itemized work to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance.
- (3) Certify that:
 - (a) Contract Documents have been reviewed.
 - (b) Work has been inspected for compliance with the Contract Documents.
 - (c) Work has been completed in accordance with the Contract Documents.
 - (d) Work is completed and ready for final inspection.
- (4) The Architect/Engineer will make an inspection to verify status of completion.
- (5) Should the Architect/Engineer determine that the Work is incomplete or defective:
 - (a) The Architect/Engineer will promptly notify the Contractor, in writing, listing the incomplete or defective work.
 - (b) The Contractor shall remedy the deficiencies promptly, and notify the Architect/Engineer when ready for inspection.
- (6) When the Architect/Engineer determines that the Work is acceptable under the Contract Documents, he will request the Contractor to make closeout submittals.

.13 FINAL PAYMENT:

Neither the final payment nor the remaining retained percentage shall become due until Contractor completes all the above requirements of this specification section.

END OF SECTION 01 7000

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.01 SECTION INCLUDES

- a. Scope of Work.
- b. Manuals.
- c. Project Record Documents.
- c. Operation and Maintenance Data.
- d. Warranties.

.02 SCOPE OF WORK:

- a. Closeout Submittals and Actions: Closeout submittals and actions include, but are not necessarily limited to:
 - (1) All items specifically required under Paragraph 9.10.6 of the General Conditions of the Contract for Construction (AIA Document A201).
 - (2) Evidence of final, continuing insurance coverage complying with insurance requirements. Include certificate of insurance for products and completed operations where required. Advise Owner of pending insurance change-over requirements.
 - (3) Final liquidated damages settlement statement (if any), acceptable to Owner.
 - (4) Specific warranties, workmanship/maintenance bonds, maintenance agreements, final certifications and similar documents.
 - (5) Evidence of compliance with requirements of governmental agencies having jurisdiction for Certificates of Inspection. Obtain and submit release enabling Owner's full and unrestricted use of the work and access to services and utilities.
 - (6) Submit maintenance manuals and similar final record information. See Specification Section 01 7000.
- b. Contractors shall also comply with specific requirements as discussed in other sections of these specifications.

.03 MANUALS:

- a. General: Unless otherwise specifically directed by the Architect/Engineer elsewhere in the specifications, prepare all required manuals covering items included in this work in accordance with the following:

- (1) Operation and maintenance data shall be submitted electronically in PDF format on Read/Write (R/W) Compact Disks (CDs) formatted to allow the data to be read and copied to and from the CD. Each CD and its case shall be professionally labeled with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of CD.
 - (a) Provide a file folder containing a master index at beginning of each CD's electronic manual file structure showing items included. The CD shall be subdivided with file folders and subfolders logically organized and labeled to allow ease of access to the data.
 - (b) First section of each respective Contractors CD shall consist of directory listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, subcontractors, and major equipment suppliers.
 - (c) Provide file folders/subfolders for each type of equipment arranged in order similar to the specifications. All sections shall be clearly labeled on the CD. At beginning of each section provide suppliers name, address and phone numbers.
- (2) Descriptive Literature:
 - (a) Include descriptive literature (manufacturer's catalog and data) of each manufactured item. Literature shall show capacities and size of equipment used and be marked indicating each specific item with applicable data underlined.
 - (b) Copy of the approved Shop Drawing(s) with all data concerning changes made during construction.
- (3) Operating instructions shall include step by step procedure to follow in putting each piece of equipment into operation.
- (4) Maintenance instructions shall include:
 - (a) Manufacturer's maintenance instructions for each piece of equipment installed in project. Instructions shall include installation instructions, parts numbers and lists, operation instructions of equipment, name of vendor, and maintenance and lubrication instructions.
 - (b) Summary list of equipment requiring lubrication showing name of equipment, location, and type and frequency of lubrication.
 - (c) List of equipment used indicating name, model, serial number, and nameplate of each item together with number and name associated with each system item.
 - (d) Test run reports if applicable/required.

- b. Extraneous Data: Where contents of the electronic manuals include manufacturer's catalog pages, clearly indicate the precise items included in this installation and delete, or otherwise clearly indicate, all manufacturer's data with which this installation is not concerned.
- c. Safety Data Sheets: Any materials installed that have an associated Safety Data Sheet (SDS) shall be included in the maintenance manuals under a separate tab.
- d. Number of Copies Required: The Contractor shall provide one copy of their electronic maintenance manual to the Architect/Engineer for review. Unless otherwise specifically directed by the Architect/Engineer, each Contractor shall deliver three (3) approved CDs to the Architect/Engineer before final inspection.

.04 PROJECT RECORD DOCUMENTS:

a. General:

- (1) Specific requirements for record documents are indicated in individual sections of these specifications. Other requirements are indicated in the General Conditions. General submittal requirements are indicated in the various "submittals" sections.
 - (2) Maintain on site, one set of the following record documents and record actual revisions to the Work:
 - (a) Contract Drawings.
 - (b) Specifications.
 - (c) Addenda.
 - (d) Change Orders and other Modifications to the Contract.
 - (e) Reviewed shop drawings, product data, and samples.
 - (3) Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Architect/Engineer's reference during normal working hours.
- b. Record Drawings: The Contractor shall maintain a record set of blue line white-prints of contract drawings and shop drawings in clean, undamaged condition. All other subcontractors shall record work variations on the Contractor's record set. Mark-up the set of record documents to show the actual installation where the installed work varies from the work as originally shown. Mark whichever drawings are most capable of showing the actual "field" condition fully and accurately; however, where shop drawings are used for mark-up, record a cross reference at corresponding locations on the working drawings. Give particular attention to concealed work that would be difficult to measure and record at a later date.

- (1) Mark record set with red erasable pencil and, where feasible, use other colors to distinguish between variations in separate categories of work. Mark-up new information which is known to be important to the Owner but, for some reason, was not shown on either contract drawings or shop drawings.
 - (2) The Contractor shall, during the progress of the work, keep accurate data on locations and elevations of underground/concealed work so that he may prepare a survey containing the final exact elevations and locations of all such work, especially that work for which an elevation or dimensional location is indicated and/or specified within the plans and/or specifications.
 - (a) Measured depths of foundations in relation to finish main floor datum.
 - (b) Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - (c) Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - (d) Field changes of dimension and detail.
 - (e) Details not on original Contract Drawings.
 - (3) Note related change order numbers where applicable.
 - (4) Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates, and other identification on the cover of each set. Submit to Architect/Engineer.
- c. Record Specifications:
- (1) Legibly mark and record at each Product section description of actual Products installed, including the following:
 - (a) Manufacturer's name and product model and number.
 - (b) Product substitutions or alternates utilized.
 - (c) Changes made by Addenda and Modifications.
 - (2) Upon completion of mark-up, submit a complete record specification to Architect/Engineer for Owner's records.
- d. Record Product Data:
- (1) Maintain one copy of each product data submittal. Mark these documents to show variations in the actual work performed in comparison with the submitted information.

Include both variations in the products as delivered to the site, and variations from manufacturer's instructions and recommendations for installation. Give particular attention to concealed products and portions of the work which cannot otherwise be readily discerned at a later date by direct observation. Note related change orders and mark-up of record drawings and specifications.

- (2) Upon completion of mark-up, submit complete set of record product data to the Architect/Engineer for the Owner's records.
- e. Miscellaneous Record Submittals: Refer to other sections of these specifications for requirements of miscellaneous record-keeping and submittals in connection with the actual performance of the work. Immediately prior to the date or dates of substantial completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the Architect/Engineer for the Owner's records.

.05 WARRANTIES:

- a. The date of Substantial Completion of the project is also date of commencement of applicable warranties required by contract documents.
- b. Provide duplicate notarized copies.
- c. Execute and assemble documents from subcontractors, suppliers, and manufacturers.
- d. Provide Table of Contents and assemble in three (3) ring binder with durable plastic cover.
- e. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within ten (10) days after acceptance, listing date of acceptance as start of warranty period.

END OF SECTION 01 7800

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SECTION 02 2300
EARTHWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Excavating, filling, backfilling, and compacting below grade, and slab-on-grade.
- B. Testing: Refer to Section 01 4000 – Testing and Laboratory Services.

1.02 SUBMITTALS

- A. See Section 01 3000 – Administrative Requirements, for submittal procedures.

1.03 QUALITY ASSURANCE

- A. Installer Qualifications: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.04 PROJECT CONDITIONS

- A. Work Included:
In general terms, the following work is included in this section.
 - 1. Remove existing topsoil.
 - 2. Excavate for slabs as shown on the drawings.
 - 3. Rough grade site as indicated on the site plans. Preparation of subgrades for slabs on grade, walls, lawns, planting beds, transformer pads, etc.
 - 4. See plan for additional notes.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Backfill and fill materials shall conform to the following except as specifically indicated otherwise on the drawings.
 - 1. Backfilling (outside walls) and subgrading: Earth Material which is free of debris, roots, wood, or other deleterious materials. Clean, excavated materials may be used.
 - 2. Coarse Aggregate Class 5: Course aggregate, conforming to State of ND Highway Department Class 5 standard.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The contractor shall visit and examine the site and note all conditions thereon and shall take into consideration all such conditions as may affect this work.
- B. The contractor shall employ a competent land surveyor to establish lines and levels necessary to execute his phase of the work.
- C. The contractor shall protect any adjoining buildings and any adjoining property including sidewalks, gutters, pavements, trees, etc., from damage due to his operations. He shall repair any damage which he causes at the completion of his work or sooner if so directed by the Architect.
Notify local authorities having jurisdiction of existing damage in adjacent streets or improvements such as paving, curbs, gutters, sidewalks and alley surfacing, prior to start of demolition work. If damage to streets and improvements is discovered after work has commenced, and such damage was not reported before start of work, the Contractor will perform and pay for the necessary repairs.
- D. Barricades, warning lights, and signs, fences, and other items of protection shall be provided and maintained as required by regulations and safety rules during the execution of this work.

- E. The Contractor shall send proper notice, make the necessary arrangements, and perform all required services in the care and maintenance of all utilities including light poles and other items of this character which may be encountered during the work. The contractor shall assume full responsibility and pay the costs for such damage to these items.
- F. Provide erosion control measures to prevent erosion or displacement of soils and discharge of soil bearing water run off or airborne dust to adjacent properties and walkways.
- G. Strip topsoil as required.
- H. Excavate to lines and elevations as necessary for the proper construction of the work. Equipment and methods shall be suitable for the work at hand. Work shall conform to the following unless indicated otherwise on the drawings.
 - 1. Sides of building excavations shall be at least 12" from outside construction lines.
 - 2. Excavated material suitable for backfilling and grading shall be separated from unsuitable material.
 - 3. Excavated material unsuitable or not required for backfilling and grading shall be removed from the site at the contractor's expense.
 - 4. Boulders over 6" in length, if apparent, shall be removed from subgrade of cut areas.
 - 5. Remove rocks, walls, floors, footings, piers, and other obstructions to depths of 6" below all new construction and 12" below subgrade in all other areas.
 - 6. Support banks of excavations where necessary to protect persons and property with suitable combinations of shoring, sheet piling, bracing, etc.
 - 7. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding project site and surrounding area. This contractor shall be responsible for water accumulation in the excavation resulting from rain, snow or site drainage.
 - 8. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
 - a. 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.
 - b. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.
- I. Trenches and all other portions of the work shall be kept free from standing water. Wherever the bottom of the excavations have become saturated with water, loose and wet dirt shall be removed just before rebar is placed and concrete is poured.
- J. Protect earth walls in such a manner that earth will not be permitted to fall into concrete.
- K. Backfill to bring the surface of the earth to the proper elevations in the various locations as indicated on the drawings. Backfilling should not proceed until the completion of the following:
 - 1. Testing and approval of all imported or select on-site fill materials.
 - 2. Acceptance of construction below finish grade.
 - 3. Inspection, testing, approval and recording of locations of underground utilities.
 - 4. Removal of concrete formwork.
 - 5. Removal of shoring and bracing and backfilling of voids with satisfactory materials.
 - 6. Removal of trash and debris.
 - 7. Testing and certification of subgrades to receive fill, subbase or base course.
- L. Backfilling / Filling Procedures: Support walls laterally as required to prevent displacement. Protect walls, waterproofing, dampproofing, drains and all underground piping utilities and structures.
 - 1. Commence filling at lowest portion of building or fill area, distributing fill uniformly in horizontal layers, over approved compacted subsoil. For compaction areas using heavy equipment, provide

successive lifts of 9" maximum loose thickness in all areas which are not shown as lawn areas. For compaction areas using light weight equipment (e.g. - "whacker"), use maximum loose thickness of 4". Obtain near optimum moisture content and compact by appropriate methods for the type and location of material being compacted. Bring fill to levels and elevations required. Provide testing of each successive lift in conformance with Compaction Requirements Schedule. Do not place fill on unsuitable material as defined, insufficiently compacted material, snow, ice, mud or frozen material.

2. Place fill in maximum lifts of 12 in. in lawn areas.
3. Do not operate heavy equipment closer to wall than a distance equal to height of backfill above bottom of footing.
4. Construct fills on subgrade surfaces steeper than one vertical to four horizontal, by plowing, stepping, benching or breaking up, as directed, to bond fill with existing slope.

M. Placement of Aggregate Fill:

1. Place aggregate in maximum 6 inch layers, roller compact to 95 percent of maximum dry density.
2. Level and contour surfaces to elevations and gradients indicated.
3. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.
4. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.
5. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

N. Unusable or excess stripped topsoil and excavated materials shall be removed from the site.

O. Seeding, Mulching, and Fertilizer

1. Soil shall be moist when seeding. Apply seed uniformly at a specified rate for the mix.
2. Apply fertilizer in accordance with manufacturer's instructions.

P. Lawn Irrigation

1. Verify the location of the existing lawn irrigation system and revise as required for the new sitework that is being done as a part of this project. The lawn irrigation system is to be functional after this project is complete, so the contractor is required to make any revisions to the lawn irrigation system where there is sitework being done for this project to make it operational again. Sprinkler heads and piping are to be removed where new paving is being installed. Care needs to be taken to protect irrigation lines that need to remain.

END OF SECTION

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SECTION 02 4100 DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED REQUIREMENTS

- A. Section 01 1100 - Summary of Work: Limitations on the Contractor's use of site and premises.
- B. Section 01 5000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- C. Section 01 7000 - Execution and Closeout Requirements: Project conditions and existing construction to remain; reinstallation of removed products.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Temporary Enclosures: May consist of sound salvage material free of nails, splinters and sharp points. Provide a secure temporary enclosure at new overhead door opening to be used during lead abatement and construction until new overhead garage door is installed.

PART 3 EXECUTION

3.01 SCOPE

- A. Remove items indicated, for salvage, relocation or recycling as indicated on the drawings.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 - 1. Provide, erect, and maintain temporary barriers and security devices.
 - 2. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
 - 3. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 - 4. 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.
 - 5. 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 the Owner.
- C. Protect existing structures and other elements that are not to be removed.
- D. Minimize production of dust due to demolition operations; contain dust to areas where demolition is occurring.
- E. If hazardous materials are discovered during removal operations, stop work and notify the Architect and the Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

3.03 EXISTING UTILITIES

- A. Protect existing utilities to remain from damage.
- B. Do not disrupt public utilities without permit from authority having jurisdiction.
- C. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to the Owner.
- D. 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 the Owner.

- E. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 - 1. Verify that construction and utility arrangements are as shown.
 - 2. Report discrepancies to the Architect before disturbing existing installation.
 - 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Separate areas in which demolition is being conducted from other areas that are still occupied.
 - 1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 5000 as necessary.
- C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
- D. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove rotted wood, corroded metals and replace with new construction specified.
 - 2. Remove items indicated on drawings.
- E. 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 that are to remain in operation; maintain access to equipment and operational components.
 - 2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 - 3. See Section 01 1100 for other limitations on outages and required notifications.
 - 4. Verify that abandoned services serve only abandoned facilities before removal.
 - 5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.
- F. Protect existing work to remain.
 - 1. Prevent movement of structure; provide shoring and bracing if necessary.
 - 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 - 3. Repair adjacent construction and finishes damaged during removal work.
 - 4. Patch as specified for patching new work.

3.05 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Remove from site all materials not to be reused on site.
- C. Leave site in clean condition, ready for subsequent work.
- D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 02 8300 - LEAD ABATEMENT

PART 1 GENERAL

1.01 Scope of Work

The work consists of cleaning lead contaminated dust from within the Firing range (164), adjacent rooms (159, 160, 161, 162, 163, 165, 166, 166A, 167, 168, 169, 170), and cleaning of HVAC and electrical equipment located in rooms 166, 166A, 167, 168, and 170. The mezzanine areas above rooms 166, 166A and 170 are also included in the scope of work. All surfaces within the firing range and adjacent rooms are to be cleaned including but not limited to floors, walls, ceilings, piping, electrical equipment and exposed ductwork. All impacted surfaces have been tested for asbestos; no asbestos was found. The cleaning and encapsulation methods will comply and be coordinated with the installation of the future materials (e.g. epoxy floor etc.).

The bullet trap, shooting stands, and the ceiling tiles have been removed during the initial decommissioning and cleaning of the firing range. The ceiling tile grid remains in approximately ¼ of the room (far east end) in the firing range (164).

The bullet trap AHU and ductwork are no longer present in the shooting range (room 164). The lights remain along with one fourth of the grid in the far east end (the lay in ceiling tiles are all removed). The current lead dust levels range from less than (<)2.9 micrograms per square foot ($\mu\text{g}/\text{ft}^2$) to 6,000 $\mu\text{g}/\text{ft}^2$ in the firing range. Most of the floors in the firing range (164) were under 100 $\mu\text{g}/\text{ft}^2$. However, one floor sample was at 760 $\mu\text{g}/\text{ft}^2$. In addition, the ceiling in the firing range (164) ranged from <4.6 $\mu\text{g}/\text{ft}^2$ to 6,000 $\mu\text{g}/\text{ft}^2$. In room 167 (Boiler East Mezzanine), the lead levels on the floor were measured at 550 $\mu\text{g}/\text{ft}^2$ to 2300 $\mu\text{g}/\text{ft}^2$.

The adjacent rooms to be cleaned include 159 (hallway and entry), 169 (hallway), 160, 161, 162, 163, 165, 166, 166A, 167, 168, 170. The mezzanine areas above 166, 166A and 170 are also included in the scope of work and are required to be cleaned as well. Floor, wall and ceiling lead dust levels range from <2.9 $\mu\text{g}/\text{ft}^2$ to 210 $\mu\text{g}/\text{ft}^2$ in the remaining rooms.

TABLE 1 – LEAD DUST SAMPLING RESULTS **April 22/23, 2026**

Sample Number	Sample Location	Surface Type	Surface Comment	Sampling Area	Clearance Level $\mu\text{g}/\text{ft}^2$	Lab Analysis $\mu\text{g}/\text{ft}^2$
1	Firing Range 164 By Entry Door to 162	Floor	Concrete	20" x 20"	5	40
2	Firing Range 164/161 Middle	Floor	Concrete	20" x 20"	5	53
3	Firing Range 164 Northeast Corner behind Firing Line	Floor	Concrete	20" x 20"	5	33

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4	Firing Range 164 Southeast Corner behind Firing Line	Floor	Concrete	20" x 20"	5	13
5	Firing Range 164 Southeast Corner in front of Firing Line	Floor	Concrete	20" x 20"	5	21
6	Firing Range 164 Northeast Corner in front of Firing Line	Floor	Concrete	20" x 20"	5	28
7	Firing Range 164 Middle	Floor	Concrete	20" x 20"	5	32
8	Firing Range 164 Northwest Corner before Trap	Floor	Concrete	20" x 20"	5	66
9	Firing Range 164 Southwest Corner before Trap	Floor	Concrete	20" x 20"	5	69
10	Firing Range 164 Southwest Corner behind Trap	Floor	White Painted Concrete	20" x 20"	5	59
11	Firing Range 164 Behind Trap	Floor	White Painted Concrete	20" x 20"	5	37
12	Firing Range 164 Far Northwest Corner by Small Door to 165	Floor	White Painted Concrete	20" x 20"	5	760
13	Firing Range 164 East Wall, Middle	Wall	CMU	20" x 20"	5	19
14	Firing Range 164 South Wall, East End behind Firing Line	Wall	Tan Painted CMU	20" x 20"	5	22
15	Firing Range 164 North Wall, East End behind Firing Line	Wall	Tan Painted CMU	20" x 20"	5	92
16	Firing Range 164 North Wall, East End in front of Firing Line	Wall	White Painted CMU	20" x 20"	5	3.6
17	Firing Range 164 South Wall, East End in front of Firing Line	Wall	White Painted CMU	20" x 20"	5	<2.9
18	Firing Range 164 South Wall, Middle	Wall	White Painted CMU	20" x 20"	5	<2.9
19	Firing Range 164 North Wall, Middle	Wall	White Painted CMU	20" x 20"	5	19

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20	Firing Range 164 North Wall, West End before Trap	Wall	White Painted CMU	20" x 20"	5	<2.9
21	Firing Range 164 South Wall, West End before Trap	Wall	White Painted CMU	20" x 20"	5	<2.9
22	Firing Range 164 South Wall, Far West End below Duct	Wall	White Painted CMU	20" x 20"	5	<2.9
23	Firing Range 164 North Wall, Far West End	Wall	White Painted CMU	20" x 20"	5	7.4
24	Firing Range 164 West Wall, Middle	Wall	White Painted CMU	20" x 20"	5	<2.9
25	Firing Range 164 East End, Middle behind Firing Line	Ceiling/Deck	Concrete	20" x 20"	5	4.6
26	Firing Range 164 North End after Firing Line	Ceiling/Deck	Concrete	20" x 20"	5	6.3
27	Firing Range 164 South Side, West End before Trap	Ceiling/Deck	Tan Painted Concrete	20" x 20"	5	48
28	Firing Range 164 Northwest Corner behind Trap	Ceiling/Deck	Tan Painted Concrete	20" x 20"	5	6000
29	Bathroom 160 Middle	Floor	Ceramic Floor Tile	20" x 20"	5	210
30	Bathroom 160 East Wall, Middle	Wall	Ceramic Floor Tile	20" x 20"	5	21
31	Room 162 Southeast Corner	Floor	12" Floor Tile	20" x 20"	5	23
32	Room 162 West End by Door to 163	Floor	12" Floor Tile	20" x 20"	5	36
33	Room 162 Middle of Countertop	Countertop	Vinyl	20" x 20"	5	18
34	Room 162 South Wall Windowsill	Sill	Metal	41" x 5"	5	5.6
35	Room 162 Middle	Ceiling/Deck	Concrete	20" x 20"	5	<2.9
36	Room 162 North Wall, Middle	Wall	Tan Painted CMU	20" x 20"	5	90
37	Room 162 South Wall, Middle	Wall	Tan Painted CMU	20" x 20"	5	26

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38	Room 163 East End, North Side	Floor	Concrete	20" x 20"	5	32
39	Room 163 Southwest Corner	Floor	Concrete	20" x 20"	5	52
40	Room 163 North Wall, East End	Wall	Tan Painted CMU	20" x 20"	5	41
41	Room 163 South Wall, West End	Wall	Tan Painted CMU	20" x 20"	5	23
42	Room 163 Middle	Ceiling/Deck	Concrete	20" x 20"	5	<2.9
43	Room 165 Southwest Corner below Small Door to 162	Floor	Concrete	20" x 20"	5	23
44	Room 165 Northeast Corner	Floor	Concrete	20" x 20"	5	39
45	Room 165 South Wall, West End	Wall	Tan Painted CMU	20" x 20"	5	16
46	Room 165 North Wall, Middle	Wall	Tan Painted CMU	20" x 20"	5	12
47	Room 165 Middle	Ceiling/Deck	Tan Painted Concrete	20" x 20"	5	24
48	Room 170 West End, Middle	Floor	Concrete	20" x 20"	5	3.5
49	Room 170 East End, Middle	Floor	Concrete	20" x 20"	5	<2.9
50	Room 170 North Wall, West End	Wall	Crème Painted CMU	20" x 20"	5	38
51	Room 170 East End, Metal Storage Shelf	Metal Shelf	Metal	20" x 20"	5	3.2
52	Room 168 North End, West Side	Floor	Concrete	20" x 20"	5	<2.9
53	Room 168 South End, West Side	Floor	Concrete	20" x 20"	5	<2.9
54	Room 168 West Wall, South End	Wall	Crème Painted CMU	20" x 20"	5	<2.9
55	Room 168 South Wall, Middle	Wall	Crème Painted CMU	20" x 20"	5	<2.9

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56	Room 167 Boiler Southwest Corner	Floor	Concrete	20" x 20"	5	<2.9
57	Room 167 Boiler South End, Middle by 3 Boilers	Floor	Concrete	20" x 20"	5	<2.9
58	Room 167 Boiler Middle, West End	Floor	Concrete	20" x 20"	5	3.4
59	Room 167 Boiler Northwest Corner	Floor	Concrete	20" x 20"	5	<2.9
60	Room 167 Boiler Northeast Corner	Floor	Concrete	20" x 20"	5	3.1
61	Room 167 Boiler North Wall, East End	Wall	Tan Painted CMU	20" x 20"	5	3.8
62	Room 167 Boiler East Wall, Middle	Wall	Tan Painted CMU	20" x 20"	5	17
63	Room 167 Boiler West Wall, North End	Wall	Tan Painted CMU	20" x 20"	5	7.9
64	Room 167 Boiler Sout End, Top Side of Middle Boiler	Top of Boiler	Metal	20" x 20"	5	17
65	Room 166 Electrical Southwest Corner	Floor	Concrete	20" x 20"	5	<2.9
66	Room 166 Electrical North End	Floor	Concrete	20" x 20"	5	<2.9
67	Room 166 Electrical West Wall, North End	Wall	Crème Painted CMU	20" x 20"	5	<2.9
68	Room 166 Electrical North Wall, Middle	Wall	Crème Painted CMU	20" x 20"	5	<2.9
69	Room 166 Electrical East End, Middle on Top of Switchboard	Top of Switchboard	Metal	20" x 20"	5	4.2
70	Room 166 Electrical West End, Middle	Ceiling	Metal Ceiling	20" x 20"	5	<2.9
71	Room 166A West End	Floor	12" Floor Tile	20" x 20"	5	4.8
72	Room 166A South Wall, West End	Wall	Crème Painted CMU	20" x 20"	5	<2.9
73	Room 166A West End, Middle	Ceiling	Metal Ceiling	18" x 22"	5	<2.9

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74	Room 167 Boiler East Mezzanine, North End, Middle	Floor	Concrete	20" x 20"	5	550
75	Room 167 Boiler East Mezzanine, Middle, North of AHU	Floor	Concrete	20" x 20"	5	2300
76	Room 167 Boiler East Mezzanine, Top of AHU	Top of AHU Unit	Metal	20" x 20"	5	12
77	Room 167 Boiler East Mezzanine, North Wall	Wall	Crème Painted CMU	20" x 20"	5	15
78	Room 167 Boiler East Mezzanine, East Wall	Wall	Crème Painted CMU	20" x 20"	5	37
79	Room 167 Boiler West Mezzanine, Northeast Corner	Floor	Concrete	20" x 20"	5	75
80	Room 167 Boiler West Mezzanine, Southwest Corner	Floor	Concrete	20" x 20"	5	19
81	Room 167 Boiler West Mezzanine, West Wall	Wall	Crème Painted CMU	20" x 20"	5	5.6
82	Room 167 Boiler West Mezzanine, Top of Unit AH-I	Top of AH-I	Metal	20" x 20"	5	4.6
83	Room 167 Boiler West Mezzanine, inside White Duct of AHU-9	Inside AHU-9	Metal	22" x 23"	5	25
84	Room 167 Boiler West Mezzanine, inside Lower Access Panel AHU-9	Inside AHU-9 at Filters	Metal	16" x 24"	5	6.3
85	Room 167 Boiler West Mezzanine, North End	Ceiling	Metal	20" x 20"	5	<2.9
86	Corridor outside Boiler 167 By Door to 167	Floor	12" Floor Tile	20" x 20"	5	<2.9
87	Corridor Outside Room 168	Floor	12" Floor Tile	20" x 20"	5	<2.9
88	Corridor 169 by Room 170 East End	Floor	12" Floor Tile	20" x 20"	5	<2.9
89	Corridor 169 by Room 170 East Wall	Wall	Brick	20" x 20"	5	<2.9
90	Corridor 169 Across from Room 170, West Wall	Wall	Brick	20" x 20"	5	<2.9

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91	Corridor by Door to Room 165	Floor	12" Floor Tile	20" x 20"	5	<2.9
92	Corridor by Door to Room 159	Floor	12" Floor Tile	20" x 20"	5	5.1
93	Corridor by Room 165 South Wall, West End	Wall	Brick	20" x 20"	5	13
94	Corridor by Room 165 South Wall, East End	Wall	Brick	20" x 20"	5	4.0
95	Corridor by Room 165 North Wall, West End	Wall	Brick	20" x 20"	5	<2.9
96	Corridor/Entry By Door to Room 162	Floor	12" Floor Tile	20" x 20"	5	<2.9
97	Corridor/Entry South Wall by Door to Room 162	Wall	Brick	20" x 20"	5	54
98	Corridor/Entry North Wall by Room 162	Wall	Brick	20" x 20"	5	33
99	Field Blank	N/A	N/A	N/A	5	<8.0 ug
100	Field Blank	N/A	N/A	N/A	5	<8.0 ug
101	Field Blank	N/A	N/A	N/A	5	<8.0 ug
102	Field Blank	N/A	N/A	N/A	5	<8.0 ug
103	Field Blank	N/A	N/A	N/A	5	<8.0 ug
104	Field Blank	N/A	N/A	N/A	5	<8.0 ug
105	Field Blank	N/A	N/A	N/A	5	<8.0 ug
106	Field Blank	N/A	N/A	N/A	5	<8.0 ug
107	Field Blank	N/A	N/A	N/A	5	<8.0 ug
108	Field Blank	N/A	N/A	N/A	5	<8.0 ug

The interior ductwork was only tested in one location (limited due to access restraints) in room 167 (boiler west mezzanine area) with results ranging from 6.3 to 25 µg/ft². The exterior of the ductwork was also tested in room 167 (boiler room west mezzanine area and boiler room east mezzanine area) with results ranging from 4.6 to 12 µg/ft². The ductwork should be fully cleaned in this room and the

mezzanines above 167 on the east and west sides of the room. The ductwork in room 166A and 170 was unable to be tested. The ductwork in those rooms should be cleaned. All electrical equipment, boilers, pumps/motors, conduit, lights and fiberglass insulated pipes in rooms 166, 166A, 167, mezzanines above 167 (both east and west), 168, 170 are to be cleaned and decontaminated appropriately by the lead remediation contractor. All lights, conduit, ceiling tile grid and fiberglass insulated pipes in rooms 160, 162, 163, and 165 are to be cleaned and decontaminated appropriately by the lead remediation contractor. LEGEND was unable to access the interior of the ductwork for testing in rooms 166A and 170 due to access or insulation inside the ductwork. The HVAC and components (i.e., sheet metal, ductwork, fans, coils, etc.) are to be cleaned with HEPA vacuums, wet wiping, washing, etc. and removed. All dust collected in the HEPA vacuums, filters, rags, wash water, etc. is to be disposed of as determined by laboratory testing for lead by TCLP testing.

Remediation Includes:

Room 164/161, former firing range/supply plenum:

- Remove lights and ceiling grid/tracking for the lights,
- Remove any remaining ceiling tiles and ceiling tile grid,
- Remove electrical conduit,
- Wash the ceiling/floor and walls. The ceiling is precast concrete plank.
- Paint the room including the walls, and ceiling with two coats of lead encapsulating paint. This should be completed prior to the painting referenced in section 09.

Room 163 – Range Storage Room:

- Wash and clean entire room (ceiling, floors, walls, electrical conduit, etc.),
- Paint the room including the walls, and ceiling with two coats of lead encapsulating paint. This should be completed prior to the painting referenced in section 09.

Room 162 Range Control Room Office

- Remove lights, and electrical conduit,
- Remove the ceiling tile grid,
- Remove the existing VCT floor and wash/clean the concrete floor afterwards.
- Wash the ceiling/floor and walls. The ceiling is precast concrete plank.
- Paint the room including the walls, and ceiling with two coats of lead encapsulating paint. This should be completed prior to the painting referenced in section 09.

Room 160 Bathroom

- Remove lights, and electrical conduit
- Clean/wash equipment in the room,

- Remove the ceiling tile grid,
- Wash/clean and remove the existing metal HVAC ductwork and exhaust fan above the ceiling tile grid (**leave the duct where it penetrates the roof above for reuse**),
- Clean the ceramic floor tile,
- Wash the walls and ceiling/floor (the ceiling is precast concrete).
- Paint the room including the walls, and ceiling with two coats of lead encapsulating paint. This should be completed prior to the painting referenced in section 09.

Room 165 Chair Storage Room

- Remove lights,
- Remove electrical conduit,
- Wash the ceiling/floor and walls. The ceiling is precast concrete plank,
- Wash and clean (HEPA vacuum) equipment in the room,
- Paint the room including the walls, and ceiling with two coats of lead encapsulating paint. This should be completed prior to the painting referenced in section 09.

Room 168 Chair Storage Room

- Clean/wash lights, and electrical conduit,
- Clean/wash the fiberglass pipe insulation,
- Wash the walls, ceilings and floor (the ceiling is exposed metal deck with metal bar joists),
- Paint the room including the walls, and ceiling with two coats of lead encapsulating paint. This should be completed prior to the painting referenced in section 09.

Room 170 Storage Room

- Remove lights, and electrical conduit,
- Remove the HVAC ductwork,
- Remove the fiberglass pipe insulation,
- Clean/wash/HEPA vacuum shelves, cabinets and equipment in the room,
- Wash the walls and floor (the ceiling is sprayed on cellulose insulation on deck),
- Remove/clean the spray on ceiling insulation from steel joists and decking floor structure above,
- Clean (wet wipe and HEPA vacuum) the metal bar joists and metal deck ceiling after removing the spray on cellulose insulation.
- Paint the room including the walls, and ceiling with two coats of lead encapsulating paint. This should be completed prior to the painting referenced in section 09..

Room 166 Large Electrical Room

- Clean/wash lights, and electrical conduit,
- Wash the walls and ceiling/floor (the ceiling is exposed metal decking and bar joists),
- Remove the HVAC ductwork in the NE corner of the room to 166A,
- Carefully Wash/Clean all electrical equipment,
- Carefully paint around the electrical and mechanical equipment on walls/ceilings,
- Painting behind the wall/ceiling mounted equipment is **not necessary**,
- Paint the room including the walls, and ceiling with two coats of lead encapsulating paint. This should be completed prior to the painting referenced in section 09.

Room 166A Small Electrical Room

- Wash/clean lights, and electrical conduit,
- Wash the walls and ceiling/floor (the ceiling is exposed metal decking and bar joists),
- Remove the HVAC ductwork along the East wall of the room to 166,
- Carefully Wash/Clean all electrical equipment and shelves in the room,
- Carefully paint the electrical and mechanical equipment on walls/ceilings,
- Painting behind the wall/ceiling mounted equipment is **not necessary**,
- Paint the room including the walls, and ceiling with two coats of lead encapsulating paint. This should be completed prior to the painting referenced in section 09.

Room 167 Boiler/Mech Room with Range Supply Equipment and (2) Mezzanines

- Clean/Wash the walls, floor, ceiling, mechanical (HVAC) and electrical equipment (including the mezzanines on the east and west sides of the room,
- The ceiling is metal decking with metal bar joists (ceiling height is at least 20' tall),
- Clean/wash the lights and conduit throughout the room and mezzanines,
- Clean/Wash the hot water heaters, tanks, generators, shelves and equipment throughout the room,
- The boilers are currently being replaced as part of a different project and will be new (**thus they should not need to be cleaned**),
- Clean/Wash the HVAC air handling units/ductwork in both of the mezzanines (both inside and outside the ductwork),
- Paint the room including the walls, and ceiling with two coats of lead encapsulating paint. This should be completed prior to the painting referenced in section 09,
- Carefully paint around the electrical and mechanical equipment on walls/ceilings,
- Painting behind the wall/ceiling mounted equipment is **not necessary**,
- The suspended fiberglass pipe insulation throughout the room should be cleaned/washed.

- Apply a light coating of a penetrating encapsulant to the exposed concrete plank ceiling structure.

Adjacent Hallways 169/Vestibule 159:

- Last area to clean, clean all the walls and the floor extending from vestibule (159) west down the hallway past room 165 and then south from room 165 to the doorway of room 168.

Please note epoxy flooring will be installed over concrete floors as an encapsulant at rooms 164, 161, 162, 163, 165, 170 and 323 mechanical mezzanine above room 167.

All hazardous waste generated from the indoor firing range closure project needs to follow all requirements outline in the North Dakota Hazardous Waste Compliance Guide, located below: https://deg.nd.gov/Publications/WM/2024_ComplianceGuide.pdf

The lead-abatement contractor is responsible for:

- Proper storage of the waste
- Utilize approved DOT & waste disposal containers
- Ensure all containers are properly maintained and closed, except when adding/removing waste
- Meeting all labeling and marking requirements, including (but not limited to):
 - The Lead Abatement Contractor is responsible for initial Lead notifications, any updates, and the final submission package that includes analytic testing data to the NDDEQ.
 - Accumulation Start Date
 - The words "Hazardous Waste"
 - Indications of the hazards
 - Proper shipping name and UN/NA number (found in 49 CFR 172.51);
 - Generator name and address
 - Manifest shipping document number
 - Hazardous Waste Warning. This warning states, Hazardous Waste Federal Law Prohibits Improper Disposal. If found, contact the nearest police, public safety authority, or the U.S. EPA; and DOT hazard labels. Hazard labels are 4" by 4" diamond shaped labels stating information such as FLAMMABLE, CORROSIVE, or OXIDIZER, etc.
 - Meet all requirements of maintaining waste as a Very Small Quantity Generator (VSQG) if generation of more than 220 pounds of hazardous waste within a given month, the lead abatement contractor needs to submit an "Episodic Generation Notice" and follow all requirements of Episodic Generation, including (but not limited to):
 - Performing & documenting weekly inspections
- Prepare Hazardous Waste Manifests
- Ensure that only transporters with a valid North Dakota Solid Waste Transporter Permit and an active EPA Identification Number may accept and transport hazardous waste.
 - <https://deg.nd.gov/FOIA/SolidWaste/ActiveWasteHaulers.aspx>
- Report all spills/release to the appropriate authorities within 24 hours, and perform all

clean-up activities.

The NDARNG is responsible for:

- Supplying the EPA ID# ND0000092841
- Supplying a storage room for the waste
- Reviewing & signing the waste manifest(s)

1.02 Schedule

The work is to be completed within a thirty (30) day time period which includes clearance testing. Work is to be performed within normal business hours. Note that clearance testing will require a **minimum** of two (2) to three (3) days to complete depending on the time of day the samples are collected.

1.03 References and Regulations

- A. Occupational Safety and Health Administration (OSHA) Lead Standard for General Industry 29 CFR 195.525.
- B. OSHA Lead Standard for Construction 29 CFR 1926.62.
- C. Department of Housing and Urban Development (HUD) Lead Safe Housing Rule 24 CFR 35.
- D. Environmental Protection Agency (EPA) Lead-Based Paint Activities 40 CFR 745 Subpart L.
- E. EPA Renovations, Repair, and Painting Rules 40 CFR 745 Subpart E.
- F. North Dakota Army National Guard (NDNG) projects must comply with Federal, State, and local environmental laws, regulations, and codes even when permitting or approvals from local regulators are not required.
- G. Where a conflict exists between applicable codes or standards, the more stringent requirement will take precedence.

1.04 Definitions

- A. Child Occupied Facility: a building or portion of a building constructed before 1978 that is visited regularly by a child who is 6 years of age or less, on at least 2 different days within a given week, if each day's visit is at least 3 hours and the combined weekly visit is at least 6 hours in length, and the combined annual visits are at least 60 hours in length.
- B. Lead-based paint: As defined by the EPA, paint or similar surface coatings that contains lead in equal to or in excess of 1.0 milligram per square centimeter (mg/cm²), 5000 milligrams per kilogram (mg/kg) [equivalent to parts per million (ppm)] or 0.5 percent by weight of lead.
- C. Lead dust: Surface dust that contains lead.
- D. Exterior work: Work that is performed outside of a building where at no time waste, workers, materials, tools, or debris will enter or pass through the building.
- E. Lead Abatement Contractor/Supervisor (supervisor): any person who supervises lead abatement workers. This person must be trained, accredited, and licensed (as required by State Regulation), and must also meet OSHA "competent person" criteria for lead abatement.
- F. Small Scale Lead-Based Paint Activity: Activity involving lead-based paint where a negligible amount of dust may be generated, requiring a minimal

amount of preparation and worker protection. Negligible may be non-visible or barely visible and localized.

G. Work Area: areas where lead abatement activities are conducted.

PART 2 SUBMITTALS

2.01 Pre-work Submittals

A. Qualifications

1. Submit a copy of current lead abatement contractor certification.
2. Submit a copy of training certificates for each individual that will be conducting work. A minimum of renovation, repair, and painting (RRP) or lead abatement worker training is required for each worker.
3. Submit a copy of lead awareness training certificates for each individual that will be conducting work. Training shall, at a minimum, cover all topics listed in OSHA regulations.
4. Submit evidence of three projects similar to scope and size to this project that were completed in the last 36 months.

B. Lead Work Plan

Submit a written lead work plan and supplemental drawings with work plan items illustrated to the North Dakota National Guard (NDNG) Occupational Health Nurse, the facilities Design & Project Management Specialist and/or the government's environmental consultant, and NDNG Environmental Officer for review and approval at least 30 calendar days prior to the start of the work.

The lead work plan must include the following:

1. Location and quantity of material that will be impacted.
2. Areas of the building which will be tenant-occupied while work takes place
3. Locations of critical barriers.
4. Delineation of each work area and location of enclosures.
5. Location of decontamination enclosure systems (attached or remote).
6. Route of workers and waste from parking lot to work area(s).
7. Location of negative air machine (NAM) exhaust points and path of exhaust ducts (if applicable).
8. A narrative sequencing plan with a detailed schedule clearly indicating the various aspects of the work.
9. Description of how lead waste will be managed during the project including waste accumulation area(s), hazard waste testing, labeling, location of disposal facility, and handling of waste manifests.
10. The EPA Number of this site is to be provided by the NDNG. This number must be used on any waste manifest. The contractor is not authorized to obtain an EPA Identification Number for this project.
11. Safety data sheets for all chemicals that will be used.
12. Completed NDNG Notification Form (Refer to Exhibit 1).
13. Variance request(s) (if applicable).

2.02 Post-Work Submittals

- A. Submit a final report detailing the work that was completed including, the procedures that were used, the quantities and exact locations of the removed materials, personal air monitoring reports, job progress reports, daily logs, entry logs, toxicity characteristic leaching procedure TCLP analysis, and waste manifests with disposal site information and EPA generator ID number.
 - 1. At any time during the project, the following must be made available upon request: the results of the personal air monitoring, the differential air pressure readings for each containment area (if applicable), job progress reports detailing daily activities and any incidents or changes to work plan, and copies of worksite entry logs showing names, dates, and times for worker and visitor access to the work area.
- B. Level 1 Cleaning Verification Process documentation by Abatement Contractor
 - 1. Document cleaning and decontamination procedures in writing and submit to the NDNG Occupational Health Nurse and the Facilities Design & Project Management Specialist prior to re-occupancy for all Level 1 Lead -Based Paint Work Procedures.
 - 2. Photographic documentation of cleaning verification shall be included in submission to the NDNG Occupational Health Nurse and the Facilities Design & Project Management Specialist prior to re-occupancy.

2.03 Variances

Any deviation from the work practices and procedures described in this specification require an approved variance. Variances must be requested in writing and must be approved by the Facilities Design & Project Management Specialist and architect prior to the start of any work. The written variance request must include a detailed description of the procedure(s) to be used in lieu of the specification requirements, and an explanation of why the variance is warranted. Variances must be included in the lead work plan, where required.

PART 3 EXECUTION**3.01 Prohibited Activities**

- A. The following methods shall not be permitted:
 - 1. Open flame burning or torching.
 - 2. The use of heat gun above 150°F.
 - 3. The use of machines to remove paint or other surface coatings through high-speed operation such as power sanding, power grinding, power planing, or needle gun unless such machines have shrouds or containment systems and are equipped with a HEPA vacuum attachment.
 - 4. The use of abrasive or sand blasting without Level 3 work area isolation and preparation engineering controls.
 - 5. Dry scraping or sanding farther than one (1) foot from electrical outlets.
 - 6. The use of volatile strippers in poorly ventilated spaces or strippers that contain methylene chloride.
 - 7. The use of compressed air.

8. Eating, drinking, smoking, chewing tobacco / gum, or applying cosmetics in the work area.
9. Chemical strippers shall not contain methylene chloride and be compatible with new paints, coverings, or coatings to be installed.
- B. Level 1 and Level 2, Lead-Based Paint Work procedures to clean existing lead dust. Level 3 Lead-Based Paint Work procedures shall be utilized as a response action to remove identified lead contaminated dust.

3.02 Personal Protective Equipment

- A. Personal protective equipment shall include:
 1. The employer is responsible for providing adequate personal protective equipment (PPE) for their employees to ensure that their workers are protected during work activities based on personal air monitoring data required by OSHA.
 2. The contractor is responsible for monitoring 25% of the work force for lead exposure to assure proper respiratory protection is maintained.
 3. Disposable body suits and foot covers are required at a minimum per this specification requirements.
 4. Don disposable foot covers each time a worker enters a work area.
 5. Doff disposable foot covers each time prior to a worker leaving the plastic containment area.

3.03 Lead-Containing Paint Work Procedures – Reserved

3.04 Lead-Based Paint and Lead Dust Work Procedures

The work practice standards and procedures include three (3) work practice levels:

Level 1: A negligible amount of dust may be generated, requiring a minimal amount of preparation and worker protection. Negligible may be non-visible or barely visible and localized.

Level 2: A moderate amount of dust and/or debris is present or will be generated or disturbed, but neither the quantities nor the duration of effort warrant full-scale work area preparation and worker protection. A moderate amount is clearly visible, may contain debris and paint chips, but will not spread beyond a small area drop cloth to any other surface in the room.

Level 3: Dust and debris is present or will be generated or disturbed in sufficient quantities and for enough time to warrant full-scale work area preparation and worker protection. A significant amount is an amount that cannot be contained by the use of a small area drop cloth.

A. Level 1 Lead-Based Paint Work Procedures - Reserved

B. Level 2 Lead Work Procedures - Reserved

C. Level 3 Lead Work Procedures:

The following applies to activities involving lead-based paint or lead dust where lead-contaminated dust is present or will be generated in sufficient quantities and

for enough time to warrant full-scale work area preparation. A significant amount is an amount that cannot be contained simply by the use of a small area drop cloth.

1. Level 3 Lead Work Methods may include:
 - a. Mechanical paint removal or other mechanical paint removal systems.
 - b. Sander, needle gun, chipper, scarifier, or other mechanical paint removal system. All such power tools shall be equipped with a HEPA vacuum collection system.
 - c. Selective demolition other than small scale projects.
 - d. Removal of lead-contaminated dust.
2. Work Area Isolation and Preparation:
 - a. Isolate the work area to prevent unauthorized access.
 - i. Post OSHA compliant lead warning signs at each entrance to the work area.
 - ii. Notify NDNG personnel in adjacent offices. Seal and lock-out doors where needed.
 - iii. Lock doors to work area.
 - iv. If doors are not present, construct a hard physical barrier to delineate the regulated area at least six (6) feet beyond the extent of the containment area and decontamination unit. The barrier shall be of ½ inch minimum thickness plywood, gypsum board or similar sheathing material with suitable framing supports. The hard physical barrier shall be erected and inspected and approved by Owner's representative and the Government's Environmental Consultant prior to performing any other work.
 - b. Wash and remove all movable belongings and furniture from the work area.
 - c. Completely cover all immovable fixtures, furniture, carpets, and other personal items with protective sheeting that have the seams and edges sealed with tape.
 - d. Cover the entire floor in the work area with two layers of taped down 6-mil plastic or equivalent impermeable material if floor is not to be remediated.
 - i. Use a vertical containment or a prefabricated mini-containment with negative pressure to minimize the amount of floor containment that is required.
 - e. If the entire room cannot be isolated as a work area, use a vertical containment or a prefabricated mini-containment with negative pressure.
 - f. Close and seal all windows in the work area with 6-mil plastic or equivalent impermeable sheeting sealed with tape.
 - g. Close and seal all doors in the work area with 6-mil plastic or equivalent impermeable sheeting sealed with tape.
 - i. Any doors that will be used for entry to the work area should be set-up with an overlapped poly flap doorway entrance or plastic zipper door.
 - h. Turn off the heating, ventilation, and air conditioning (HVAC) system that serves the work area.
 - i. Close and seal all HVAC vents in the work area with 6-mil plastic or equivalent impermeable sheeting sealed with tape.

- j. Seal all other penetrations in the work area with 6-mil plastic or equivalent impermeable sheeting sealed with tape.
 - k. Establish a negative pressure system to prevent contaminated air from migrating to uncontaminated areas.
 - l. Negative pressure system shall:
 - i. Exhaust from the work area to the outside of the building.
 - ii. Provide sufficient number of Negative Air Machines (NAMs) to provide a negative pressure of at least 0.02" mercury between the work area and adjacent spaces, and 4 air changes per hour. Assume NAMs operate at 80% of design capacity. At least one backup NAM shall be available per Work Site. A recording manometer is required on site.
 - iii. The negative air system shall remain in continuous operation until cleanup and clearance is achieved.
 - m. Construct an attached three-stage decontamination enclosure system that consists of an overlapped poly flap doorway, equipment room, a overlapped poly flap doorway, shower, overlapped poly flap doorway, clean room, and a overlapped poly flap doorway.
 - i. Place at the location where workers will enter and exit the work area a foot tack mat.
 - ii. Maintain in a well-lit, clean, and hygienically acceptable condition at all times.
3. Follow all procedures in Section 3.04.D Clean-up, Disposal, and Re-Establishment of Work Area.

D. Clean-up, Disposal, and Re-Establishment of Work Area:

- 1. Clean-up:
 - 1. Conduct prompt clean-up of dust and debris using a HEPA vacuum and wet methods using a lead specific cleaner on a continuous basis.
 - 2. Conduct cleaning of all tools and equipment using a HEPA vacuum and wet methods using a lead specific cleaner prior to leaving the plastic containment area.
 - 3. If a remote decontamination system is used, use a HEPA vacuum and wet methods using a lead specific cleaner to clean off clothing and shoes each time prior to a worker leaving the plastic containment area.
 - 4. At the end of each shift and upon completion, clean the drop cloth using a HEPA vacuum and wet methods using a lead specific cleaner.
 - 5. Upon completion, clean all surfaces (horizontal and vertical) in the work area using a HEPA vacuum and wet methods using a lead specific cleaner following a "top to bottom, back your way out" approach.
 - 6. Clean at least four (4) feet beyond the contained work area.
 - 7. Follow the specific demolition, cleaning, and painting specified per room/area in Section 1.01.
- 2. Disposal:
 - 1. Collect all dust and debris in leak-tight containers (6-mil thick).
 - 2. Collect and dispose of drop cloths by misting, folding inwards, securing with duct tape, and placing in leak-tight containers (6-mil thick).

3. Collect and dispose of all other work-related items (e.g., PPE, mops, wipes, filters, etc.) in leak-tight containers (6-mil thick).
 4. If items are too large to fit into bags, wrap items in 6-mil plastic and seal with tape prior to removal from the plastic containment area.
 5. Seal poly bags with duct tape in a gooseneck configuration.
 6. Use a HEPA vacuum and wet methods using a lead specific cleaner to clean the outside of the bags and larger wrapped items before removing them from the plastic containment area.
 7. Move bags out of the work area into a secure location coordinated with the building owner.
 8. Dispose of wastewater in accordance with local, state, and Federal regulatory requirements.
 9. The Lead Abatement Contractor will be responsible to collect a minimum of four (4) samples of all the waste and submit for testing to an EPA accredited lab for Toxicity Characteristic Leaching Procedure (TCLP) analysis. Individual Waste streams would be defined as
 - Building Materials,
 - Wastewater,
 - Used PPE,
 - Used poly sheeting, tape, cleaning supplies, equipment, HEPA machine filters, etc.
 - i. If the concentration of lead is equal to or greater than 5.0 milligrams per liter (mg/L) as determined by the TCLP, the handling and disposal of hazardous waste must be conducted in accordance with applicable local, state, and the Resource Conservation and Recovery Act (RCRA) regulations applicable to the activity being conducted.
 - i. The Lead Abatement Contractor will arrange proper containerization and disposal of waste.
 - ii. The Lead Abatement Contractor is responsible for testing or disposal of the waste generated at the site.
3. **Clearance sampling (2 sets) must be coordinated with LEGEND Technical Services in Fargo, ND (701-271-6779):**
1. Following the completion of final clean-up, coordinate with the project manager and the government environmental consultant for the clearance testing of the area.
 2. Clearance sampling shall be conducted in accordance with HUD protocol for surface wipe testing.
 3. Conduct post-cleaning/pre-encapsulation sampling. Results should be under 200 ug/ft².
 4. Conduct post-encapsulation sampling after sheetrock and epoxy is installed. Results should be under 5 ug/ft².
 5. Clearance requirements will be as follows:

- **Inside firing range (164): lead in wipe samples less than or equal to 5 ug/ft² on all horizontal and vertical surfaces including but not limited to floors, walls and ceilings.**
 - **Areas/rooms immediately adjacent to firing range (160, 162, 163, 165, 166, 166A, 167, 167 mezzanines, 168, 169, 170): lead in wipe samples less than or equal to 5 ug/ft² on horizontal and vertical surfaces including but not limited to floors, walls and ceilings.**
- i. If criteria are met, the work area may be released for general use.
 - ii. If the clearance criteria are not met, the work area(s) shall be re-cleaned by the contractor and the clearance sampling repeated at no cost to the government.

This Specification was prepared by:



Cheryl Ann Sykora, CIH, CSP, CHMM, SDSRP
Certified Lead Risk Assessor
LEGEND Technical Services, Inc.

EXHIBIT 1

(Submit this exhibit with the Lead Work Plan)

Notification of Lead Work

North Dakota National Guard

1.0 FACILITY INFORMATION (provide name and phone number):

NDNG Facilities Design & Project Management Specialist – Clark V. Johnson 701-791-3272

NDNG Occupational Health Nurse – Kevin K. Buck

NDNG Project manager: Clark V. Johnson 701-791-3272

NDNG Environmental Compliance Manager & Lead Risk Assessor #161 Andrew W Schirado 701-791-3071

NDNG property manager: Lt. Col. Kristopher Elijah 701-791-3077

Government environmental consultant: LEGEND Technical Mike Molstre – 701-271-6779

Architect – MBA Greg Oakland – 701-235-5563

General Contractor: _____

2.0 LEAD CONTRACTOR INFORMATION:

Company name: _____

Name of contact and phone number: _____

3.0 PROVIDE A DESCRIPTION OF THE WORK AND LOCATION OF THE LEAD THAT WILL BE DISTURBED:

4.0 SCHEDULED DATES:

Start Date_____ Completion Date: _____

Number of shifts: _____

Scheduled Working Hours: _____

5.0 CONTRACTOR'S CERTIFICATION:

I certify that a trained individual as needed, licensed as a lead supervisor in the State where the work is being performed, will be on site at all times when any lead related work is occurring.

Name, title, and Signature of Contractor

Date

SECTION 03 1000 CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Formwork for cast-in place concrete, with shoring, bracing and anchorage.
- B. Openings for other work.
- C. Form accessories.
- D. Form stripping.

1.02 REFERENCE STANDARDS

- A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; Current Edition.
- B. ACI 301 - Specifications for Structural Concrete; Current Edition.
- C. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; Current Edition.
- D. ACI 347R - Guide to Formwork for Concrete; Current Edition.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Use adequate numbers of skilled staff who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work in this Section.

PART 2 PRODUCTS

2.01 FORMWORK - GENERAL

- A. Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.
- B. Design and construct to provide resultant concrete that conforms to design with respect to shape, lines, and dimensions.
- C. Comply with applicable state and local codes with respect to design, fabrication, erection, and removal of formwork.
- D. Comply with relevant portions of ACI 347R, ACI 301, and ACI 318.

2.02 WOOD FORM MATERIALS

- A. Form Materials: At the discretion of the Contractor.
- B. Softwood Plywood: PS 1, C Grade, Group 2.
- C. Softwood Plywood: PS 1, B-B High Density Concrete Form Overlay, Class I.
- D. Plywood: Douglas Fir species; solid one side grade; sound undamaged sheets with clean, true edges.

2.03 REMOVABLE PREFABRICATED FORMS

- A. Preformed Steel Forms: Minimum 16 gage, 0.0598 inch (1.52 mm) thick, matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
- B. Preformed Plastic Forms: Thermoplastic polystyrene form liner, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

- C. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.

2.04 FORMWORK ACCESSORIES

- A. Form Ties: Removable type, galvanized metal, fixed length, cone type, with waterproofing washer, free of defects that could leave holes larger than 1 inch (25 mm) in concrete surface.
- B. Form Release Agent: Capable of releasing forms from hardened concrete without staining or discoloring concrete or forming bugholes and other surface defects, compatible with concrete and form materials, and not requiring removal for satisfactory bonding of coatings to be applied.
 - 1. Composition: Colorless reactive, mineral oil-based, soy-based, or vegetable-oil based compound.
 - 2. Do not use materials containing diesel oil or petroleum-based compounds.
 - 3. VOC Content: In compliance with applicable local, State, and federal regulations.
 - 4. Products:
 - a. SpecChem, LLC; Bio Strip WB (water-based): www.specchemllc.com.
 - b. W.R. Meadows, Inc.; Duogard: www.wrmeadows.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- C. Dovetail Anchor Slot: Galvanized steel, at least 22 gage, 0.0299 inch (0.76 mm) thick, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
- D. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.
- E. Embedded Anchor Shapes, Plates, Angles and Bars.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.02 ERECTION - FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- D. Align joints and make watertight. Keep form joints to a minimum.
- E. Obtain approval before framing openings in structural members that are not indicated on drawings.
- F. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.
- G. Coordinate this section with other sections of work that require attachment of components to formwork.
- H. If formwork is placed after reinforcement, resulting in insufficient concrete cover over reinforcement, request instructions from the Architect before proceeding.

3.03 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.04 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in passing through concrete work.
- B. Locate and set in place items that will be cast directly into concrete.
- C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.
- D. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- E. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.05 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
 - 1. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

3.06 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 117, unless otherwise indicated.

3.07 FIELD QUALITY CONTROL

- A. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.

3.08 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged forms.

END OF SECTION

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SECTION 03 2000 CONCRETE REINFORCING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Reinforcing steel for cast-in-place concrete.
- B. Supports and accessories for steel reinforcement.

1.02 REFERENCE STANDARDS

- A. ACI 301 - Specifications for Structural Concrete; Current Edition.
- B. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; Current Edition.
- C. ACI SP-66 - ACI Detailing Manual; Current Edition.
- D. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; Current Edition.
- E. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; Current Edition.
- F. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; Current Edition.
- G. CRSI (DA4) - Manual of Standard Practice; Current Edition.
- H. CRSI (P1) - Placing Reinforcing Bars; Current Edition.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Comply with requirements of ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.

1.04 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301.

PART 2 PRODUCTS

2.01 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) (420 MPa).
 - 1. Deformed billet-steel bars.
- B. Steel Welded Wire Reinforcement (WWR): Galvanized, deformed type; ASTM A1064/A1064M.
- C. Reinforcement Accessories:
 - 1. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch (1.29 mm).
 - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

2.02 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.
- B. Welding of reinforcement is permitted only with the specific approval of the Architect. Perform welding in accordance with AWS D1.4/D1.4M.
 - 1. Galvanized Reinforcement: Clean surfaces, weld and re-protect welded joint in accordance with CRSI (DA4).
- C. Locate reinforcing splices not indicated on drawings at point of minimum stress.

PART 3 EXECUTION

3.01 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position.
- B. Accommodate placement of formed openings.

- C. Maintain concrete cover around reinforcing as follows:
 - 1. Supported Slabs and Joists: 2 inch.
 - 2. Walls: 2 inch.
 - 3. Footings and Concrete Formed Against Earth: 2 inch.
 - 4. Slabs on Fill: 2 inch.
- D. Conform to applicable code for concrete cover over reinforcement.

END OF SECTION

SECTION 03 3000 CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete slabs on grade and exterior paving.
- B. Joint devices associated with concrete work.
- C. Concrete curing.

1.02 REFERENCE STANDARDS

- A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; Current Edition.
- B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; Current Edition.
- C. ACI 301 - Specifications for Structural Concrete; Current Edition.
- D. ACI 302.1R - Guide for Concrete Floor and Slab Construction; Current Edition.
- E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; Current Edition.
- F. ACI 308R - Guide to Curing Concrete; Current Edition.
- G. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; Current Edition.
- H. ACI 347R - Guide to Formwork for Concrete; Current Edition.
- I. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; Current Edition.
- J. ASTM C33/C33M - Standard Specification for Concrete Aggregates; Current Edition.
- K. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; Current Edition.
- L. ASTM C150/C150M - Standard Specification for Portland Cement; Current Edition.
- M. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; Current Edition.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Mix Design: Submit proposed concrete mix design.
 - 1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.

1.04 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301 and ACI 318.

PART 2 PRODUCTS

2.01 FORMWORK

- A. Comply with requirements of Section 03 1000.

2.02 REINFORCEMENT

- A. Comply with requirements of Section 03 2000.

2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
 - 1. Acquire all cement for entire project from same source.

- B. Fine and Coarse Aggregates: ASTM C 33.
 - 1. Acquire all aggregates for entire project from same source.
- C. Shale: Concrete mixes shall not contain any shale aggregate.
- D. Water: Clean and not detrimental to concrete.

2.04 CURING MATERIALS

- A. Curing Compound, Non-dissipating: Liquid, membrane-forming, clear, non-yellowing acrylic; complying with ASTM C309.
 - 1. Vehicle: Water-based.
 - 2. Manufacturers:
 - a. Dayton Superior Corporation; Cure & Seal 309 J18: www.daytonsuperior.com.
 - b. Kaufman Products Inc.; Krystal 15 Emulsion: www.kaufmanproducts.net.
 - c. L&M Construction Chemicals, Inc., a subsidiary of Laticrete International, Inc.; Dress & Seal WB: www.lmcc.com.
 - d. The QUIKRETE Companies; QUIKRETE® Acrylic Concrete Cure & Seal: www.quikrete.com.
 - e. SpecChem, LLC; Cure and Seal WB: www.specchemllc.com.
 - f. W.R. Meadows, Inc.; VOCOMP-20: www.wrmeadows.com.
 - g. Substitutions: See Section 01 6000 - Product Requirements.

2.05 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
 - 1. For trial mixtures method, employ independent testing agency acceptable to the Architect for preparing and reporting proposed mix designs.
- C. Normal Weight Concrete:
 - 1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4,000 pounds per square inch (20.7 MPa).
 - 2. Fly Ash Content: Maximum 20 percent of cementitious materials by weight.
 - a. Fly ash content of mixes (cold weather) will be reduced to zero when placed after October 20 and before April 1st without an adequate cold weather management plan.
 - 3. Water-Cement Ratio: Maximum 40 percent by weight.
 - 4. Total Air Content: 6 percent shall be targeted at exposed slabs (5-8 percent range), determined in accordance with ASTM C173/C173M.
 - 5. Maximum Slump: 4 inches (75 mm).
 - 6. Maximum Aggregate Size: 5/8 inch (16 mm).

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

- A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
- B. Verify that forms are clean and free of rust before applying release agent.
- C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
- D. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
- E. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

- A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.
- B. Furnish, Install, and Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.04 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. Place concrete for floor slabs in accordance with ACI 302.1R.
- C. Notify the Architect not less than 24 hours prior to commencement of placement operations.
- D. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.
- E. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.
- F. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.05 SLAB JOINTING

- A. Locate joints as indicated on the drawings. Where a specific jointing layout is not provided, jointing shall be per the standard detail. All joints shall be sawed along a true and straight line established by the Contractor and shall not deviate at an point by more than ½ inch from the established line.
- B. Anchor joint fillers and devices to prevent movement during concrete placement.
- C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.
- D. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch (5 mm) thick blade and cut at least 1 inch (25 mm) deep but not less than one quarter (1/4) the depth of the slab.

3.06 FLOOR FLATNESS AND LEVELNESS TOLERANCES

- A. Maximum Variation of Surface Flatness:
 - 1. Exposed Concrete Floors: 1/4 inch (6 mm) in 10 feet (3 m).
 - 2. Exterior Pavement: 1/4 inch (6 mm) in 10 feet (3 m).
- B. Correct the slab surface if tolerances are less than specified.
- C. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.07 CONCRETE FINISHING

- A. Repair surface defects, including tie holes, immediately after removing formwork.
- B. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch (6 mm) or more in height. Provide finish as follows:
 - 1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.
- C. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
 - 1. Surfaces to Receive Floor Coverings: "Steel trowel" as described in ACI 302.1R; thin floor coverings include carpeting, resilient flooring, seamless flooring, thin set quarry tile, and thin set ceramic tile.
- D. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains as indicated on drawings.

- E. Exterior Pavement: Light broom texture.

3.08 CURING AND PROTECTION

- A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Surfaces Not in Contact with Forms:
 - 1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water- fog spray, or saturated burlap.
 - 2. Final Curing: Begin after initial curing but before surface is dry.

3.09 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing and concrete replacement shall be borne by the Contractor when defective concrete is identified.

3.10 PROTECTION

- A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION

SECTION 03 3511
CONCRETE SEALER

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface treatments for concrete floors and slabs.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with concrete floor placement and concrete floor curing.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's published data on each finishing product, including information on compatibility of different products and limitations.
- C. Maintenance Data: Provide data on maintenance and renewal of applied finishes.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's sealed packaging, including application instructions.

PART 2 PRODUCTS

2.01 COATINGS

- C. Clear Sealant Coating: Transparent, non-yellowing, water- or solvent-based coating.
 - 1. Composition: Acrylic polymer-based.
 - 2. Nonvolatile Content: 15 percent, minimum, when measured by volume.
 - 3. Manufacturers:
 - a. BRICKFORM ; www.brickform.com/sle.
 - b. Concrete Sealers USA ; www.concretesealersusa.com.
 - c. Concrete Coatings, Inc. ; www.concretecoatingsinc.com.
 - d. Kaufman Products, Inc. ; www.kaufmanproducts.net.
 - e. Dayton Superior Corporation; www.daytonsuperior.com.
 - f. L&M Construction Chemicals, Inc., a subsidiary of Laticrete International, Inc. ; www.lmcc.com.
 - g. The QUIKRETE Companies ; www.quikrete.com.
 - h. SpecChem, LLC; Crystal Shine: www.specchemllc.com.
 - i. W.R. Meadows, Inc; www.wrmeadows.com.
 - j. Atlas Construction Supply ; www.atlasform.com.
 - k. BASF Corporation ; www.basf.com.
 - l. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that floor surfaces are acceptable to receive the work of this section.
- B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes.

3.02 GENERAL

- A. Apply materials in accordance with manufacturer's instructions.

3.03 COATING APPLICATION

- A. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.
- B. Verify that water vapor emission from concrete and relative humidity in concrete are within limits established by coating manufacturer.

- C. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove excess material.
- D. Apply coatings in accordance with manufacturer's instructions, matching approved mock-ups for color, special effects, sealing and workmanship.

END OF SECTION

SECTION 04 2000 UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 REFERENCE STANDARDS

- A. ASTM C67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile; Current Edition.
- B. ASTM C91/C91M - Standard Specification for Masonry Cement; Current Edition.
- C. ASTM C140/C140M - Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units; Current Edition.
- D. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; Current Edition.
- E. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale); Current Edition.
- F. ASTM C270 - Standard Specification for Mortar for Unit Masonry; Current Edition.
- G. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; Current Edition.
- H. ASTM C476 - Standard Specification for Grout for Masonry; Current Edition.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for masonry units, fabricated wire reinforcement, and mortar.
- C. Samples: Submit four samples of decorative block units to illustrate color, texture, and extremes of color range.

1.04 QUALITY ASSURANCE

- A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.
 - 1. Maintain one copy of each document on project site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum three years of documented experience.
- C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience .

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.
- B. Handle and store ceramic glazed masonry units in protective cartons or trays. Do not remove from protective packaging until ready for installation.

1.06 FIELD CONDITIONS

- A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

- B. Maintain materials and surrounding air temperature to minimum 40 degrees F (5 degrees C) prior to, during, and 48 hours after completion of masonry work.
- C. Maintain materials and surrounding air temperature to maximum 90 degrees F (32 degrees C) prior to, during, and 48 hours after completion of masonry work.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards and as follows:
 - 1. Size: Standard units with nominal face dimensions of 16 by 8 inches (400 by 200 mm) and nominal depths as indicated on the drawings for specific locations.
 - 2. Special Shapes: Provide non-standard blocks configured for corners.
 - 3. Load-Bearing Units: ASTM C90, normal weight.
 - a. Hollow block , as indicated.
 - b. Exposed Faces: Manufacturer's standard color and texture where indicated.
 - c. Pattern: Vertical single score.
 - 4. Non-Loadbearing Units: ASTM C129.
 - a. Hollow block , as indicated.
 - b. Lightweight.

2.02 BRICK UNITS

- A. Facing Brick: Salvage existing brick and glazed block where removed for new overhead door opening to repair brick jambs around new door openings and louvers. If existing brick cannot be salvaged for reuse, provide brick that matches the existing brick, color, size, and texture.

2.03 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I ; color as required to produce approved color sample.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Mortar Aggregate: ASTM C144.
- D. Grout Aggregate: ASTM C404.
- E. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
 - 1. Color(s): To match existing mortar when incorporated into specified mix design(s).
 - 2. Manufacturers:
 - a. Davis Colors: www.daviscolors.com.
 - b. Lambert Corporation: www.lambertusa.com.
 - c. Solomon Colors: www.solomoncolors.com/sle.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- F. Water: Clean and potable.

2.04 REINFORCEMENT AND ANCHORAGE

- A. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi) (280 MPa) yield strength, deformed billet bars; galvanized.
- B. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.
- C. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A 153/A 153M, Class B.
 - 1. Wire ties: Manufacturer's standard shape, 0.1875 inch (4.75 mm) thick.
 - 2. Vertical adjustment: Not less than 3-1/2 inches (89 mm).

2.05 FLASHINGS

- A. EPDM Flashing: ASTM D4637/D4637M, Type I, 0.040 inch (1.0 mm) thick.

1. Manufacturers:
 - a. Hohmann & Barnard, Inc: www.h-b.com/sle.
 - b. Carlisle.
 - c. Firestone.
 - d. Wirebond.
 - e. WR Meadows.
 - f. Substitutions: See Section 01 6000 - Product Requirements.
- B. Flashing Sealant/Adhesives: Silicone, polyurethane, or silyl-terminated polyether/polyurethane, or other type required or recommended by flashing manufacturer; type capable of adhering to type of flashing used.

2.06 ACCESSORIES

- A. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self expanding; maximum lengths available.
 1. Manufacturers:
 - a. Hohmann & Barnard, Inc: www.h-b.com/sle.
 - b. WIRE-BOND: www.wirebond.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- B. Cavity Vents & Weeps: Polyester mesh.
 1. Manufacturers:
 - a. Blok-Lok Limited: www.blok-lok.com.
 - b. CavClear/Archovations, Inc; CavClear Weep Vents: www.cavclear.com
 - c. Hohmann & Barnard, Inc: www.h-b.com/sle.
 - d. WIRE-BOND: www.wirebond.com.
 - e. Mortar Net Solutions: www.mortarnet.com.
 - f. Substitutions: See Section 01 6000 - Product Requirements.
- C. Drainage Fabric: Polyester or polypropylene mesh.
 1. Manufacturers:
 - a. York Manufacturing, Inc ; Weep Armor Weep Vent Protection: www.yorkmfg.com.
 - b. Mortar Net Solutions: www.mortarnet.com.
 - c. Advanced Building Products, Inc.; Mortairvent: www.advancedbuildingproducts.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- D. 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: Panels installed at flashing locations.
 - a. Manufacturers:
 - 1) Advanced Building Products Inc.; Mortar Break: www.advancedbuildingproducts.com.
 - 2) Mortar Net Solutions: www.mortarnet.com.
 - 3) Substitutions: See Section 01 6000 - Product Requirements.
- E. Lap Sealants and Tapes: As recommended by flashing manufacturer; compatible with membrane and adhesives.
- F. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.07 MORTAR AND GROUT MIXES

- A. Mortar for Unit Masonry: ASTM C270, Proportion Specification.
 1. Masonry below grade and in contact with earth; Type S.
 2. Exterior, non-loadbearing masonry; Type N.
- B. Grout: ASTM C476; consistency as required to fill volumes completely for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches (50 mm) or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches (50 mm).

- C. Mixing: Use mechanical batch mixer and comply with referenced standards.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Concrete Masonry Units:
 - 1. Bond: Running (Match existing).
 - 2. Coursing: One unit and one mortar joint to equal 8 inches (200 mm).
 - 3. Mortar Joints: Concave.
- D. Brick Units:
 - 1. Bond: Running (Match existing).
 - 2. Mortar Joints: Concave.

3.03 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- C. Remove excess mortar as work progresses.
- D. Interlock intersections and external corners, except for units laid in stack bond.
- E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- F. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- G. Isolate top joint of masonry veneer from horizontal structural framing members or support angles with compressible joint filler.

3.04 WEEPS AND CAVITY VENTS

- A. Install weeps in veneer walls at 24 inches (600 mm) on center horizontally above through-wall flashing, above shelf angles and lintels, and at bottom of walls.
- B. Install cavity vents in veneer walls at 32 inches (800 mm) on center horizontally below shelf angles and lintels and at top of walls.

3.05 CAVITY MORTAR CONTROL

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
- B. 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.

3.06 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

- A. 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. Lap joint reinforcement ends minimum 6 inches (150 mm).

3.07 MASONRY FLASHINGS

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
 - 1. Extend flashings full width at such interruptions and at least 6 inches (152 mm), minimum, into adjacent masonry or turn up at least 8 inches (203 mm), minimum, to form watertight pan at non-masonry 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. Extend EPDM flashings to within 1/4 inch (6 mm) of exterior face of masonry.
- C. Lap end joints of flashings at least 6 inches (152 mm), minimum, and seal watertight with flashing sealant/adhesive.

3.08 LINTELS

- A. Install loose steel lintels over openings.

3.09 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control or expansion joints.
- B. Form control joint with a sheet building paper bond breaker fitted to one side of the hollow contour end of the block unit. Fill the resultant core with grout fill. Rake joint at exposed unit faces for placement of backer rod and sealant.
- C. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- D. Size control joints as indicated on drawings; if not shown, 3/4 inch (19 mm) wide and deep.

3.10 TOLERANCES

- A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch (1.6 mm).
- B. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft (6 mm in 3 m) and 1/2 inch in 20 ft (13 mm in 6 m) or more.
- C. Maximum Variation from Plumb: 1/4 inch (6 mm) per story non-cumulative; 1/2 inch (13 mm) in two stories or more.
- D. Maximum Variation from Level Coursing: 1/8 inch in 3 ft (3 mm in 1 m) and 1/4 inch in 10 ft (6 mm in 3 m); 1/2 inch in 30 ft (13 mm in 9 m).
- E. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch (minus 6.4 mm, plus 9.5 mm).

3.11 CUTTING AND FITTING

- A. Cut and fit for pipes and conduit. Coordinate with other sections of work to provide correct size, shape, and location.
- B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.12 CLEANING

- A. Remove excess mortar and mortar smears as work progresses.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.
- D. Use non-metallic tools in cleaning operations.

3.13 PROTECTION

- A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

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SECTION 05 5000 METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated steel items including bollards, lintel angles, and miscellaneous steel members.

1.02 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; Current Edition.
- B. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; Current Edition.
- C. AWS D1.1/D1.1M - Structural Welding Code - Steel; Current Edition.
- D. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; Current Edition.
- E. SSPC-SP 2 - Hand Tool Cleaning; Current Edition.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.
- C. Bolts, Nuts, and Washers: ASTM A325 (ASTM A325M), Type 1, plain.
- D. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- E. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Continuously seal joined members by intermittent welds and plastic filler.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 FINISHES - STEEL

- A. Prime paint steel items.
- B. Prepare surfaces to be primed in accordance with SSPC-SP2.
- C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- D. Prime Painting: One coat.

2.04 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch (3 mm) maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch (1.5 mm).
- C. Maximum Misalignment of Adjacent Members: 1/16 inch (1.5 mm).
- D. Maximum Bow: 1/8 inch (3 mm) in 48 inches (1.2 m).
- E. Maximum Deviation from Plane: 1/16 inch (1.5 mm) in 48 inches (1.2 m).

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Obtain approval prior to site cutting or making adjustments not scheduled.
- C. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

3.04 TOLERANCES

- A. Maximum Variation from Plumb: 1/4 inch (6 mm) per story, non-cumulative.
- B. Maximum Offset from True Alignment: 1/4 inch (6 mm).
- C. Maximum Out-of-Position: 1/4 inch (6 mm).

END OF SECTION

SECTION 07 9200 JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 REFERENCE STANDARDS

- A. ASTM C834 - Standard Specification for Latex Sealants; Current Edition.
- B. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; Current Edition.
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; Current Edition.
- D. ASTM C1193 - Standard Guide for Use of Joint Sealants; Current Edition.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. 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.
- C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.

1.05 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
 - 1. Adhesives Technology Corporation: www.atcepoxy.com.
 - 2. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 - 3. Bostik Inc: www.bostik-us.com.
 - 4. Dow Corning Corporation: www.dowcorning.com/construction/sle.
 - 5. Fortifiber Building Systems Group: www.fortifiber.com/sle.
 - 6. Franklin International, Inc: www.titebond.com.
 - 7. Hilti, Inc: www.us.hilti.com/#sle.
 - 8. Momentive Performance Materials, Inc (formerly GE Silicones): www.momentive.com/sle.
 - 9. Pecora Corporation: www.pecora.com.
 - 10. The QUIKRETE Companies: www.quikrete.com.
 - 11. Tremco Global Sealants: www.tremcosealants.com.
 - 12. Sherwin-Williams Company: www.sherwin-williams.com.
 - 13. Sika Corporation: www.usa-sika.com.
 - 14. W.R. Meadows, Inc: www.wrmeadows.com.
 - 15. Substitutions: See Section 01 6000 - Product Requirements.

- B. Self-Leveling Sealants: Pourable or self-leveling sealant that has sufficient flow to form a smooth, level surface when applied in a horizontal joint.
1. Adhesives Technology Corporation: www.atcepoxy.com.
 2. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 3. Bostik Inc: www.bostik-us.com.
 4. Dayton Superior Corporation: www.daytonsuperior.com.
 5. Dow Corning Corporation: www.dowcorning.com/construction/sle.
 6. Pecora Corporation: www.pecora.com.
 7. The QUIKRETE Companies: www.quikrete.com.
 8. Tremco Global Sealants: www.tremcosealants.com.
 9. Sherwin-Williams Company: www.sherwin-williams.com.
 10. Sika Corporation: www.usa-sika.com.
 11. W.R. Meadows, Inc: www.wrmeadows.com.
 12. Substitutions: See Section 01 6000 - Product Requirements.

2.02 JOINT SEALANT APPLICATIONS

- A. Scope:
1. Exterior Joints: Seal open joints, whether or not the joint is indicated on the drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
 - a. Joints between door, window, and other frames and adjacent construction.
 - b. Joints between different exposed materials.
 - c. Openings below ledge angles in masonry.
 - d. Joints in the masonry wall where the face of the wall transitions.
 - e. The transition joint between the building and adjacent sidewalk, paving, or surfacing. Self-leveling sealant to be used at these locations.
 - f. Joints in concrete sidewalks and transitions to concrete stoops. Self-leveling sealant should be used at these locations.
 2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
 - a. Joints between door, window, and other frames and adjacent construction.
 - b. Other joints indicated on the drawings.
 3. Do not seal the following types of joints.
 - a. Intentional weepholes in masonry.
 - b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
 - c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - d. Joints where installation of sealant is specified in another section.
 - e. Joints between suspended panel ceilings/grid and walls.
- B. Exterior Joints: Use nonsag non-staining silicone sealant, unless otherwise indicated.
- C. Interior Joints: Use nonsag polyurethane sealant, unless otherwise indicated.
1. Wall and Ceiling Joints in Non-Wet Areas: Acrylic emulsion latex sealant.
 2. Wall and Ceiling Joints in Wet Areas: Nonsag polyurethane sealant for continuous liquid immersion.
 3. Floor Joints in Wet Areas: Non-sag polyurethane "non-traffic-grade" sealant suitable for continuous liquid immersion.
 4. Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.
 5. Narrow Control Joints in Interior Concrete Slabs: Self-leveling epoxy sealant.
 6. Other Floor Joints: Self-leveling polyurethane "traffic-grade" sealant.
- D. Interior Wet Areas: Bathrooms, restrooms, kitchens, food service areas, and food processing areas; fixtures in wet areas include plumbing fixtures, food service equipment, countertops, cabinets, and other similar items.

2.03 JOINT SEALANTS - GENERAL

- A. Sealants and Primers of each type shall be from one manufacturer.
- B. Primers shall be as recommended by sealant manufacturer.
- C. 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 sealant manufacturers based on testing and field experience.
- D. Colors: To match adjacent surfaces as approved by the Architect.

2.04 NONSAG JOINT SEALANTS

- A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus and minus 50 percent, minimum.
 - 2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
 - 3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
 - 4. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
 - 5. Color: Match adjacent finished surfaces as approved by Architect.
 - 6. Cure Type: Single-component, neutral moisture curing.
 - 7. Service Temperature Range: Minus 65 to 180 degrees F (Minus 54 to 82 degrees C).
 - 8. Manufacturers:
 - a. Dow Corning Corporation; 795 Silicone Building Sealant: www.dowcorning.com/construction/sle.
 - b. Pecora Corporation; 864NST Low Modulus Architectural Silicone Sealant - Class 50: www.pecora.com.
 - c. Sika Corporation; Sikasil WS-295: www.usa-sika.com.
 - d. Similar products from the manufacturers listed in 2.01, A; will be acceptable.
 - e. Substitutions: See Section 01 6000 - Product Requirements.
- 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: White.
 - 2. Manufacturers:
 - a. Pecora Corporation; 898NST Sanitary Silicone Sealant - Class 50: www.pecora.com.
 - b. Sika Corporation; Sikasil GP: www.usa-sika.com.
 - c. Similar products from the manufacturers listed in 2.01, A; will be acceptable.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- C. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multicomponent; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus and minus 25 percent, minimum.
 - 2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
 - 3. Color: Match adjacent finished surfaces as approved by Architect.
 - 4. Service Temperature Range: Minus 40 to 180 degrees F (Minus 40 to 82 degrees C).
 - 5. Manufacturers:
 - a. Pecora Corporation; DynaTrol II General Purpose Two Part Polyurethane Sealant: www.pecora.com.
 - b. The QUIKRETE Companies; QUIKRETE® Polyurethane Non-Sag Sealant: www.quikrete.com.
 - c. Sherwin-Williams Company; Stampede 2NS Polyurethane Sealant: www.sherwin-williams.com.
 - d. Sika Corporation; Sikaflex-2c NS: www.usa-sika.com.
 - e. W. R. Meadows, Inc.; POURTHANE NS: www.wrmeadows.com.
 - f. Similar products from the manufacturers listed in 2.01, A; will be acceptable.
 - g. Substitutions: See Section 01 6000 - Product Requirements.

- 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 as approved by Architect.
 - 4. Service Temperature Range: Minus 40 to 180 degrees F (Minus 40 to 82 degrees C).
 - 5. Manufacturers:
 - a. Sika Corporation; Sikaflex-2c NS: www.usa-sika.com.
 - b. Similar products from the manufacturers listed in 2.01, A; will be acceptable.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- E. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
 - 1. Color: Standard colors matching finished surfaces, Type OP (opaque) as approved by Architect.
 - 2. Grade: ASTM C834; Grade - Minus 18 Degrees C.

2.05 SELF-LEVELING SEALANTS

- A. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; multicomponent; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion.
 - 1. Adheres to concrete and other surfaces without priming.
 - 2. Movement Capability: Plus and minus 25 percent, minimum.
 - 3. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.
 - 4. Color: Gray.
 - 5. Service Temperature Range: Minus 40 to 180 degrees F (Minus 40 to 82 degrees C).
 - 6. Manufacturers:
 - a. Pecora Corporation; NR-200 Self-Leveling Traffic-Grade Polyurethane Sealant: www.pecora.com.
 - b. The QUIKRETE Companies; QUIKRETE® Polyurethane Self-Leveling Sealant: www.quikrete.com.
 - c. Sherwin-Williams Company; Stampede 2SL Polyurethane Sealant: www.sherwin-williams.com.
 - d. Sika Corporation; Sikaflex-2c SL: www.usa-sika.com.
 - e. Similar products from the manufacturers listed in 2.01, A; will be acceptable.
 - f. Substitutions: See Section 01 6000 - Product Requirements.
- B. 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. Manufacturers:
 - a. ARDEX Engineered Cements; ARDEX ARDIFIX: www.ardexamericas.com.
 - b. Similar products from the manufacturers listed in 2.01, A; will be acceptable.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

2.06 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
 - 1. Contractor to use open or closed cell backer rod based on manufacturer's recommendation for each type of sealant and joint application.
 - 2. The backer rod shall be one size larger than the joint opening.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

- C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.
- E. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in inconspicuous area to verify that it does not stain or discolor slab.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Perform acoustical sealant application work in accordance with ASTM C919.
- D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- E. Install bond breaker backing tape where backer rod cannot be used.
- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- G. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- H. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

END OF SECTION

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SECTION 08 1113 HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hollow metal doors and frames.

1.02 RELATED REQUIREMENTS

- A. Section 08 7100 - Door Hardware.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; Current Edition.
- B. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); Current Edition.
- C. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; Current Edition.
- D. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; Current Edition.
- E. ICC A117.1 - Accessible and Usable Buildings and Facilities; Current Edition.
- F. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; Current Edition.
- G. UL (BMD) - Building Materials Directory; Current Edition.
- H. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- I. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.
- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document that prescribes installation requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Hollow Metal Doors and Frames:
 - 1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com.
 - 2. Curries Co.: www.curries.com.
 - 3. De La Fontaine Inc: www.delafontaine.com.

4. Republic Doors: www.republicdoor.com.
5. Steelcraft, an Allegion brand: www.allegion.com/sle.
6. Technical Glass Products; SteelBuilt Window & Door Systems: www.tgpamerica.com.
7. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DESIGN CRITERIA

- A. Requirements for Hollow Metal Doors and Frames:
 1. Steel used for fabrication of doors and frames shall comply with one or more of the following requirements; Galvannealed steel conforming to ASTM A653/A653M, cold-rolled steel conforming to ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel conforming to ASTM A1011/A1011M, Commercial Steel (CS) Type B for each.
 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
 3. Door Edge Profile: Manufacturers standard for application indicated.
 4. Typical Door Face Sheets: Flush.
 5. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturers standard.
 6. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
 7. Finish: Factory primed for field finishing.

2.03 HOLLOW METAL DOORS

- A. Door Finish: Factory primed for field finishing.
- B. Interior Doors, Non-Fire Rated:
 1. Based on NAAMM HMMA Custom Guidelines:
 - a. Comply with guidelines of NAAMM HMMA 860 for Hollow Metal Doors and Frames.
 - b. Performance Level 1 - Light Duty, in accordance with NAAMM HMMA 805.
 - c. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
 - d. Door Face Metal Thickness: 20 gage, 0.032 inch (0.8 mm), minimum.
 2. Core Material: Manufacturers standard core material/construction and in compliance with requirements.
 3. Door Thickness: 1-3/4 inch (44.5 mm), nominal.
 4. Door Face Sheets: Flush.
- C. Interior Doors, Fire-Rated Doors:
 1. Based on NAAMM HMMA Custom Guidelines: Comply with NAAMM HMMA 850 requirements for fire-rated doors.
 - a. Comply with guidelines of NAAMM HMMA 860 for Hollow Metal Doors and Frames.
 - b. Performance Level 1 - Light Duty, in accordance with NAAMM HMMA 805.
 - c. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
 - d. Door Face Metal Thickness: 20 gage, 0.032 inch (0.8 mm), minimum.
 - e. Zinc Coating: G90/Z275 galvanized coating; ASTM A653/A653M.
 2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
 - a. Temperature-Rise Rating (TRR) Across Door Thickness: In accordance with local building code and authorities having jurisdiction.
 - b. Provide units listed and labeled by UL (DIR) or ITS (DIR).
 - c. Attach fire rating label to each fire rated unit.
 3. Core Material: Manufacturers standard core material/construction in compliance with requirements.
 4. Door Thickness: 1-3/4 inch (44.5 mm), nominal.
 5. Door Face Sheets: Flush.

2.04 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

- B. Frame Finish: Factory primed for field finishing.
- C. Interior Door Frames, Non-Fire Rated: Full profile / continuously welded type.
 - 1. Frame Metal Thickness: 18 gage, 0.042 inch (1.0 mm), minimum.
- D. Door Frames, Fire-Rated: Full profile / continuously welded type.
 - 1. Fire Rating: Same as door, labeled.
 - 2. Terminated Stops: Provide at interior doors; closed end stop terminated 6 inch (150 mm), maximum, above floor at 45 degree angle.
 - 3. Frame Metal Thickness: 18 gage, 0.042 inch (1.0 mm), minimum.
- E. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.

2.05 ACCESSORIES

- A. Glazing: Fully Tempered Safety Glass, factory installed.
- B. Mechanical Fasteners for Concealed Metal-to-Metal Connections: Self-drilling, self-tapping, steel with electroplated zinc finish.
- C. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.
- D. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

2.06 FINISHES

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

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Install fire rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.
- D. Coordinate installation of hardware.
- E. Coordinate installation of glazing.
- F. Coordinate installation of electrical connections to electrical hardware items.

3.03 TOLERANCES

- A. Clearances Between Door and Frame: Comply with related requirements of specified door and frame standards or custom guidelines indicated.
- B. Maximum Diagonal Distortion: 1/16 in (1.5 mm) measured with straight edge, corner to corner.

3.04 ADJUSTING

- A. Adjust for smooth and balanced door movement.
- B. Adjust sound control doors so that seals are fully engaged when door is closed.

3.05 SCHEDULE

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

END OF SECTION

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SECTION 08 3613 SECTIONAL DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Overhead sectional doors, electrically operated.
- B. Operating hardware and supports.
- C. Electrical controls.

1.02 REFERENCE STANDARDS

- A. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; Current Edition.
- B. DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors; Current Edition.
- C. NEMA MG 1 - Motors and Generators; Current Edition.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified.

1.05 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for warranty requirements.
- B. Correct defective Work within a one year period after Date of Substantial Completion.
- C. Warranty: Include coverage for electric motor and transmission.
- D. Provide five year manufacturer warranty for electric operating equipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Sectional Doors.
- B. Acceptable Manufacturers:
 - 1. C.H.I. Overhead Doors; Model 3295 Aluminum Full-View Doors: www.chiohd.com/sle.
 - 2. Clopay Building Products; Model 3720: www.clopaydoor.com/sle.
 - 3. Entrematic; Amarr 3552 Aluminum Full View Door: www.amarr.com/commercial.
 - 4. Fimbel Architectural Door Specialties: www.fimbelads.com.
 - 5. Midland Garage Door; www.midlandgaragedoor.com
 - 6. Overhead Door Corp.; www.overheaddoor.com
 - 7. Raynor; www.raynordoor.com
 - 8. Wayne-Dalton, a Division of Overhead Door Corporation: www.wayne-dalton.com.
 - 9. Substitutions: See Section 01 6000 - Product Requirements.

2.02 STEEL DOOR COMPONENTS

- A. Steel Doors: Flush steel, insulated; standard lift operating style with track and hardware; complying with DASMA 102, Commercial application.
 - 1. Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.
 - 2. Door Nominal Thickness: 2 inches (51 mm) thick.
 - 3. Exterior Finish: Factory finished with acrylic baked enamel; custom color to match other overhead doors on the building as approved by Architect. If a matching custom color cannot be factory finished, the overhead door shall be painted in the field to match the color of the existing overhead doors on the building.
 - 4. Interior Finish: Factory finished with acrylic baked enamel; color as selected from manufacturers standard line.
 - 5. Glazed Lights: Full panel width, one row; set in place with resilient glazing channel.
 - 6. Operation: Electric motor.
- B. Door Panels: Steel construction; outer steel sheet of 20 gage, 0.0359 inch (0.91 mm) minimum thickness, flush profile; inner steel sheet of 20 gage, 0.0359 inch (0.91 mm) minimum thickness, flat profile; core reinforcement sheet steel roll formed to channel shape, rabbeted weather joints at meeting rails; polyurethane insulation.
- C. Window Frame: Manufacturers standard, finish to match.
- D. Glazing: Fully tempered glass; insulated double pane; clear; 1 inch thick.

2.03 DOOR COMPONENTS

- A. Track: Galvanized steel angles, 0.094 inch (2.4 mm) minimum thickness; 2-5/16 x 4 inch (59 x 102 mm) size, continuous one piece per side; galvanized steel mounting brackets 1/4 inch (6 mm) thick.
- B. Hinge and Roller Assemblies: Heavy duty hinges and adjustable roller holders of galvanized steel; floating hardened steel bearing rollers, located at top and bottom of each panel, each side.
- C. Lift Mechanism: Torsion spring on cross head shaft, with braided galvanized steel lifting cables.
- D. Sill Weatherstripping: Resilient hollow rubber strip, one piece; fitted to bottom of door panel, full length contact.
- E. Jamb Weatherstripping: Roll formed steel section full height of jamb, fitted with resilient weatherstripping, placed in moderate contact with door panels.
- F. Head Weatherstripping: EPDM rubber seal, one piece full length.
- G. Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.

2.04 MATERIALS

- A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G60/Z180 coating, plain surface.
- B. Float Glass: Provide float glass glazing, unless noted otherwise.
 - 1. Heat-Strengthened and Fully Tempered Types: ASTM C1048.
- C. Insulation: Foamed-in-place polyurethane, bonded to facing.
 - 1. Same thickness as core framing members.

2.05 ELECTRICAL OPERATION

- A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by a testing agency acceptable to authorities having jurisdiction.
- B. Electrical Characteristics:
 - 1. 1 hp (750 W); manually operable in case of power failure, transit speed of 12 inches (300 mm) per second.
- C. Motor: NEMA MG 1, Type 1.
- D. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.

- E. Disconnect Switch: Factory mount disconnect switch in control panel.
- F. Electric Operator: Side mounted on cross head shaft, adjustable safety friction clutch; brake system actuated by independent voltage solenoid controlled by motor starter; enclosed gear driven limit switch; enclosed magnetic cross line reversing starter; mounting brackets and hardware.
- G. Safety Edge: At bottom of door panel, full width; electro-mechanical sensitized type, wired to stop door upon striking object; hollow neoprene covered to provide weatherstrip seal.
- H. Photo Eyes: Through-beam photo eye where the door automatically stops closing and reverses when objects pass through the photo eye.
- I. Control Station: Standard three button (open-close-stop) momentary type control for each electric operator.
 - 1. 24 volt circuit.
 - 2. Surface mounted.
 - 3. Locate at inside door jamb.
- J. Push button keypad located at exterior door jamb.
- K. Radio Control Antenna Detector.
- L. Hand Held Transmitter: Digital control, resettable. Provide 4 operators per door.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- B. Verify that electric power is available and of the correct characteristics.

3.02 PREPARATION

- A. Prepare opening to permit correct installation of door unit to perimeter air and vapor barrier seal.
- B. Apply primer to wood frame.

3.03 INSTALLATION

- A. Install door unit assembly in accordance with manufacturer's instructions.
- B. Anchor assembly to wall construction and building framing without distortion or stress.
- C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- D. Fit and align door assembly including hardware.
- E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.
- F. Install perimeter trim.

3.04 TOLERANCES

- A. Maximum Variation from Plumb: 1/16 inch (1.5 mm).
- B. Maximum Variation from Level: 1/16 inch (1.5 mm).
- C. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch (3 mm) from 10 ft (3 m) straight edge.
- D. Maintain dimensional tolerances and alignment with adjacent work.

3.05 ADJUSTING

- A. Adjust door assembly for smooth operation and full contact with weatherstripping.
- B. Have manufacturer's field representative present to confirm proper operation and identify adjustments to door assembly for specified operation.

3.06 CLEANING

- A. Clean doors and frames and glazing.
- B. Remove temporary labels and visible markings.

3.07 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.
- B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

END OF SECTION

SECTION 08 7100 DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hardware for hollow metal doors.

1.02 RELATED REQUIREMENTS

- A. Section 08 1113 - Hollow Metal Doors and Frames.

1.03 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; Current Edition.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; Current Edition.
- C. BHMA A156.1 - American National Standard for Butts and Hinges; Current Edition.
- D. BHMA A156.2 - American National Standard for Bored and Preassembled Locks & Latches; Current Edition.
- E. BHMA A156.3 - American National Standard for Exit Devices; Current Edition.
- F. BHMA A156.4 - American National Standard for Door Controls - Closers; Current Edition.
- G. BHMA A156.5 - American National Standard for Cylinders and Input Devices for Locks; Current Edition.
- H. BHMA A156.8 - American National Standard for Door Controls - Overhead Stops and Holders; Current Edition.
- I. BHMA A156.18 - American National Standard for Materials and Finishes; Current Edition.
- J. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; Current Edition.
- K. ICC A117.1 - Accessible and Usable Buildings and Facilities; Current Edition.
- L. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the manufacture, fabrication, and installation of products that door hardware will be installed upon.
- B. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.
- C. Convey the Owner's keying requirements to manufacturers.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project.
- C. Hardware Schedule: Detailed listing of each item of hardware to be installed on each door. Use door numbering scheme as included in the Contract Documents. Identify electrically operated items and include power requirements.
- D. Keying Schedule: Submit for approval of the Owner.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Hardware Supplier Qualifications: Company specializing in supplying the type of products specified in this section with at least three years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

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

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year warranty for door closers and locksets.

PART 2 PRODUCTS**2.01 DOOR HARDWARE - GENERAL**

- A. Provide hardware specified or required to make doors fully functional, compliant with applicable codes, and secure to the extent indicated.
- B. Provide items of a single type of the same model by the same manufacturer.
- C. Provide products that comply with the following:
 - 1. Applicable provisions of federal, state, and local codes.
 - 2. Accessibility: ADA Standards and ICC A117.1.
 - 3. Applicable provisions of NFPA 101, Life Safety Code.
 - 4. Fire-Rated Doors: NFPA 80.
 - 5. Hardware on Fire-Rated Doors , Except Hinges: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.
 - 6. Auxiliary Hardware: BHMA A156.16.
 - 7. Hardware Preparation for Steel Doors and Steel Frames: BHMA A156.115.
 - 8. Hardware Preparation for Wood Doors with Wood or Steel Frames: BHMA A156.115W.
- D. Finishes: Provide door hardware of the same finish unless otherwise indicated.
 - 1. Primary Finish: Satin chrome plated over nickel on brass or bronze, 626 (approx US26D).
 - 2. Finish Definitions: BHMA A156.18.

2.02 DOOR HARDWARE

- A. Locks: Provide a lock for every door, unless specifically indicated as not requiring locking.
 - 1. Hardware Sets indicate locking functions required for each door.
 - 2. If no hardware set is indicated for a swinging door provide an office lockset.
 - 3. Trim: Provide lever handle or pull trim on outside of all locks unless specifically stated to have no outside trim.
 - 4. Lock Cylinders: Provide key access on outside of all locks unless specifically stated to have no locking or no outside trim.
- B. Door Lock Cylinders: Falcon 6-pin key cylinders.
 - 1. Provide cams and/or tailpieces as required for locking devices required.
 - 2. Provide large format interchangeable cores to facilitate maintenance and lock changes.
- C. Keying: Grand master keyed.
 - 1. Key to existing keying systems.
 - 2. Supply keys in the following quantities:
 - a. 2 master keys.
 - b. 2 grand master keys.
 - c. 2 change keys for each lock.
 - 3. When providing keying information, comply with DHI Handbook "Keying systems and nomenclature".
 - 4. Coordinate keying with the Owner.
- D. Latches: Provide a latch for every door that is not required to lock, unless specifically indicated "push/pull" or "not required to latch".
- E. HINGES
 - 1. Self-Closing Hinges: Comply with BHMA A156.17.
 - 2. Hinges: Provide hinges on every swinging door.
 - a. Provide five-knuckle full mortise butt hinges unless otherwise indicated.

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- b. Provide ball-bearing hinges at all doors having closers.
 - c. Provide hinges in the quantities indicated.
 - d. Provide non-removable pins on exterior outswinging doors.
 - 3. Butt Hinges: Comply with BHMA A156.1 and BHMA A156.7; standard weight, unless otherwise indicated.
 - a. Provide hinge width required to clear surrounding trim.
 - 4. Quantity of Hinges Per Door:
 - a. Doors From 60 inches (1.5 m) High up to 90 inches (2.3 m) High: Three hinges.
 - 5. Manufacturers - Hinges:
 - a. Assa Abloy Brands; McKinney: www.assaabloydss.com.
 - b. Bommer Industries, Inc.: www.bommer.com.
 - c. C. R. Laurence Company, Inc.: www.crl-arch.com.
 - d. Hager Companies: www.hagerco.com.
 - e. Stanley Black & Decker: www.stanleyblackanddecker.com.
 - f. Substitutions: See Section 01 6000 - Product Requirements.
 - F. CYLINDRICAL LOCKSETS
 - 1. Locking Functions: As defined in BHMA A156.2, and as follows.
 - a. Passage: No locking, always free entry and exit.
 - b. Privacy: F76, emergency tool unlocks.
 - c. Office: F82 Grade 1, key not required to lock, unlocks upon exit.
 - d. Office: F81, key not required to lock, remains locked upon exit.
 - e. Always-Locked: F86, key required to lock, may not be left unlocked.
 - f. Exit Only: F89, may not be left unlocked.
 - 2. Manufacturers - Cylindrical Locksets: (must be compatible with existing key system)
 - a. Assa Abloy Brands; Medeco, Corbin Russwin, Sargent, or Yale: www.assaabloydss.com.
 - b. Schlage or Falcon, an Allegion brand: www.allegion.com/us.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
 - G. CLOSERS
 - 1. Closers: Complying with BHMA A156.4.
 - a. Provide surface-mounted, door-mounted closers unless otherwise indicated.
 - b. Provide a door closer on every fire- and smoke-rated door. Spring hinges are not an acceptable self-closing device unless specifically so indicated.
 - c. At corridors, locate door-mounted closer on room side of door.
 - 2. Manufacturers - Surface Mounted Closers:
 - a. Assa Abloy Brands; Corbin Russwin, Norton, Rixson, Sargent, or Yale: www.assaabloydss.com.
 - b. C. R. Laurence Company, Inc.: www.crl-arch.com.
 - c. DORMA USA, Inc; 7400 Series, 8600 Series, 8900 Series, and TS93: www.dorma.com.
 - d. Hager Companies: www.hagerco.com.
 - e. LCN, an Allegion brand: www.allegion.com/us.
 - f. Substitutions: See Section 01 6000 - Product Requirements.
 - H. STOPS AND HOLDERS
 - 1. Stops: Complying with BHMA A156.8; provide a stop for every swinging door, unless otherwise indicated.
 - a. Provide wall stops, unless otherwise indicated.
 - b. If wall stops are not practical, due to configuration of room or furnishings, provide overhead stop.
 - c. Stop is not required if positive stop feature is specified for door closer; positive stop feature of door closer is not an acceptable substitute for a stop unless specifically so stated.
 - 2. Manufacturers - Overhead Holders/Stops:
 - a. Assa Abloy Brands; Rixson or Sargent: www.assaabloydss.com.
 - b. C. R. Laurence Company, Inc.: www.crl-arch.com.
 - c. DORMA USA, Inc; 900 Series: www.dorma.com.
 - d. Glynn-Johnson, an Allegion brand: www.allegion.com/us.
 - e. Substitutions: See Section 01 6000 - Product Requirements.

3. Manufacturers - Wall and Floor Stops/Holders:
 - a. Assa Abloy Brands; McKinney: www.assaabloydss.com.
 - b. C. R. Laurence Company, Inc.: www.crl-arch.com.
 - c. Hager Companies: www.hagerco.com.
 - d. Hiawatha, Inc, division of Activar Construction Products Group, Inc.: www.activarcpg.com/hiawatha.
 - e. Trimco Hardware: www.trimcohardware.com.
 - f. Substitutions: See Section 01 6000 - Product Requirements.
- I. GASKETING
 1. Gaskets: Complying with BHMA A156.22.
 - a. On each rated door, provide weatherstripping gaskets, unless otherwise indicated; top, sides, and meeting stiles of pairs.
 3. Fasteners: Non-corroding.
 4. Manufacturers - Gasketing:
 - a. Assa Abloy Brands; McKinney: www.assaabloydss.com.
 - b. Hager Companies: www.hagerco.com.
 - c. National Guard Products, Inc: www.ngpinc.com.
 - d. Pemko Manufacturing Co: www.pemko.com.
 - e. Reese Weatherstripping & Thresholds: www.reeseusa.com
 - f. Zero International, Inc: www.zerointernational.com.
 - g. Substitutions: See Section 01 6000 - Product Requirements.
- J. PROTECTION PLATES AND ARCHITECTURAL TRIM
 1. Protection Plates:
 - a. Kickplate: Provide on push side of every door with closer, where indicated.
 2. Manufacturers - Protection Plates and Architectural Trim:
 - a. Assa Abloy Brands; McKinney: www.assaabloydss.com.
 - b. C. R. Laurence Company, Inc.: www.crl-arch.com.
 - c. Hager Companies: www.hagerco.com.
 - d. Hiawatha, Inc, division of Activar Construction Products Group, Inc.: www.activarcpg.com/hiawatha.
 - e. Trimco Hardware: www.trimcohardware.com.
 - f. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Use templates provided by hardware item manufacturer.
- C. Do not install surface mounted items until finishes applied to substrate are complete.
- D. Install hardware on fire-rated doors and frames in accordance with code and NFPA 80.
- E. Mounting heights for hardware from finished floor to center line of hardware item.
 1. For steel doors and frames: Comply with DHI (LOCS) "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames".

3.03 ADJUSTING

- A. Adjust hardware for smooth operation.
- B. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

3.04 CLEANING

- A. Clean adjacent surfaces soiled by hardware installation. Clean finished hardware per manufacturer's instructions after final adjustments has been made. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

HARDWARE SETS

4.01 HARDWARE SETS - GENERAL

- A. These Hardware Sets indicate requirements for single doors of that type, with conditional requirements for pairs and other situations.
- B. HW-CYL: Doors whose hardware is specified in other sections but which must be keyed to building system:
 - 1. Lock Cylinder, Mortise, keyed to building system.

4.02 SWING DOORS -- LOCKABLE, MAY BE LEFT UNLOCKED, KEY NOT REQUIRED TO LOCK

- A. HW-10: Office with closer:
 - 1. Closer.
 - 2. Lockset, F82 Office.
- B. HW-10P: Pair office with closer:
 - 1. Closers.
 - 2. Lockset, F82 Office.
 - 3. Pair: One leaf active, with automatic flush bolts and door coordinators.

END OF SECTION

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SECTION 08 8000 GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED REQUIREMENTS

- A. Section 08 1113 - Hollow Metal Doors and Frames: Glazed lites in doors and borrowed lites.

1.03 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test; Current Edition.
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; Current Edition.
- C. ASTM C1036 - Standard Specification for Flat Glass; Current Edition.
- D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; Current Edition.
- E. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; Current Edition.
- F. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; Current Edition.
- G. GANA (GM) - GANA Glazing Manual; Current Edition.
- H. GANA (SM) - GANA Sealant Manual; Current Edition.
- I. ICC (IBC) - International Building Code; Current Edition.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data on Insulating Glass Unit: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.
- D. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in the Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

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

1.06 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.

1.07 WARRANTY

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

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Glass Fabricators:
 - 1. JE Berkowitz, LP : www.jeberkowitz.com.
 - 2. Trulite Glass & Aluminum Solutions, LLC : www.trulite.com.
 - 3. Viracon, Inc : www.viracon.com.
 - 4. Substitutions: Refer to Section 01 6000 - Product Requirements.
- B. Float Glass Manufacturers:
 - 1. AGC Glass Company North America, Inc : www.us.agc.com.
 - 2. Cardinal Glass Industries : www.cardinalcorp.com.
 - 3. Guardian Industries Corp : www.sunguardglass.com.
 - 4. Pilkington North America Inc : www.pilkington.com/na.
 - 5. PPG Industries, Inc : www.ppgideascape.com.
 - 6. Old Castle Glass.
 - 7. Substitutions: See Section 01 6000 - Product Requirements.

2.02 GLASS MATERIALS

- A. Float Glass: Provide float glass based glazing unless noted otherwise.
 - 1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality-Q3.
 - 2. Heat-Strengthened and Fully Tempered Types: ASTM C1048, Kind HS and FT.
 - 3. Fully Tempered Safety Glass: Complies with ANSI Z97.1 and 16 CFR 1201 criteria.
 - 1. Tinted Type: ASTM C1036, Class 2 - Tinted , Quality-Q3, color and performance characteristics as indicated.
 - 2. Thicknesses: As indicated; provide greater thickness as required for exterior glazing wind load design.

2.03 GLAZING UNITS

- A. Type G-1 - Monolithic Interior Vision Glazing:
 - 1. Applications: Interior glazing unless otherwise indicated.
 - 2. Glass Type: Annealed float glass.
 - 3. Tint: Clear.
 - 4. Thickness: 1/4 inch (6.4 mm), nominal.

2.04 GLAZING COMPOUNDS

- A. Type GC-1 - Glazing Putty: Polymer modified latex recommended by manufacturer for outdoor use, knife grade consistency; grey color.
- B. Type GC-2 - Polyurethane Sealant: Single component, chemical curing, non-staining, non-bleeding ; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 20 to 35.
- C. Manufacturers:
 - 1. Bostik Inc: www.bostik-us.com.
 - 2. Dow Corning Corporation: www.dowcorning.com/construction.
 - 3. Momentive Performance Materials, Inc: www.momentive.com.
 - 4. Pecora Corporation: www.pecora.com.
 - 5. BASF Corporation: www.basf.com/us/en.html.
 - 6. Substitutions: See Section 01 6000 - Product Requirements.

2.05 ACCESSORIES

- A. Setting blocks, space shims, glazing tape, clips, and all other fasteners as required shall be provided by the glazing manufacturer to complete the installation.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.

- B. Verify that the minimum required face and edge clearances are being provided.
- C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.
- D. Verify that sealing between joints of glass framing members has been completed effectively.
- E. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

- A. Install glazing 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, etc.

3.04 CLEANING

- A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- B. Remove non-permanent labels immediately after glazing installation is complete.
- C. Clean glass and adjacent surfaces after sealants are fully cured.
- D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.05 PROTECTION

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste ; do not mark heat absorbing or reflective glass units.
- B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

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SECTION 09 2116 GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 REFERENCE STANDARDS

- A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; Current Edition.
- B. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; Current Edition.
- C. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; Current Edition.
- D. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; Current Edition.
- E. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; Current Edition.
- F. ASTM C1280 - Standard Specification for Application of Gypsum Sheathing Board; Current Edition.
- G. ASTM C1396/C1396M - Standard Specification for Gypsum Board; Current Edition.
- G. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; Current Edition.
- H. ASTM E413 - Classification for Rating Sound Insulation; Current Edition.
- I. GA-216 - Application and Finishing of Gypsum Board; Current Edition.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

1.04 QUALITY ASSURANCE

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

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.

2.02 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
 - 1. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com.
 - 2. Marino: www.marinoware.com.
 - 3. Phillips Manufacturing Company: www.phillipsmfg.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

- B. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf (L/240 at 240 Pa).
 - 1. Studs: "C" shaped with flat or formed webs with knurled faces.
 - 2. Runners: U shaped, size to match studs.
 - 3. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
 - 4. Furring: Hat-shaped sections, minimum depth of 7/8 inch (22 mm).

2.03 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
 - 1. American Gypsum Company : www.americangypsum.com.
 - 2. CertainTeed Corporation : www.certainteed.com.
 - 3. Continental Building Products : www.continental-bp.com.
 - 4. Georgia-Pacific Gypsum : www.gpgypsum.com.
 - 5. National Gypsum Company : www.nationalgypsum.com.
 - 6. PABCO Gypsum : www.pabco gypsum.com.
 - 7. USG Corporation : www.usg.com.
 - 8. Substitutions: See Section 01 6000 - 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. Thickness:
 - a. Vertical Surfaces: 5/8 inch (16 mm).
 - b. Ceilings: 5/8 inch (16 mm).
 - c. Multi-Layer Assemblies: Thicknesses as indicated on drawings.
- C. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 - 1. Application: Ceilings, unless otherwise indicated.
 - 2. Thickness: 5/8 inch.
 - 3. Edges: Tapered.

2.04 ACCESSORIES

- A. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
 - 1. Types: As detailed or required for finished appearance.
 - 2. Special Shapes: In addition to conventional corner bead and control joints, provide U-bead at exposed panel edges.
- B. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, galvanized steel, or rolled zinc, unless noted otherwise.
 - 1. Rigid Corner Beads: Low profile, for 90 degree outside corners and archways.
 - 2. Expansion Joints: V-shaped PVC with tear away fins.
- C. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
- D. Textured Finish Materials: Latex-based compound; plain.
- E. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch (0.84 mm) in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.

3.03 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
 - 1. Exception: Tapered edges to receive joint treatment at right angles to framing.
- C. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- D. Installation on Metal Framing: Use screws for attachment of gypsum board except face layer of non-rated double-layer assemblies, which may be installed by means of adhesive lamination.

3.04 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.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials .

3.05 JOINT TREATMENT

- A. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 - 1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 - 2. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
- B. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 - 1. Feather coats of joint compound so that camber is maximum 1/32 inch (0.8 mm).

END OF SECTION

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SECTION 09 5100 SUSPENDED ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 REFERENCE STANDARDS

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

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements.
- B. Shop Drawings: Indicate grid layout and related dimensioning.
- C. Product Data: Provide data on suspension system components.
- D. Samples: Submit two samples illustrating material and finish of acoustical units.
- E. Samples: Submit two samples of suspension system main runner.
- F. Maintenance Materials: Furnish the following for the Owner's use in maintenance of project.
 - 1. Extra Acoustical Units: Quantity equal to 5 percent of total installed.

1.04 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.

1.05 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

2.01 MANUFACTURERS

- A. Acoustic Panels:
 - 1. Armstrong World Industries, Inc; www.armstrong.com.
 - 2. Acoustic Ceiling Products, Inc; www.acpideas.com.
 - 3. CertainTeed Corporation; www.certainteed.com.
 - 4. Hunter Douglas Contract; www.hunterdouglascontract.com.
 - 5. USG; www.usg.com.
 - 6. Celotex Corp.
 - 7. Substitutions: See Section 01 6000 - Product Requirements.
- B. Suspension Systems:
 - 1. Same as for acoustical units.
 - 2. Armstrong World Industries, Inc; www.armstrong.com.
 - 3. Acoustic Ceiling Products, Inc.; www.acpideas.com.
 - 4. CertainTeed Corporation; www.certainteed.com.
 - 5. Hunter Douglas Contract; www.hunterdouglascontract.com.
 - 6. Rockfon, LLC; www.rockfon.com.
 - 7. Chicago Metallic Corp.
 - 8. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ACOUSTICAL UNITS

- A. Acoustical Units - General: ASTM E1264, Class A.
- B. Acoustical Panels:
 - 1. Size: 24 by 24 inches (600 by 600 mm).
 - 2. Panel Edge: Revealed Edge.
 - 3. Surface Pattern: Perforated.
 - 4. Surface Color: White.
 - 5. Suspension System: Exposed grid.
 - 6. Products:
 - a. Celotex VAN-154 or similar products from approved manufacturers.
 - b. Substitutions: See Section 01 6000 - Product Requirements.

2.03 SUSPENSION SYSTEM(S)

- A. Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.
- B. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled; heavy-duty.
 - 1. Profile: Tee; 15/16 inch (24 mm) wide face.
 - 2. Construction: Double web.
 - 3. Finish: White painted.
 - 4. Products:
 - a. "Snap Grid 200" by Chicago Metallic Corp or similar products from approved manufacturers.
 - b. Substitutions: See Section 01 6000 - Product Requirements.

2.04 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Perimeter Moldings: Same material and finish as grid.
 - 1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
 - 2. At Concealed Grid: Provide exposed L-shaped molding.
- C. Acoustical Sealant For Perimeter Moldings: Non-hardening, non-skinning, for use in conjunction with suspended ceiling system.
 - a. Substitutions: See Section 01 6000 - Product Requirements.
- D. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.
- D. Locate system on room axis according to reflected plan.
- E. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- F. Provide hanger clips and inserts as required.
- G. 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.
- H. 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.
- I. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
 - J. Support fixture loads using supplementary hangers located within 6 inches (150 mm) of each corner, or support components independently.
 - K. Do not eccentrically load system or induce rotation of runners.
 - L. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Install with continuous gasket.
 - 2. Use longest practical lengths.
 - 3. Overlap and rivet corners.

3.03 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Lay directional patterned units with pattern parallel to longest room axis.
- D. Fit border trim neatly against abutting surfaces.
- E. Install units after above-ceiling work is complete.
- F. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- G. 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.
- H. Where round obstructions occur, provide preformed closures to match perimeter molding.

3.04 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

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SECTION 09 6500 RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Resilient base.
- B. Resilient tile flooring to patch in around new door frames.
- C. Installation accessories.

1.02 REFERENCE STANDARDS

- A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; Current Edition.
- B. ASTM F1861 - Standard Specification for Resilient Wall Base; Current Edition.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.
- D. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- E. Maintenance Materials: Furnish the following for the Owner's use in maintenance of project.
 - 1. Extra Flooring Material: 100 square feet of each type and color.
 - 2. Extra Wall Base: 100 linear feet of each type and color.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- B. Store all materials off of the floor in an acclimatized, weather-tight space.
- C. Maintain temperature in storage area between 55 degrees F (13 degrees C) and 90 degrees F (72 degrees C).
- D. Protect roll materials from damage by storing on end.

1.05 FIELD CONDITIONS

- A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F (21 degrees C) to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F (13 degrees C).

PART 2 PRODUCTS

2.01 RESILIENT BASE

- A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove.
 - 1. Manufacturers:
 - a. Burke Flooring: www.burkemercer.com.
 - b. Johnsonite, a Tarkett Company: www.johnsonite.com.
 - c. Roppe Corp: www.roppe.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Height: 4 inch (100 mm).
 - 3. Thickness: 0.125 inch (3.2 mm) thick.
 - 4. Finish: Satin.
 - 5. Length: Roll.
 - 6. Color: Color as selected from manufacturer's standards.

2.02 TILE FLOORING

- A. Vinyl Composition Tile: Homogeneous, with color extending throughout thickness to match the existing VCT colors and patterns in the building.
 - 1. Manufacturers:
 - a. Armstrong World Industries, Inc : www.armstrong.com.
 - b. Johnsonite, a Tarkett Company : www.johnsonite.com.
 - c. Mannington Mills, Inc : www.mannington.com.
 - e. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Minimum Requirements: Comply with ASTM F1066, of Class corresponding to type specified.
 - 4. Size: 12 by 12 inch (305 by 305 mm).
 - 6. Thickness: 0.125 inch (3.2 mm).
 - 7. Pattern: Match existing VCT color and pattern.

2.03 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.
- C. Moldings, Transition and Edge Strips: Same material as flooring.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- 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 resilient base.
- C. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.
- C. Clean substrate.
- D. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

3.03 INSTALLATION

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

3.04 RESILIENT BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches (45 mm) between joints.

- B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.
- C. Install base on solid backing. Bond tightly to wall and floor surfaces.
- D. Scribe and fit to door frames and other interruptions.

3.05 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

END OF SECTION

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SECTION 09 6700 EPOXY FLUID-APPLIED FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Epoxy fluid-applied flooring.
- B. Divider strips and accessories.

1.02 REFERENCE STANDARDS

- A. ANSI/ESD STM7.1 - Standard Test Method for the Protection of Electrostatic Discharge Susceptible Items - Floor Materials - Resistive Characterization of Materials; Current Edition.
- B. ASTM D905 - Standard Test Method for Strength Properties of Adhesive Bonds in Shear by Compression; Current Edition.
- C. ASTM D4060 - Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser; Current Edition.
- D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; Current Edition.
- E. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; Current Edition.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; patterns and colors available.
- C. Samples: Submit two samples illustrating color and pattern for each floor material for each color specified.
- D. Maintenance Data: Include maintenance procedures, recommended maintenance materials, procedures for stain removal, repairing surface, and suggested schedule for cleaning.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the work of this section.
 - 1. Minimum three years of documented experience.
 - 2. Approved by manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store resin materials in a dry, secure area.
- B. Store materials for three days prior to installation in area of installation to achieve temperature stability.

1.06 FIELD CONDITIONS

- A. Maintain minimum temperature in storage area of 55 degrees F (13 degrees C).
- B. Store materials in area of installation for minimum period of 24 hours prior to installation.
- C. Maintain ambient temperature required by manufacturer 72 hours prior to, during, and 24 hours after installation of materials.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fluid-Applied Flooring:
 - 1. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 - 2. Citadel Floor Finishing Systems: www.citadelfloors.com
 - 3. Concrete Solutions by Rhino Linings: www.concretesolutions.com.

4. Crossfield Products Corp: www.crossfieldproducts.com.
5. Key Resin Company: www.keyresin.com.
6. KRETUS: www.kretus.com
7. SPARTACOTE, a division of LATICRETE International, Inc: www.laticrete.com.
8. Sherwin-Williams Company: www.protective.sherwin-williams.com.
9. Sika Corporation: www.sikafloorusa.com.
10. Terrazzo & Marble Supply Companies: www.tmsupply.com.
11. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

- A. Fluid-Applied Flooring: Epoxy flooring with multi-colored vinyl chips with resin.
 1. Sheen: High gloss.
 2. Color: As selected by Architect.
 3. Products:
 - a. Sherwin-Williams Company; High Performance Flooring with Deco Flake Resilient Decorative Flooring 1/8" Flake.
 - b. Similar products from the manufacturers listed in 2.01, A. will be acceptable.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

2.03 ACCESSORIES

- A. Control Joint Strips: 1/8 inch (3 mm) wide neoprene filler strip between side strips, with anchoring features, strip height to suit flooring thickness.
- B. Cant Strips: Molded of flooring resin material.
- C. Subfloor Filler: White premix latex; type recommended by flooring material manufacturer.
- D. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of materials to sub-floor surfaces.

3.02 PREPARATION

- A. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with sub-floor filler.
- B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Grind irregularities above the surface level. Prohibit traffic until filler is cured.
- C. Vacuum clean substrate.
- D. Apply primer to surfaces required by flooring manufacturer.

3.03 INSTALLATION - FLOORING

- A. Apply in accordance with manufacturer's instructions.
- B. Apply each coat to minimum thickness indicated.
- C. Finish to smooth level surface.

3.04 PROTECTION

- A. Prohibit traffic on floor finish for 48 hours after installation.
- B. Barricade area to protect flooring until fully cured.

END OF SECTION

SECTION 09 9000 PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints, stains, and varnishes.
- C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.

1.02 REFERENCE STANDARDS

- A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; Current Edition.
- B. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.
- C. SSPC V1 (PM1) - Good Painting Practice: Painting Manual, Volume 1; Current Edition.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. 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.
 - 2. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens definitely not required.
- C. Manufacturer's Instructions: Indicate special surface preparation procedures.
- D. 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.
- E. Maintenance Materials: Furnish the following for the Owner's use in maintenance of project.
 - 1. Extra Paint and Finish Materials: 1 gallon (4 L) of each color; from the same product run, store where directed.
 - 2. Label each container with color in addition to the manufacturer's label.

1.04 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.

1.05 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes used in any individual system from the same manufacturer.

- B. Paints:
 - 1. Behr Process Corporation: www.behr.com.
 - 2. Benjamin Moore & Co: www.benjaminmoore.com.
 - 3. Diamond Vogel Paints: www.diamondvogel.com.
 - 4. Hirshfield's, Inc.: www.hirshfields.com.
 - 5. PPG Paints: www.ppgpaints.com.
 - 6. Pratt & Lambert Paints: www.prattandlambert.com.
 - 7. Sherwin-Williams Company: www.sherwin-williams.com.
 - 8. Valspar Corporation: www.valsparpaint.com.
- C. Primer Sealers: Same manufacturer as top coats.
- D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready mixed, unless 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.
- B. Flammability: Comply with applicable code for surface burning characteristics.
- C. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
- D. Colors:
 - 1. Selection to be made by Architect after award of contract.
 - 2. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to the Owner.

2.03 PAINT SYSTEMS - INTERIOR

- A. Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board, wood, plaster, uncoated steel, and shop primed steel.
 - 1. Two top coats and one coat primer.
 - 2. Top Coat(s): High Performance Architectural Interior Latex ; MPI #138, 139, 140, or 141.
 - 3. Top Coat Sheen:
 - a. Satin: MPI gloss level 4; use this sheen for items subject to frequent touching by occupants, including door frames and railings.
 - 4. Primer: As recommended by top coat manufacturer for specific substrate.
- B. Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals and wood:
 - 1. Medium duty applications include doors, door frames, railings, handrails, guardrails, and balustrades.
 - 2. Two top coats and one coat primer.
 - 3. Top Coat(s): Interior Epoxy-Modified Latex ; MPI #115 or 215.
 - 4. Top Coat Sheen:
 - a. Satin: MPI gloss level 4; use this sheen at all locations.
 - 5. Primer: As recommended by top coat manufacturer for specific substrate.
- C. Concrete / Masonry, Opaque, Latex, 3 Coats.
 - 1. One coat of block filler.

2. Semi-gloss: Two coats of latex enamel.
- D. Ferrous Metals, Primed, Alkyd, 2 Coat:
 1. Touch-up with alkyd primer.
 2. Gloss: Two coats of alkyd enamel.
 3. Semi-gloss: Two coats of alkyd enamel.

2.04 PRIMERS

- A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
 1. Interior Institutional Low Odor/VOC Primer Sealer ; MPI #149.
 - a. Products:
 - 1) PPG Paints Pure Performance Interior Latex Primer, 9-900.
 - 2) PPG Paints Speedhide zero Interior Latex Sealer, 6-4900XI. (MPI #149)
 - 3) Pratt & Lambert Pro-Hide Gold Interior Latex Zero VOC Primer. (MPI #149)
 - 4) Valspar Professional Interior Latex Zero VOC Primer, No. 11286. (MPI#149)
 - 5) Substitutions: See Section 01 6000 - Product Requirements.
 2. Anti-Corrosive Alkyd Primer for Metal ; MPI #79.
 - b. Products:
 - 1) Pratt & Lambert Alkyd Shopcoat Primer, OTC Compliant. (MPI #79)
 - 2) Pratt & Lambert Rust Inhibitive Metal Primer.
 - 3) Pratt & Lambert Universal HP Alkyd Metal Primer.
 - 4) Valspar Armor Anti-Rust Oil Metal Primer, No. 21852. (MPI #79)
 - 5) Valspar Controlz Interior Oil Stain Blocking Primer, No. 11920. (MPI#79)
 - 6) Substitutions: See Section 01 6000 - Product Requirements.

2.05 ACCESSORY MATERIALS

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

PART 3 EXECUTION

3.01 EXAMINATION

- A. 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 effect 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 are below the following maximums:
 1. Gypsum Wallboard: 12 percent.
 2. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or repair existing paints or finishes that exhibit surface defects.
- D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- E. Seal surfaces that might cause bleed through or staining of topcoat.

- F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- G. Concrete and masonry surfaces to be painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
- H. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- I. Ferrous Metal:
 - 1. Solvent clean according to SSPC-SP 1.
 - 2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
 - 3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.
- J. Metal Door Frames to be Painted: Prime metal door frame top and bottom edge surfaces.

3.03 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. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- F. Sand wood and metal surfaces lightly between coats to achieve required finish.
- G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

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

3.05 PROTECTION

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

END OF SECTION

**SECTION 12 9301
PLASTIC BOLLARD COVER**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Plastic bollard covers.

1.02 SUBMITTALS

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

PART 2 PRODUCTS

2.01 MATERIALS

- A. 1/8" Plastic Bollard Cover: Polyethylene Thermoplastic (HDPE) tubes having ultra-violet resistance and anti static properties, nominal thickness 0.125 inches.
 - 1. Color shall be OSHA yellow unless noted otherwise.
 - 2. Surface of sleeve to be smooth with round top, no ribbed or two piece systems accepted.
 - 3. Diameter: 5" (Field verify pipe diameter and size covers accordingly).
 - 4. Manufacturers:
 - a. Ideal Shield: www.idealshield.com.
 - b. Encore Commercials Products, Inc.: www.postguard.com.
 - c. Innoplast: www.innoplast.com.
 - d. Seton: www.seton.com.
 - e. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 INSTALLATION

- A. Bumper Post Sleeve: Install with manufacturers neoprene adhesive tape per manufacturers installation guidelines.

END OF SECTION

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**SECTION 21 0100
FIRE SUPPRESSION REQUIREMENTS**

PART 1 - GENERAL

1.01 APPLICABILITY

- A. The work covered by the Division of the Specifications consists of providing all labor, supervision, equipment, materials, all incidentals, related items and appurtenances, and performing all operations necessary to complete the installation of work in strict accordance with these specifications and drawings.
- B. All work shall be finished, tested, and ready for operation. The word "Provide" shall mean "furnish and install complete and ready for use".

1.02 DRAWINGS:

- A. The drawings indicate the extent and general layout of the mechanical systems intended for the building. Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings, connections, and accessories which may be required. Provide offsets, fittings, valves, and accessories as may be required, to produce a complete and operating installation of type shown and specified.
- B. Mechanical drawings are diagrammatic in nature and should not be scaled to obtain dimensions. Obtain dimensions and locations of partitions, walls, etc., from the Architectural dimensioned drawings. Consult the Architectural drawings for details of construction, location of suspended ceilings, ceiling heights, and other pertinent information. Architect's drawings shall not take precedence over field measurements.
- C. All drawings and specifications shall be considered in bidding. The drawings and specifications are complimentary, and what is called for in either of these shall be as binding as though called for by both. Should any conflict arise between drawings and specifications, such conflict shall be brought to the attention of the Architect.

1.03 APPROVED MANUFACTURERS

- A. Where approved manufacturers are indicated in the specifications, the approval does not relieve the responsibility of the contractor to provide products and systems which meet the requirements of the specifications and drawings.
- B. Performance, dimensions, electrical requirements, and functions shall be coordinated with the basis of design indicated on the drawings and in the specifications. If there are differences from the basis of design they should be brought to the attention of the Engineer.
- C. Revisions required by the differences from basis of design, shall be provided to the Owner without additional cost. Revisions to the work of other contractors on the project, due to differences in equipment, shall be provided by the contractor supplying the equipment at no additional cost to the Owner.

1.04 INSTRUCTION OF OWNER'S EMPLOYEES:

- A. Provide, without additional expense to the Owner, the services of competent instructors, who will give full instructions in the care, adjustment, and operation of all parts of the mechanical equipment to the Owner's employees who are to have charge of the equipment.
- B. An operating and maintenance manual shall be made available to the Owner's operating personnel during the instruction and left with the Owner upon completion of the instruction.
- C. Provide two (2) hours of instruction to the Owner's employees about the operation and maintenance requirements for the installed systems. Provide written documentation signed by the Owner's representative that the training was completed.

1.05 INSTALLATION OF EQUIPMENT:

- A. All appliances and equipment shall be installed and connected in accordance with manufacturer's instructions and recommendations unless such instructions are in conflict with these specifications.
- B. All equipment shall be installed in such a manner and location as to facilitate accessibility for maintenance and/or replacement.

1.06 COOPERATION WITH OTHER TRADES:

- A. Cooperate with other trades so as to avoid interferences. Where required to avoid interferences with other work or to increase the headroom, the Contractor shall off-set the piping and/or re-route the duct work where directed by the Engineer. Carefully check all construction details to assure the proper installation of all work under this specification. Schedule the work such that it will keep pace with the work of other crafts and cause no delay.

1.07 INSPECTION OF SITE:

- A. Before submitting a proposal on the work contemplated in these specifications and accompanying drawings, each bidder shall examine the site and familiarize himself with all of the existing conditions and limitations. No extras will be allowed because of Contractor's misunderstanding as to the amount of work involved or lack of his knowledge of any condition in connection with the new construction.

1.08 CODES, ORDINANCES, REGULATIONS, & STANDARDS:

- A. The entire installation shall be made in accordance with all state and local laws. If, in any instance, the plans and specifications conflict with such laws, the law shall take precedence. This, however, shall not be construed as relieving the contractor from complying with any requirements of the drawings and specifications that may be in excess of the rules and not contrary to the same.
- B. All work shall conform to applicable state and local codes, ordinances, regulations, and/or standards.

1.09 PERMITS, LICENSES AND FEES

- A. The contractor shall secure and pay for all the associated 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.

1.10 CONTRACTOR WARRANTIES

- A. Contractor shall guarantee all equipment, materials, and workmanship for a period of one year from the date of final completion. Any defects in equipment, materials or workmanship that appear or cause any issues within the one year period shall be repaired at no additional cost, (this shall include materials and labor). Refer to all other specification sections for additional guarantees/warranties requirements.
- B. All warranty time periods begin from the date of substantial completion.

PART 2 - PRODUCTS

2.01 OPERATION & MAINTENANCE MANUALS

- A. Contractor to provide Operation and Maintenance manuals to meet all requirements detailed by this section in addition to all requirements defined in Section 01 of this manual.
- B. The contractor shall furnish two (2) hard copy Operation and Maintenance Manuals for the mechanical systems.

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- C. Manuals shall be bound in new 3 ring binders, 2" D-ring, black color, with the title "Operations and Maintenance Manual" and the project title and volume number clearly printed on the front cover and spine of the binders.
 - D. Manual shall include an index in the front of each manual for the sections included in the manual. Each section shall be referenced with plastic tabs.
 - E. Include in the front of each manual a complete listing of all mechanical contractors and sub-contractors used on the project. Include names, addresses and phone numbers for each contracted listed.
 - F. Manuals shall be arranged by specification number. Each piece of equipment shall be referenced by tag number with tabs. At the beginning of each section, the equipment supplier's name, address and phone number shall be provided.
 - G. Data for equipment included in the manuals:
 - 1. Approved shop drawings clearly showing the models, sizes and capacities of equipment used. All shop drawings included in the manual shall have all review comments addressed.
 - 2. Operations Manuals detailing step by step procedures for putting equipment into operation.
 - 3. Maintenance Manuals from the manufacturer of each piece of equipment including instructions for installation, maintenance and lubrication. Manuals shall include parts lists for all replacement parts.
 - 4. All equipment warranty information with warranty registration completed in owners name.
 - H. Include the following reports in the manuals:
 - 1. Testing and balancing reports for air and water systems as specified.
 - 2. Start-up reports.
 - 3. Valve and damper tag lists.
 - I. Submit one hard copy of the Operation & Maintenance Manuals to the Engineer and the Contracting Officer for approval prior to delivery to the Owner.

2.02 SUB-BASES FOR EQUIPMENT:

- A. Sub-bases shall be provided for all equipment such as fans, water heaters, boilers, pumps, air compressors, and refrigeration machines. Each electric motor shall be mounted on the same sub-base as the driven machine.
- B. Sub-bases generally consist of pads constructed of 2500 psi concrete with all exposed surfaces finished with cement mortar, troweled smooth. Machines other than those supported on isolation units shall be secured to concrete sub-bases with anchor bolts of ample size. All machines having bed plates and flexible and solidly connected motors shall be grouted under the full area of the bed plates with a non-shrinking, premixed grout. After grout has set, all wedges, shims, and jack bolts shall be removed and spaces filled with grout.

2.03 SUPPORTING STEEL, ROOF AND WALL OPENINGS:

- A. Provide structural steel framework for supporting mechanical equipment as required.
- B. Unless otherwise indicated by the drawings, lintels for new mechanical openings shall be provided by the contractor installing the pipe or duct.
- C. Unless otherwise indicated by the drawings, angles to frame a new roof opening through the roof deck shall be provided by the contractor installing the pipe through the roof.
- D. All steel work shall be in conformance with the requirement of the AISC Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings. Material shall conform to ASTM A36.

2.04 SLEAVES, CUTTING, AND CORE DRILLING:

- A. Provide sleeves for piping and ductwork openings in masonry walls.
- B. The contractor shall saw cut or core drill existing masonry floors and walls for new piping penetrations. The contractor shall cut new openings through framed walls for piping penetrations. Provide headers as needed in frame walls.

2.05 FIRESTOPPING

- A. Provide firestopping assemblies for the required fire ratings and listed in the current year certification books of UL, FM or ITS (Warnock Hersey).
- B. See the Architectural drawings for required ratings. Refer to the Mechanical drawings for additional ratings. Provide firestopping for all penetrations of these assemblies.

2.06 SEALING PENETRATIONS IN NON-RATED WALLS AND FLOORS

- A. Provide caulk at penetrations of non-rated walls and floors for piping. If the gap is too large for caulk, provide fiberglass insulation for backing. Conceal the fiberglass with either caulk or sheetmetal. Refer to specifications for sleeve requirements.
- B. In mechanical rooms and other water-proof floor areas, provide sleeves or concrete pads at least 2" higher than the top of slab to prevent water from running through the annular space between the pipe and the floor opening. In addition to the sleeve, provide packing and caulking around the pipe inside the sleeve to prevent noise transmission through openings in the floor.

2.07 ACCESS DOORS IN CEILINGS AND WALLS

- A. Provide metal lockable access doors in gypsum board ceilings and walls where needed for access to valves. Coordinate the installation of the access doors with the ceiling contractor. Confirm the location of the panels with the Architect. Provide rated doors where required, refer to architects plans for rated walls/ceilings.

PART 3 - EXECUTION

3.01 FIRESTOPPING INSTALLATION

- A. Verify openings are ready to receive the firestopping. Modify the openings as required to accommodate the requirements for the certified assembly drawing for the firestopping material.
- B. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter that could adversely affect bond of firestopping material.
- C. Remove incompatible materials that could adversely affect bond.

END OF SECTION

**SECTION 21 0110
FIRE SUPPRESSION DEMOLITION**

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Contract documents and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections apply to this section.
- B. This section specifies the demolition and removal of all fire protection including but not limited to piping, controls and accessories in existing building.
- C. Unless otherwise noted in the Documents, all salvage items removed in connection with this Contract are to become the property of the Contractor, however the Owner shall have the first right of refusal on all equipment removed.

1.02 SUBMITTALS:

- A. Proposed Dust Control and Noise Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.
- B. Schedule of selective demolition activities:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 - 2. Interruption of building utility services.
 - 3. Coordination for shutoff, capping and continuation of services.
 - 4. Coordination of Owner's continued occupancy of portions of existing building and of Owner's occupancy of completed work.
- C. Pre-demolition photographs or videotape showing existing pre-demolition conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by selective demolition operations. Submit before demolition work begins.

1.03 PROJECT CONDITIONS:

- A. Owner will occupy portions of the building immediately adjacent to selective demolition area. Conduct demolition so Owner's operation will not be disturbed. Provide not less than 48 hours notice to Owner of activities that will affect the Owner's operations.
- B. Maintain existing services to Owner occupied areas during demolition if possible or coordinate interruption of services prior to demolition.
- C. Owner assumes no responsibility for condition of area to be selectively demolished.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
- E. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify the Owner. Hazardous materials will be removed by Owner under a separate contract.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Verify field measurements and piping arrangements are as shown on Drawings.

- B. Verify that abandoned equipment serves only abandoned facilities.
- C. Demolition drawings are based on causal field observation and existing record documents. The demolition Drawings are diagrammatic and show the general scope of demolition work and do not show all the construction detail of the original record drawings. Report discrepancies to the Project Engineer before disturbing existing installation.
- D. The Contractor shall visit the existing building and ground and review the existing building record drawings for details of existing installation to familiarize himself with existing conditions prior to submitting bid. No allowance will be made subsequently, in this connection, on behalf of the contractor for any error or negligence on his part.
- E. Beginning of demolition means the Contractor accepts existing conditions.

3.02 PREPARATION:

- A. Disconnect utilities in areas scheduled for removal. Notify Project Engineer and Owner of areas to be affected by fire protection demolition work prior to commencing.
- B. Disconnect fire protection controls in areas scheduled for removal. Notify Project Engineer and Owner of area to be affected by control demolition work prior to commencing.

3.03 SELECTIVE DEMOLITION AND EXTENSION OF EXISTING FIRE PROTECTION WORK:

- A. Demolish and remove from site, and extend existing mechanical work under provisions of this Division and as indicated on the Drawings unless otherwise noted.
- B. Salvage items noted to remain the property of the Owner shall be delivered to a location to be designated by the Owner. Contractor shall remove from construction areas all trash or debris as it accumulates and dispose of it off site at no additional cost to the Owner. All construction areas shall be kept clean, safe, and orderly at all times. At the completion and acceptance for work, Contractor shall remove from the site all debris and surplus materials resulting from this work and dispose of them off site at no additional cost to the Owner.
- C. Do not use cutting torches until work area is clear of flammable materials. At concealed spaces verify condition and contents of hidden space before starting flame cutting operations. Maintain Fire Watch and portable fire-suppression devices during flame-cutting operations. Maintain and evaluate ventilation during flame-cutting operations.
- D. Maintain ventilation for dust control during selective demolition process. Verify Owner requirements for dust control and conform to their standards for all demolition activities.
- E. Remove, relocate, and extend existing installations to accommodate new construction as required for proper installation and system operation.
- F. Remove all accessories above grade. When removing equipment or terminal devices all associated pipe, devices, wiring, etc. shall be removed and capped as required. Cut piping, tubing, etc. behind walls, above ceilings and below floors, and patch surfaces to match existing conditions. Finishes will be by others unless otherwise noted in documents.
- G. Neatly cut openings and holes plumb, square and true to dimension required. Use cutting methods least likely to damage construction to remain or adjoining construction. Cut and drill from exposed surfaces into concealed surfaces to avoid marring or spalling of finished surfaces. Temporarily cover openings to remain.
- H. Patch all openings created by removal of fire protection equipment, pipes, etc. unless noted as being patched by others. Openings to be patched to match existing with similar material and finish unless otherwise noted.
- I. Remove, relocate or provide brackets, hangers, and other accessories as required.
- J. Repair adjacent construction and finished damaged during demolition and extension work.
- K. Maintain access to existing mechanical installations, which remain active.

3.04 CLEANING AND REPAIR:

- A. Clean and repair existing materials and equipment, which remain or are to be returned to the Owner.
- B. All building surfaces damaged and openings left by new Work or the removal or relocation of fire protection equipment, piping, etc., shall be repaired to original condition and painted by the Contractor.

END OF SECTION

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**SECTION 21 0550
FIRE SUPPRESSION SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe, fittings, valves, and connections for sprinkler systems.
- B. Wet-pipe sprinkler system.
- C. System design, installation, and certification.

1.02 REFERENCES

- A. ASME (BPV IX) - Boiler and Pressure Vessel Code, Section IX - Welding and Brazing Qualifications; The American Society of Mechanical Engineers; 2004.
- B. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; The American Society of Mechanical Engineers; 2005.
- C. ASME B16.3 - Malleable Iron Threaded Fittings; The American Society of Mechanical Engineers; 1998 (R2006).
- D. ASME B16.4 - Gray Iron Threaded Fittings; The American Society of Mechanical Engineers; 1998 (R2006).
- E. ASME B16.9 - Factory-made Wrought Steel Buttwelding Fittings; The American Society of Mechanical Engineers; 2003.
- F. ASTM A 53/A 53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2006a.
- G. ASTM A 795/A 795M - Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use; 2004.
- H. NFPA 13 - Standard for the Installation of Sprinkler Systems; National Fire Protection Association; 2007.
- I. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.
- J. UL 262 - Gate Valves for Fire-Protection Service; Underwriters Laboratories Inc.; 2004.
- K. UL 312 - Check Valves for Fire-Protection Service; Underwriters Laboratories Inc.; 2004.
- L. MSS SP-69 - Pipe Hangers and Supports - Selection and Application; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2003.
- M. MSS SP-89 - Pipe Hangers and Supports - Fabrication and Installation Practices; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2003.

1.03 SUBMITTALS

- A. Product Data: Provide manufacturers catalogue information. Indicate valve data and ratings.
- B. Shop Drawings:
 - 1. Indicate hydraulic calculations, detailed pipe layout, hangers and supports, sprinklers, components and accessories. Indicate system controls.
 - 2. Submit shop drawings to authority having jurisdiction for approval. Submit proof of approval to Architect.
- C. Operation and Maintenance Data: Include components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Conform to UL, FM, and Warnock Hersey requirements.
- C. Valves: Bear UL label or marking. Provide manufacturer's name and pressure rating marked on valve body.
- D. Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.
- E. Design system under direct supervision of a Professional Engineer or NICET Certified experienced in design of this type of work and licensed in the State in which the Project is located.

1.05 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver and store valves in shipping containers, with labelling in place.
- B. Provide temporary protective coating on cast iron and steel valves.

1.06 EXTRA MATERIALS

- A. Provide extra sprinklers of type and size matching those installed, in quantity required by referenced NFPA design and installation standard.
- B. Provide suitable wrenches for each sprinkler type.
- C. Provide metal storage cabinet located adjacent to alarm valve.

PART 2 PRODUCTS

2.01 GENERAL SYSTEM AND PRODUCT REQUIREMENTS

- A. Sprinkler Systems: Conform work to NFPA 13.
- B. Welding Materials and Procedures: Conform to ASME Code.
- C. All welding of pipe shall be performed by AWS certified welders.

2.02 SPRINKLER SYSTEM REQUIREMENTS

- A. Sprinkler System: Building has an existing sprinkler system. Provide coverage for building areas noted on plans and any other areas requiring the fire sprinkler to be modified due to the installation of new equipment, ductwork, piping or conduit.
- B. Occupancy: Light hazard; comply with NFPA 13. Except where the drawings indicate different hazards.
- C. Water Supply: Determine volume and pressure from water flow test data.

2.03 SPRINKLERS

- A. Provide standard or extended coverage heads per NFPA 13 standards and sprinkler head manufacturer's recommendations.
- B. Refer to architects reflected ceiling plan for ceiling types and locations.
- C. Suspended Ceiling Type: Recessed pendant type with matching push on escutcheon plate.
 - 1. Finish: Chrome plated.
 - 2. Escutcheon Plate Finish: Chrome plated.
 - 3. Fusible Link: Glass bulb type temperature rated for specific area hazard.
- D. Gypsum Ceiling Type: Recessed pendant type with matching push on escutcheon plate.
 - 1. Finish: Chrome plated.
 - 2. Escutcheon Plate Finish: Chrome plated.
 - 3. Fusible Link: Glass bulb type temperature rated for specific area hazard.

- E. Exposed Area Type: Standard upright type .
 - 1. Finish: Brass.
 - 2. Fusible Link: Glass bulb type temperature rated for specific area hazard.
- F. Sidewall Type: Recessed horizontal sidewall type with matching push on escutcheon plate and guard.
 - 1. Finish: Chrome plated.
 - 2. Escutcheon Plate Finish: Chrome plated.
 - 3. Fusible Link: Glass bulb type temperature rated for specific area hazard.
- G. Contractor's Option for Flexible Drop System: Stainless steel, multiple use, open gate type.
 - 1. FM approved and UL listed system. The contractor shall verify suspended ceilings are in accordance with ASTM C-635 so that they will support the load of the hose and fittings.
 - 2. Application: Use to properly locate sprinkler heads.
 - 3. Include all supports and bracing.
 - 4. Provide braided type tube as required for the application.

2.04 PIPING SPECIALTIES

- A. Existing wet pipe alarm and flow switches to remain at current locations. Contractor to verify locations and connection to existing fire sprinkler riser.

2.05 ABOVE GROUND PIPING

- A. Steel Pipe: ASTM A 795 Schedule 7, Schedule 30, ASTM A 795 Schedule 10 or ASTM A 53 Schedule 40, black. Branch piping 3" and smaller can be threadable thinwall galvanized pipe, ASTM A-135.
 - 1. Steel Fittings: ASME B16.9, wrought steel, buttwelded.
 - 2. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings and ASME B16.4, threaded fittings.
 - 3. Malleable Iron Fittings: ASME B16.3, threaded fittings.
 - 4. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.
- B. CPVC plastic pipe will not be allowed.

2.06 PIPE HANGERS AND SUPPORTS

- A. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
- B. Hangers for Pipe Sizes 2 inches and Over: Carbon steel, adjustable, clevis.
- C. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- 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.
- F. Vertical Support: Steel riser clamp.
- G. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- H. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.07 GATE VALVES

- A. Up to and including 2 inches:
 - 1. Bronze body, bronze trim, rising stem, handwheel, solid wedge or disc, threaded ends.
- B. Over 2 inches:
 - 1. Iron body, bronze trim, rising stem pre-grooved for mounting tamper switch, handwheel, OS&Y, solid rubber covered bronze or cast iron wedge, flanged ends.

C. Over 4 inches:

1. Iron body, bronze trim, non-rising stem with bolted bonnet, solid bronze wedge, flanged ends, iron body indicator post assembly.

2.08 BALL VALVES

A. Up to and including 2 inches:

1. Bronze two piece body, brass, chrome plated bronze, or stainless steel ball, teflon seats and stuffing box ring, lever handle and balancing stops, threaded ends with union.

2.09 BUTTERFLY VALVES

A. Bronze Body:

1. Stainless steel disc, resilient replaceable seat, threaded or grooved ends, extended neck, handwheel and gear drive and integral indicating device, and built-in tamper proof switch rated 10 amp at 115 volt AC.

B. Cast or Ductile Iron Body

1. Cast or ductile iron, chrome or nickel plated ductile iron or aluminum bronze disc, resilient replaceable EPDM seat, wafer, lug, or grooved ends, extended neck, handwheel and gear drive and integral indicating device, and internal tamper switch rated 10 amp at 115 volt AC.

2.10 CHECK VALVES

A. Up to and including 2 inches:

1. Bronze body and swing disc, rubber seat, threaded ends.

B. Over 2 inches:

1. Iron body, bronze trim, swing check with rubber disc, renewable disc and seat, flanged ends with automatic ball check.

C. 4 inches and Over:

1. Iron body, bronze disc, stainless steel spring, resilient seal, threaded, wafer, or flanged ends.

2.11 DRAIN VALVES

A. Ball Valve:

1. Brass with cap and chain, 3/4 inch hose thread.

PART 3 EXECUTION**3.01 PREPARATION**

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and foreign material, from inside and outside, before assembly.

3.02 INSTALLATION

- A. Install and test sprinkler system and service main piping, hangers, and supports in accordance with NFPA 13.
- B. Perform all required acceptance tests as per NFPA 13.
- C. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- D. Install piping to conserve building space, to not interfere with use of space and other work.
- E. Group piping whenever practical at common elevations.
- F. Sleeve pipes passing through partitions, walls, and floors.
- G. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- H. Pipe Hangers and Supports:

1. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 2. Place hangers within 12 inches of each horizontal elbow.
 3. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 4. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
 5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- I. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
 - J. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
 - K. Do not penetrate building structural members unless indicated.
 - L. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
 - M. Install valves with stems upright or horizontal, not inverted. Remove protective coatings prior to installation.
 - N. Provide drain valves at main shut-off valves, low points of piping and apparatus.
 - O. Locate fire department connection with sufficient clearance from walls, obstructions, or adjacent siamese connectors to allow full swing of fire department wrench handle.
 - P. Place pipe runs to minimize obstruction to other work.
 - Q. Place piping in concealed spaces above finished ceilings.
 - R. Coordinate piping locations with other trades.
 - S. Center sprinklers in two directions in ceiling tile and provide piping offsets as required.
 - T. Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting. Replace painted sprinklers.
 - U. Flush entire piping system of foreign matter.
 - V. Install nail plates on all wood members when the pipe is within penetration distance of nails and screws.
 - W. Hydrostatically test entire system per NFPA 13 requirements.
 - X. The fire sprinkler contractor shall review the Architectural drawings and site conditions. Wet pipe sprinkler systems shall not be installed in exterior wall systems, roof systems, ventilated attics or any building cavity with potential for freezing temperatures. Ceiling spaces shall be separated from exterior walls or attics by taped drywall construction or similar air tight method to eliminate infiltration of outside air into the ceiling space. If they are not, the piping needs to be routed through a heated space instead of the ceiling space. Contact the Engineer in order to coordinate alternate pipe routing. Contact the Engineer or Architect to coordinate exposed piping in rooms other than mechanical rooms.

3.03 INTERFACE WITH OTHER PRODUCTS

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

END OF SECTION

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**SECTION 22 0100
PLUMBING GENERAL REQUIREMENTS**

PART 1 - GENERAL

1.01 APPLICABILITY

- A. The work covered by the Division of the Specifications consists of providing all labor, supervision, equipment, materials, all incidentals, related items and appurtenances, and performing all operations necessary to complete the installation of work in strict accordance with these specifications and drawings.
- B. All work shall be finished, tested, and ready for operation. The word "Provide" shall mean "furnish and install complete and ready for use".

1.02 DRAWINGS:

- A. The drawings indicate the extent and general layout of the mechanical systems intended for the building. Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings, connections, and accessories which may be required. Provide offsets, fittings, valves, and accessories as may be required, to produce a complete and operating installation of type shown and specified.
- B. Mechanical drawings are diagrammatic in nature and should not be scaled to obtain dimensions. Obtain dimensions and locations of partitions, walls, etc., from the Architectural dimensioned drawings. Consult the Architectural drawings for details of construction, location of suspended ceilings, ceiling heights, and other pertinent information. Architect's drawings shall not take precedence over field measurements.
- C. All drawings and specifications shall be considered in bidding. The drawings and specifications are complimentary, and what is called for in either of these shall be as binding as though called for by both. Should any conflict arise between drawings and specifications, such conflict shall be brought to the attention of the Architect.

1.03 SUBMITTALS

- A. All submittals to be reviewed, approved, and stamped by submitting contractor prior to submittal to engineer. Submittals not reviewed by submitting contractor prior to submittal to engineer will be returned marked "Not Reviewed".

1.04 APPROVED MANUFACTURERS

- A. Where approved manufacturers are indicated in the specifications, the approval does not relieve the responsibility of the contractor to provide products and systems which meet the requirements of the specifications and drawings.
- B. Performance, dimensions, electrical requirements, and functions shall be coordinated with the basis of design indicated on the drawings and in the specifications. If there are differences from the basis of design they should be brought to the attention of the Engineer.
- C. Revisions required by the differences from basis of design, shall be provided to the Owner without additional cost. Revisions to the work of other contractors on the project, due to differences in equipment, shall be provided by the contractor supplying the equipment at no additional cost to the Owner.

1.05 INSTRUCTION OF OWNER'S EMPLOYEES:

- A. Provide, without additional expense to the Owner, the services of competent instructors, who will give full instructions in the care, adjustment, and operation of all parts of the mechanical equipment to the Owner's employees who are to have charge of the equipment.
- B. An operating and maintenance manual shall be made available to the Owner's operating personnel during the instruction and left with the Owner upon completion of the instruction.

- C. Hours of instruction shall be divided up into a minimum of two (2) instruction periods. Provide a minimum of four (4) total hours of training for plumbing equipment and systems.

1.06 INSTALLATION OF EQUIPMENT:

- A. All appliances and equipment shall be installed and connected in accordance with manufacturer's instructions and recommendations unless such instructions are in conflict with these specifications.
- B. All equipment shall be installed in such a manner and location as to facilitate accessibility for maintenance and/or replacement.

1.07 COOPERATION WITH OTHER TRADES:

- A. Cooperate with other trades so as to avoid interferences. Where required to avoid interferences with other work or to increase the headroom, the Contractor shall off-set the piping and/or re-route the duct work where directed by the Engineer. Carefully check all construction details to assure the proper installation of all work under this specification. Schedule the work such that it will keep pace with the work of other crafts and cause no delay.

1.08 INSPECTION OF SITE:

- A. Before submitting a proposal on the work contemplated in these specifications and accompanying drawings, each bidder shall examine the site and familiarize himself with all of the existing conditions and limitations. No extras will be allowed because of Contractor's misunderstanding as to the amount of work involved or lack of his knowledge of any condition in connection with the new construction.

1.09 CODES, ORDINANCES, REGULATIONS, & STANDARDS:

- A. The entire installation shall be made in accordance with all state and local laws. If, in any instance, the plans and specifications conflict with such laws, the law shall take precedence. This, however, shall not be construed as relieving the contractor from complying with any requirements of the drawings and specifications that may be in excess of the rules and not contrary to the same.
- B. All work shall conform to applicable state and local codes, ordinances, regulations, and/or standards.

1.10 PERMITS, LICENSES AND FEES

- A. The contractor shall secure and pay for all the associated 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.

1.11 CONTRACTOR WARRANTIES

- A. Contractor shall guarantee all equipment, materials, and workmanship for a period of one year from the date of final completion. Any defects in equipment, materials or workmanship that appear or cause any issues within the one year period shall be repaired at no additional cost, (this shall include materials and labor). Refer to all other specification sections for additional guarantees/warranties requirements.
- B. All warranty time periods begin from the date of substantial completion.

PART 2 - PRODUCTS**2.01 OPERATION & MAINTENANCE MANUALS**

- A. Contractor to provide Operation and Maintenance manuals to meet all requirements detailed by this section in addition to all requirements defined in Section 01 of this manual.

- B. Manuals shall be bound in new 3 ring binders, 2" D-ring, black color, with the title "Operations and Maintenance Manual" and the project title and volume number clearly printed on the front cover and spine of the binders.
- C. Manual shall include an index in the front of each manual for the sections included in the manual. Each section shall be referenced with plastic tabs.
- D. Include in the front of each manual a complete listing of all mechanical contractors and sub-contractors used on the project. Include names, addresses and phone numbers for each contracted listed.
- E. Manuals shall be arranged by specification number. Each piece of equipment shall be referenced by tag number with tabs. At the beginning of each section, the equipment supplier's name, address and phone number shall be provided.
- F. Data for equipment included in the manuals:
 - 1. Approved shop drawings clearly showing the models, sizes and capacities of equipment used. All shop drawings included in the manual shall have all review comments addressed.
 - 2. Operations Manuals detailing step by step procedures for putting equipment into operation.
 - 3. Maintenance Manuals from the manufacturer of each piece of equipment including instructions for installation, maintenance and lubrication. Manuals shall include parts lists for all replacement parts.
 - 4. All equipment warranty information with warranty registration completed in owners name.
- G. Include the following reports in the manuals:
 - 1. Testing and balancing reports for air and water systems as specified.
 - 2. Start-up reports.
 - 3. Valve and damper tag lists.
- H. Submit one hard copy of the Operation & Maintenance Manuals to the Engineer and the Contracting Officer for approval prior to delivery to the Owner.

2.02 SUB-BASES FOR EQUIPMENT:

- A. Sub-bases shall be provided for all equipment such as water heaters, pumps, and air compressors. Each electric motor shall be mounted on the same sub-base as the driven machine.
- B. Sub-bases generally consist of pads constructed of 2500 psi concrete with all exposed surfaces finished with cement mortar, troweled smooth. Machines other than those supported on isolation units shall be secured to concrete sub-bases with anchor bolts of ample size. All machines having bed plates and flexible and solidly connected motors shall be grouted under the full area of the bed plates with a non-shrinking, premixed grout. After grout has set, all wedges, shims, and jack bolts shall be removed and spaces filled with grout.
- C. Premanufactured rooftop curbs and/or supports for any roof mounted item supplied under this division of the specifications shall be provided by the Mechanical Contractor. Sizes, locations, and installation shall be coordinated with the Roofing Contractor.

2.03 SUPPORTING STEEL, ROOF AND WALL OPENINGS:

- A. Provide structural steel framework for supporting mechanical equipment as required.
- B. Unless otherwise indicated by the drawings, lintels for new mechanical openings shall be provided by the contractor installing the pipe.
- C. Unless otherwise indicated by the drawings, angles to frame a new roof opening through the roof deck shall be provided by the contractor installing the pipe through the roof.

- D. All steel work shall be in conformance with the requirement of the AISC Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings. Material shall conform to ASTM A36.

2.04 SLEAVES, CUTTING, AND CORE DRILLING:

- A. Provide sleeves for piping openings in masonry walls.
- B. The contractor shall saw cut or core drill existing masonry floors and walls for new piping penetrations. The contractor shall cut new openings through framed walls for piping penetrations. Provide headers as needed in frame walls.

2.05 FIRESTOPPING

- A. Provide firestopping assemblies for the required fire ratings and listed in the current year certification books of UL, FM or ITS (Warnock Hersey).
- B. See the Architectural drawings for required ratings. Refer to the Mechanical drawings for additional ratings. Provide firestopping for all penetrations of these assemblies.

2.06 SEALING PENETRATIONS IN NON-RATED WALLS AND FLOORS

- A. Provide caulk at penetrations of non-rated walls and floors for piping. If the gap is too large for caulk, provide fiberglass insulation for backing. Conceal the fiberglass with either caulk or sheetmetal. Refer to specifications for sleeve requirements.
- B. In mechanical rooms and other water-proof floor areas, provide sleeves or concrete pads at least 2" higher than the top of slab to prevent water from running through the annular space between the pipe and the floor opening. In addition to the sleeve, provide packing and caulking around the pipe inside the sleeve to prevent noise transmission through openings in the floor.

2.07 ACCESS DOORS IN CEILINGS AND WALLS

- A. Provide metal lockable access doors in gypsum board ceilings and walls where needed for access to dampers or valves. Coordinate the installation of the access doors with the ceiling contractor. Confirm the location of the panels with the Architect. Provide rated doors where required, refer to architects plans for rated walls/ceilings.

PART 3 - EXECUTION

3.01 FIRESTOPPING INSTALLATION

- A. Verify openings are ready to receive the firestopping. Modify the openings as required to accommodate the requirements for the certified assembly drawing for the firestopping material.
- B. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter that could adversely affect bond of firestopping material.
- C. Remove incompatible materials that could adversely affect bond.

END OF SECTION

**SECTION 22 0110
PLUMBING DEMOLITION**

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Contract documents and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections apply to this section.
- B. This section specifies the demolition and removal of all plumbing equipment and distribution conduits including but not limited to piping, controls, insulation, plumbing fixtures and accessories in existing building.
- C. Unless otherwise noted in the Documents, all salvage items removed in connection with this Contract are to become the property of the Contractor, however the Owner shall have the first right of refusal on all equipment removed.

1.02 SUBMITTALS:

- A. Proposed Dust Control and Noise Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.
- B. Schedule of selective demolition activities:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 - 2. Interruption of building utility services.
 - 3. Coordination for shutoff, capping and continuation of services.
 - 4. Coordination of Owner's continued occupancy of portions of existing building and of Owner's occupancy of completed work.
- C. Pre-demolition photographs or videotape showing existing pre-demolition conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by selective demolition operations. Submit before demolition work begins.

1.03 PROJECT CONDITIONS:

- A. Owner will occupy portions of the building immediately adjacent to selective demolition area. Conduct demolition so Owner's operation will not be disturbed. Provide not less than 48 hours notice to Owner of activities that will affect the Owner's operations.
- B. Maintain existing services to Owner occupied areas during demolition if possible or coordinate interruption of services prior to demolition.
- C. Owner assumes no responsibility for condition of area to be selectively demolished.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
- E. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify the Owner. Hazardous materials will be removed by Owner under a separate contract.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Verify field measurements and piping arrangements are as shown on Drawings.

- B. Verify that abandoned equipment serves only abandoned facilities.
- C. Demolition drawings are based on causal field observation and existing record documents. The demolition Drawings are diagrammatic and show the general scope of demolition work and do not show all the construction detail of the original record drawings. Report discrepancies to the Project Engineer before disturbing existing installation.
- D. The Contractor shall visit the existing building and ground and review the existing building record drawings for details of existing installation to familiarize himself with existing conditions prior to submitting bid. No allowance will be made subsequently, in this connection, on behalf of the contractor for any error or negligence on his part.
- E. Beginning of demolition means the Contractor accepts existing conditions.

3.02 PREPARATION:

- A. Disconnect utilities in areas scheduled for removal. Notify Project Engineer and Owner of areas to be affected by plumbing demolition work prior to commencing.

3.03 SELECTIVE DEMOLITION AND EXTENSION OF EXISTING PLUMBING WORK:

- A. Demolish and remove from site, and extend existing mechanical work under provisions of this Division and as indicated on the Drawings unless otherwise noted.
- B. Salvage items noted to remain the property of the Owner shall be delivered to a location to be designated by the Owner. Contractor shall remove from construction areas all trash or debris as it accumulates and dispose of it off site at no additional cost to the Owner. All construction areas shall be kept clean, safe, and orderly at all times. At the completion and acceptance for work, Contractor shall remove from the site all debris and surplus materials resulting from this work and dispose of them off site at no additional cost to the Owner.
- C. Do not use cutting torches until work area is clear of flammable materials. At concealed spaces verify condition and contents of hidden space before starting flame cutting operations. Maintain Fire Watch and portable fire-suppression devices during flame-cutting operations. Maintain and evaluate ventilation during flame-cutting operations.
- D. Maintain ventilation for dust control during selective demolition process. Verify Owner requirements for dust control and conform to their standards for all demolition activities.
- E. Remove, relocate, and extend existing installations to accommodate new construction as required for proper installation and system operation.
- F. Remove all accessories above grade. When removing equipment or devices all associated pipe, wiring, etc. shall be removed and capped as required. Cut piping, tubing, etc. behind walls, above ceilings and below floors, and patch surfaces to match existing conditions. Finishes will be by others unless otherwise noted in documents.
- G. Neatly cut openings and holes plumb, square and true to dimension required. Use cutting methods least likely to damage construction to remain or adjoining construction. Cut and drill from exposed surfaces into concealed surfaces to avoid marring or spalling of finished surfaces. Temporarily cover openings to remain.
- H. Patch all openings created by removal of plumbing equipment, pipes, etc. unless noted as being patched by others. Openings to be patched to match existing with similar material and finish unless otherwise noted.
- I. Seal all existing roof penetrations, which will not be reused. Roof patching shall be the responsibility of the mechanical contractor.
- J. Remove, relocate or provide brackets, hangers, and other accessories as required.
- K. Repair adjacent construction and finished damaged during demolition and extension work.
- L. Maintain access to existing mechanical installations, which remain active.

3.04 CLEANING AND REPAIR:

- A. Clean and repair existing materials and equipment, which remain or are to be returned to the Owner.
- B. All building surfaces damaged and openings left by new Work or the removal or relocation of plumbing equipment, piping, etc., shall be repaired to original condition and painted by the Contractor.

END OF SECTION

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**SECTION 22 0553
PLUMBING IDENTIFICATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 SUBMITTALS

- A. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Piping: Pipe Markers or Stencils.
- B. Pumps: Nameplates.
- C. Valves: Tags and ceiling tacks where located above lay-in ceiling.

2.02 NAMEPLATES

- A. Description: Laminated three-layer plastic with engraved letters.
 - 1. Letter Color: White.
 - 2. Letter Height: 1/4 inch.
 - 3. Background Color: Black.

2.03 TAGS

- A. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- B. Chart: Typewritten letter size list framed behind glass and secured to the wall. Either a floor plan of the building indicating location of valve or describe location by room number, etc. Also include description of service and duty of valve, unless obvious from location on the floor plan.

2.04 STENCILS

- A. Stencils: With clean cut symbols and letters of following size:
 - 1. 3/4 to 1-1/4 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 1/2 inch high letters.
 - 2. 1-1/2 to 2 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 3/4 inch high letters.
 - 3. 2-1/2 to 6 inch Outside Diameter of Insulation or Pipe: 12 inch long color field, 1-1/4 inch high letters.
 - 4. 8 to 10 inch Outside Diameter of Insulation or Pipe: 24 inch long color field, 2-1/2 inch high letters.
 - 5. Over 10 inch Outside Diameter of Insulation or Pipe: 32 inch long color field, 3-1/2 inch high letters.
 - 6. Ductwork and Equipment: 2-1/2 inch high letters.

2.05 PIPE MARKERS

- A. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

- B. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

- A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Identify valves in main and branch piping with tags.
- E. Identify piping, concealed above the ceiling or exposed within equipment rooms and tunnels, with stencilled painting. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

3.03 IDENTIFICATION SCHEDULES

- A. Chart: Submit valve chart, including valve tag number, location, function, and valve manufacturer's name and model number. Locate valve chart in mechanical room.
- B. Plumbing Systems
 - 1. Domestic Hot Water
 - a. Stencil
 - b. Pipe Markers
 - 2. Domestic Cold Water
 - a. Stencil
 - b. Pipe Markers
 - 3. Recirculating Hot Water
 - a. Stencil
 - b. Pipe Markers
 - 4. Sanitary Drain
 - a. Stencil
 - b. Pipe Markers
 - c. Pipe Markers
 - 5. Storm Drain
 - a. Stencil
 - b. Pipe Markers
 - 6. System Main Shut-off Valves
 - a. Brass Identification Tag
 - 7. Balancing Valves
 - a. Brass Identification Tag

END OF SECTION

SECTION 22 0719
PLUMBING PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping insulation.

1.02 REFERENCE STANDARDS

- A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019.
- B. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2019.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2020.
- D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- E. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- B. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum five years of experience.

1.05 DELIVERY, STORAGE, AND HANDLING

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

1.06 FIELD CONDITIONS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

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

2.02 GLASS FIBER

- A. Insulation: ASTM C547 and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
 - 1. K Value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum Service Temperature: 650 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- B. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.

2.03 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
 - 1. Minimum Service Temperature: Minus 40 degrees F.
 - 2. Maximum Service Temperature: 220 degrees F.
 - 3. Connection: Waterproof vapor barrier adhesive.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with North American Insulation Manufacturers Association (NAIMA) National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- D. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- E. Glass fiber insulated pipes conveying fluids below ambient temperature:
 - 1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- F. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- G. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
- H. Glass fiber insulated pipes conveying fluids above ambient temperature:
 - 1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
 - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- I. Inserts and Shields:
 - 1. Application: Piping 1-1/2 inches diameter or larger.
 - 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 - 3. Insert Location: Between support shield and piping and under the finish jacket.
 - 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
 - 5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
- J. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions.

3.03 SCHEDULES

- A. Plumbing Systems:
 - 1. Domestic Hot Water Supply:

- a. Glass Fiber Insulation:
 - 1) 1-1/4" and less: 1 inch
 - 2) 1 1/2" to 3": 1 1/2 inch
 - 3) 4" and larger: 1 1/2 inch
2. Domestic Hot Water Recirculation:
 - a. Glass Fiber Insulation:
 - 1) 1-1/4" and less: 1 inch
 - 2) 1 1/2" to 3": 1 1/2 inch
 - 3) 4" and larger: 1 1/2 inch
3. Domestic Cold Water:
 - a. Glass Fiber Insulation:
 - 1) 1-1/4" and less: 1 inch
 - 2) 1 1/2" to 3": 1 1/2 inch
 - 3) 4" and larger: 1 1/2 inch
 - 4) 1/2" Piping Downstream of Distribution Manifolds: No Insulation Requirement
4. Roof Drain Bodies:
 - a. Glass Fiber Insulation:
 - 1) All sizes: 1 inch
5. Rain Leaders Above Grade:
 - a. Glass Fiber Insulation:
 - 1) All sizes: 1 inch
6. Plumbing Vents Within 10 Feet of the Exterior:
 - a. Glass Fiber Insulation:
 - 1) All sizes: 1 inch

END OF SECTION

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SECTION 23 0100
HVAC GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 APPLICABILITY

- A. The work covered by the Division of the Specifications consists of providing all labor, supervision, equipment, materials, all incidentals, related items and appurtenances, and performing all operations necessary to complete the installation of work in strict accordance with these specifications and drawings.
- B. All work shall be finished, tested, and ready for operation. The word "Provide" shall mean "furnish and install complete and ready for use".

1.02 DRAWINGS:

- A. The drawings indicate the extent and general layout of the mechanical systems intended for the building. Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings, connections, and accessories which may be required. Provide offsets, fittings, valves, and accessories as may be required, to produce a complete and operating installation of type shown and specified.
- B. Mechanical drawings are diagrammatic in nature and should not be scaled to obtain dimensions. Obtain dimensions and locations of partitions, walls, etc., from the Architectural dimensioned drawings. Consult the Architectural drawings for details of construction, location of suspended ceilings, ceiling heights, and other pertinent information. Architect's drawings shall not take precedence over field measurements.
- C. All drawings and specifications shall be considered in bidding. The drawings and specifications are complimentary, and what is called for in either of these shall be as binding as though called for by both. Should any conflict arise between drawings and specifications, such conflict shall be brought to the attention of the Architect.

1.03 SUBMITTALS

- A. All submittals to be reviewed, approved, and stamped by submitting contractor prior to submittal to engineer. Submittals not reviewed by submitting contractor prior to submittal to engineer will be returned marked "Not Reviewed".

1.04 APPROVED MANUFACTURERS

- A. Requests for substitution of materials and/or equipment other than those named in the specifications may be made to the Engineer. The request shall be made in duplicate and shall include a request for approval or substitution, pre-addressed, postage pre-paid envelope and information relating to the suitability of the product. No requests by fax. Requests shall be in the Engineer's office not later than ten (10) days prior to Bid Date. Addenda will publish the approved requests.
- B. Where approved manufacturers are indicated in the specifications, the approval does not relieve the responsibility of the contractor to provide products and systems which meet the requirements of the specifications and drawings.
- C. Performance, dimensions, electrical requirements, and functions shall be coordinated with the basis of design indicated on the drawings and in the specifications. If there are differences from the basis of design they should be brought to the attention of the Engineer.
- D. Revisions required by the differences from basis of design, shall be provided to the Owner without additional cost. Revisions to the work of other contractors on the project, due to differences in equipment, shall be provided by the contractor supplying the equipment at no additional cost to the Owner.

1.05 INSTRUCTION OF OWNER'S EMPLOYEES:

- A. Provide, without additional expense to the Owner, the services of competent instructors, who will give full instructions in the care, adjustment, and operation of all parts of the mechanical equipment to the Owner's employees who are to have charge of the equipment.
- B. An operating and maintenance manual shall be made available to the Owner's operating personnel during the instruction and left with the Owner upon completion of the instruction.
- C. The instruction provided for each system shall be as specified in other sections of this specification. Have the Owner's employees sign a statement that they were present for the training session. Submit a copy of the sign-in sheet with close-out documents.

1.06 INSTALLATION OF EQUIPMENT:

- A. All appliances and equipment shall be installed and connected in accordance with manufacturer's instructions and recommendations unless such instructions are in conflict with these specifications.
- B. All equipment shall be installed in such a manner and location as to facilitate accessibility for maintenance and/or replacement.
- C. As a part of the work of this contract, the Mechanical Contractor shall make any changes in the pulleys, belts, and dampers, and shall install additional dampers required for correct balance as recommended by air balance agency, at no additional cost to the Owner.
- D. The use of permanent HVAC system for temporary heating, cooling, ventilating and air conditioning is prohibited.

1.07 COOPERATION WITH OTHER TRADES:

- A. Cooperate with other trades so as to avoid interferences. Where required to avoid interferences with other work or to increase the headroom, the Contractor shall off-set the piping and/or re-route the duct work where directed by the Engineer. Carefully check all construction details to assure the proper installation of all work under this specification. Schedule the work such that it will keep pace with the work of other crafts and cause no delay.

1.08 INSPECTION OF SITE:

- A. Before submitting a proposal on the work contemplated in these specifications and accompanying drawings, each bidder shall examine the site and familiarize himself with all of the existing conditions and limitations. No extras will be allowed because of Contractor's misunderstanding as to the amount of work involved or lack of his knowledge of any condition in connection with the new construction.

1.09 CODES, ORDINANCES, REGULATIONS, & STANDARDS:

- A. The entire installation shall be made in accordance with all state and local laws. If, in any instance, the plans and specifications conflict with such laws, the law shall take precedence. This, however, shall not be construed as relieving the contractor from complying with any requirements of the drawings and specifications that may be in excess of the rules and not contrary to the same.
- B. All work shall conform to applicable state and local codes, ordinances, regulations, and/or standards.

1.10 PERMITS, LICENSES AND FEES

- A. The contractor shall secure and pay for all the associated 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.

1.11 CONTRACTOR WARRANTIES

- A. Contractor shall guarantee all equipment, materials, and workmanship for a period of one year from the date of final completion. Any defects in equipment, materials or workmanship that appear or cause any issues within the one year period shall be repaired at no additional cost, (this shall include materials and labor). Refer to all other specification sections for additional guarantees/warranties requirements.
- B. All warranty time periods begin from the date of substantial completion.

PART 2 - PRODUCTS

2.01 OPERATION & MAINTENANCE MANUALS

- A. Contractor to provide Operation and Maintenance manuals to meet all requirements detailed by this section in addition to all requirements defined in Section 01 of this manual.
- B. The contractor shall furnish two (2) hard copy Operation and Maintenance Manuals for the mechanical systems.
- C. Manuals shall be bound in new 3 ring binders, 2" D-ring, black color, with the title "Operations and Maintenance Manual" and the project title and volume number clearly printed on the front cover and spine of the binders.
- D. Manual shall include an index in the front of each manual for the sections included in the manual. Each section shall be referenced with plastic tabs.
- E. Include in the front of each manual a complete listing of all mechanical contractors and sub-contractors used on the project. Include names, addresses and phone numbers for each contracted listed.
- F. Manuals shall be arranged by specification number. Each piece of equipment shall be referenced by tag number with tabs. At the beginning of each section, the equipment supplier's name, address and phone number shall be provided.
- G. Data for equipment included in the manuals:
 - 1. Approved shop drawings clearly showing the models, sizes and capacities of equipment used. All shop drawings included in the manual shall have all review comments addressed.
 - 2. Operations Manuals detailing step by step procedures for putting equipment into operation.
 - 3. Maintenance Manuals from the manufacturer of each piece of equipment including instructions for installation, maintenance and lubrication. Manuals shall include parts lists for all replacement parts.
 - 4. All equipment warranty information with warranty registration completed in owners name.
- H. Include the following reports in the manuals:
 - 1. Testing and balancing reports for air and water systems as specified.
 - 2. Start-up reports.
 - 3. Valve and damper tag lists.
- I. Submit one hard copy of the Operation & Maintenance Manuals to the Engineer and the Contracting Officer for approval prior to delivery to the Owner.

2.02 SUB-BASES FOR EQUIPMENT:

- A. Sub-bases shall be provided for all equipment such as fans, water heaters, boilers, pumps, air compressors, and refrigeration machines. Each electric motor shall be mounted on the same sub-base as the driven machine.
- B. Sub-bases generally consist of pads constructed of 2500 psi concrete with all exposed surfaces finished with cement mortar, troweled smooth. Machines other than those supported on isolation units shall be secured to concrete sub-bases with anchor bolts of ample size. All

machines having bed plates and flexible and solidly connected motors shall be grouted under the full area of the bed plates with a non-shrinking, premixed grout. After grout has set, all wedges, shims, and jack bolts shall be removed and spaces filled with grout.

- C. Premanufactured rooftop curbs and/or supports for any roof mounted item supplied under this division of the specifications shall be provided by the Mechanical Contractor. Sizes, locations, and installation shall be coordinated with the Roofing Contractor. Where the roof is pitched, the curb shall be designed for the pitch of the roof. Curbs shall be insulated.

2.03 MECHANICAL ANCHORS TO CONCRETE

- A. Anchors shall have current ICC-ES report that demonstrates compliance with ACI 355.2 supplemented by ICC-ES AC 193.

2.04 SUPPORTING STEEL, ROOF AND WALL OPENINGS:

- A. Provide structural steel framework for supporting mechanical equipment as required.
- B. Unless otherwise indicated by the drawings, lintels for new mechanical openings shall be provided by the contractor installing the pipe or duct.
- C. Unless otherwise indicated by the drawings, angles to frame a new roof opening through the roof deck shall be provided by the contractor installing the pipe or duct through the roof.
- D. All steel work shall be in conformance with the requirement of the AISC Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings. Material shall conform to ASTM A36.

2.05 SLEAVES, CUTTING, AND CORE DRILLING:

- A. Provide sleeves for piping and ductwork openings in masonry walls.
- B. The contractor shall saw cut or core drill existing masonry floors and walls for new ductwork and/or piping penetrations. The contractor shall cut new openings through framed walls for ductwork and/or piping penetrations. Provide headers as needed in frame walls.

2.06 FIRESTOPPING

- A. Provide firestopping assemblies for the required fire ratings and listed in the current year certification books of UL, FM or ITS (Warnock Hersey).
- B. See the Architectural drawings for required ratings. Refer to the Mechanical drawings for additional ratings. Provide firestopping for all penetrations of these assemblies.

2.07 SEALING PENETRATIONS IN NON-RATED WALLS AND FLOORS

- A. Provide caulk at penetrations of non-rated walls and floors for ductwork and piping. If the gap is too large for caulk, provide fiberglass insulation for backing. Conceal the fiberglass with either caulk or sheetmetal. Refer to specifications for sleeve requirements.
- B. In mechanical rooms and other water-proof floor areas, provide sleeves or concrete pads at least 2" higher than the top of slab to prevent water from running through the annular space between the duct or pipe and the floor opening. In addition to the sleeve, provide packing and caulking around the duct or pipe inside the sleeve to prevent noise transmission through openings in the floor.

2.08 ACCESS DOORS IN CEILINGS AND WALLS

- A. Provide metal lockable access doors in gypsum board ceilings and walls where needed for access to dampers or valves. Coordinate the installation of the access doors with the ceiling contractor. Confirm the location of the panels with the Architect. Provide rated doors where required, refer to architects plans for rated walls/ceilings.

PART 3 - EXECUTION

3.01 FIRESTOPPING INSTALLATION

- A. Verify openings are ready to receive the firestopping. Modify the openings as required to accommodate the requirements for the certified assembly drawing for the firestopping material.
- B. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter that could adversely affect bond of firestopping material.
- C. Remove incompatible materials that could adversely affect bond.

END OF SECTION

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**SECTION 23 0110
HVAC DEMOLITION**

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Contract documents and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections apply to this section.
- B. This section specifies the demolition and removal of all HVAC, equipment and distribution conduits including but not limited to ductwork, air outlets, piping, controls, insulation and accessories in existing building.
- C. Unless otherwise noted in the Documents, all salvage items removed in connection with this Contract are to become the property of the Contractor, however the Owner shall have the first right of refusal on all equipment removed.

1.02 SUBMITTALS:

- A. Proposed Dust Control and Noise Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.
- B. Schedule of selective demolition activities:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 - 2. Interruption of building utility services.
 - 3. Coordination for shutoff, capping and continuation of services.
 - 4. Coordination of Owner's continued occupancy of portions of existing building and of Owner's occupancy of completed work.
- C. Pre-demolition photographs or videotape showing existing pre-demolition conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by selective demolition operations. Submit before demolition work begins.

1.03 PROJECT CONDITIONS:

- A. Owner will occupy portions of the building immediately adjacent to selective demolition area. Conduct demolition so Owner's operation will not be disturbed. Provide not less than 48 hours notice to Owner of activities that will affect the Owner's operations.
- B. Maintain existing services to Owner occupied areas during demolition if possible or coordinate interruption of services prior to demolition.
- C. Owner assumes no responsibility for condition of area to be selectively demolished.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
- E. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify the Owner. Hazardous materials will be removed by Owner under a separate contract.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Verify field measurements and existing ductwork arrangements are as shown on Drawings.

- B. Verify that abandoned equipment serves only abandoned facilities.
- C. Demolition drawings are based on causal field observation and existing record documents. The demolition Drawings are diagrammatic and show the general scope of demolition work and do not show all the construction detail of the original record drawings. Report discrepancies to the Project Engineer before disturbing existing installation.
- D. The Contractor shall visit the existing building and ground and review the existing building record drawings for details of existing installation to familiarize himself with existing conditions prior to submitting bid. No allowance will be made subsequently, in this connection, on behalf of the contractor for any error or negligence on his part.
- E. Beginning of demolition means the Contractor accepts existing conditions.

3.02 PREPARATION:

- A. Disconnect HVAC systems in areas scheduled for removal. Notify Project Engineer and Owner of areas to be affected by hvac demolition work prior to commencing.
- B. Disconnect automatic temperature controls in areas scheduled for removal. Notify Project Engineer and Owner of area to be affected by control demolition work prior to commencing.

3.03 SELECTIVE DEMOLITION AND EXTENSION OF EXISTING HVAC WORK:

- A. Demolish and remove from site, and extend existing hvac work under provisions of this Division and as indicated on the Drawings unless otherwise noted.
- B. Salvage items noted to remain the property of the Owner shall be delivered to a location to be designated by the Owner. Contractor shall remove from construction areas all trash or debris as it accumulates and dispose of it off site at no additional cost to the Owner. All construction areas shall be kept clean, safe, and orderly at all times. At the completion and acceptance for work, Contractor shall remove from the site all debris and surplus materials resulting from this work and dispose of them off site at no additional cost to the Owner.
- C. Do not use cutting torches until work area is clear of flammable materials. At concealed spaces verify condition and contents of hidden space before starting flame cutting operations. Maintain Fire Watch and portable fire-suppression devices during flame-cutting operations. Maintain and evaluate ventilation during flame-cutting operations.
- D. Maintain ventilation for dust control during selective demolition process. Verify Owner requirements for dust control and conform to their standards for all demolition activities.
- E. Remove, relocate, and extend existing installations to accommodate new construction as required for proper installation and system operation.
- F. Remove all accessories above grade. When removing hvac equipment or terminal devices all associated pipe, duct, ATC devices, wiring, etc. shall be removed and capped as required. Cut piping, duct, tubing, etc. behind walls, above ceilings and below floors, and patch surfaces to match existing conditions. Finishes will be by others unless otherwise noted in documents.
- G. Neatly cut openings and holes plumb, square and true to dimension required. Use cutting methods least likely to damage construction to remain or adjoining construction. Cut and drill from exposed surfaces into concealed surfaces to avoid marring or spalling of finished surfaces. Temporarily cover openings to remain.
- H. Patch all openings created by removal of hvac equipment, ATC devices, duct, pipes, etc. unless noted as being patched by others. Openings to be patched to match existing with similar material and finish unless otherwise noted.
- I. Seal all existing roof penetrations, which will not be reused. Roof patching shall be the responsibility of the mechanical contractor.
- J. Remove, relocate or provide brackets, hangers, and other accessories as required.
- K. Repair adjacent construction and finished damaged during demolition and extension work.

- L. Maintain access to existing mechanical installations, which remain active.

3.04 CLEANING AND REPAIR:

- A. Clean and repair existing materials and equipment, which remain or are to be returned to the Owner.
- B. All building surfaces damaged and openings left by new Work or the removal or relocation of hvac equipment, piping, etc., shall be repaired to original condition and painted by the Contractor.

END OF SECTION

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**SECTION 23 0514
VARIABLE-FREQUENCY MOTOR CONTROLLERS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Variable frequency controllers.

1.02 REFERENCES

- A. NEMA ICS 7.1 - Safety Standards for Construction and Guide for Selection, Installation, and Operation of Adjustable Speed Drive Systems; National Electrical Manufacturers Association; 2006.
- B. NEMA ICS 7 - Industrial Control and Systems: Adjustable Speed Drives; National Electrical Manufacturers Association; 2006.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2003.
- D. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

1.03 SUBMITTALS

- A. Product Data: Provide catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.
- B. Shop Drawings: Indicate front and side views of enclosures with overall dimensions and weights shown; conduit entrance locations and requirements; and nameplate legends.
- C. Test Reports: Indicate field test and inspection procedures and test results.
- D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. Manufacturer's Field Reports: Indicate start-up inspection findings.
- F. Operation Data: NEMA ICS 7.1. Include instructions for starting and operating controllers, and describe operating limits that may result in hazardous or unsafe conditions. The AC Drive manufacturer shall supply a comprehensive 8-1/2 x 11-inch bound instruction/installation manual that includes wiring diagrams, layout diagrams, and outline dimensions. This manual must be 3-hole punched for insertion in a shop manual supplied by the installing contractor.
- G. Maintenance Data: NEMA ICS 7.1. Include routine preventive maintenance schedule.

1.04 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to components, enclosure, and finish.

1.06 MAINTENANCE SERVICE

- A. Provide service and maintenance of controller for one year from Date of Substantial Completion.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Square D; Model Altivar S-Flex 21: www.squared.com.
- B. Allen Bradley; Model Power Flex 40.
- C. ABB; Model ACH580
- D. Danfoss; Model VLT
- E. Taco SmartDrive (As manufactured by Danfoss, Model VLT)
- F. Yaskawa; Model HV600

2.02 DESCRIPTION

- A. Variable Frequency Controllers: Enclosed controllers suitable for operating the indicated loads, in conformance with requirements of NEMA ICS 7. Select unspecified features and options in accordance with NEMA ICS 3.1.
 - 1. Employ microprocessor-based inverter logic isolated from power circuits.
 - 2. Employ pulse-width-modulated inverter system.
 - 3. Design for ability to operate controller with motor disconnected from output.
 - 4. AC Drive shall be sized to operate a variable torque load.
 - 5. The speed range shall be from a minimum speed of 1.0 Hz to a maximum speed of 60 Hz.
 - 6. The AC Drive shall be protected against short circuits, between output phases and to ground.
 - 7. For a fault condition other than a ground fault, short circuit or internal fault, an auto restart function will provide up to 6 programmable restart attempts. The time delay before restart attempts will be 30 seconds.
 - 8. The AC Drive shall have a solid-state UL 508 C listed overload protective device and meet IEC 60947.
- B. Enclosures: NEMA 250, Type 1, suitable for equipment application in places regularly open to the public. The enclosure shall provide a fully coordinated 22 kAIC rating marked on the enclosure nameplate. Short circuit coordination to UL 508C Power Conversion Equipment and NEMA ICS 7.1.
- C. Finish: Manufacturer's standard enamel.

2.03 OPERATING REQUIREMENTS

- A. Displacement Power Factor: Between 1.0 and 0.95, lagging, over entire range of operating speed and load.
- B. Operating Ambient: 0 degrees C to 40 degrees C.
- C. Minimum Efficiency at Full Load: 97 percent.
- D. Current Limit Adjustment: 110 percent of rated.
- E. Acceleration Rate Adjustment: 0.1 to 999 seconds.
- F. Deceleration Rate Adjustment: 0.1 to 999 seconds.
- G. Input Signal: 4 to 20 mA DC or 0 to 10 volts, 2 inputs.
- H. Output: 1 analog 4 to 20 mA or 0 to 10 volt, selectable.
- I. 0.96 displacement power factor minimum.

- J. Class 10 overload protection.
- K. Adjustable switching frequency from 6 to 16 kHz.
- L. Provide 3 percent line reactor for harmonic mitigation.

2.04 COMPONENTS

- A. Display: Provide integral digital display to indicate output voltage, output frequency, and output current. Indicators for overcurrent, overvoltage, ground fault, overtemperature, and input power ON. Provide programming buttons, LOCAL/REMOTE button, stop button, run button with run status indicator.
- B. Furnish HAND-OFF-AUTOMATIC selector switch and manual speed control.
- C. Control Power Source: Separate circuit.
- D. Door Interlocks: Furnish mechanical means to prevent opening of equipment with power connected, or to disconnect power if door is opened; include means for defeating interlock by qualified persons.
- E. Safety Interlocks: Furnish terminals for remote contact to inhibit starting under both manual and automatic mode. The combination enclosure shall include terminal point connection for fire /freeze state interlock, to prevent drive operation.
- F. Control Interlocks: Furnish terminals for remote contact to allow starting in automatic mode.
- G. Disconnecting Means: Include integral fused disconnect switch or circuit breaker on the line side of each controller. Provide mechanism to padlock in the OFF position.
 - 1. Provide 3 spare fuses for fused disconnect switch per drive.
- H. Wiring Terminations: Match conductor materials and sizes indicated.

2.05 SOURCE QUALITY CONTROL

- A. Shop inspect and perform standard productions tests for each controller.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surface is suitable for controller installation.
- B. Do not install controller until building environment can be maintained within the service conditions required by the manufacturer.

3.02 INSTALLATION

- A. Install in accordance with NEMA ICS 7.1 and manufacturer's instructions.
- B. Tighten accessible connections and mechanical fasteners after placing controller.
- C. Provide fuses in fusible switches; refer to Section 26 2813 for product requirements.
- D. Provide shaft grounding kits on all motors with variable frequency drives installed on them.
- E. Provide engraved plastic nameplates.
- F. Neatly type label inside each motor controller door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating. Place in clear plastic holder.

3.03 MANUFACTURER'S FIELD SERVICES

- A. Provide the service of the manufacturer's field representative to prepare and start controllers.
- B. The AC Drive manufacturer shall provide a factory certified technical representative to inspect the contractor's installation, test and start-up the AC Drive(s) furnished under this specification. The start-up service shall be quoted as a separate line item.

3.04 ADJUSTING

- A. Make final adjustments to installed controller to assure proper operation of load system. Obtain performance requirements from installer of driven loads.

3.05 DEMONSTRATION

- A. Demonstrate operation of controllers in automatic and manual modes.
- B. Provide on-site training course of 2 hours shall be provided by a representative of the AC Drive manufacturer to plant and/or maintenance personnel.

END OF SECTION

SECTION 23 0519
METERS AND GAUGES FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pressure gauges and pressure gauge taps.
- B. Thermometers and thermometer wells.
- C. Static pressure gauges.

1.02 REFERENCE STANDARDS

- A. ASME B40.100 - Pressure Gauges and Gauge Attachments; 2013.
- B. UL 393 - Indicating Pressure Gauges for Fire-Protection Service; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.
- C. Project Record Documents: Record actual locations of components and instrumentation.

PART 2 PRODUCTS

2.01 PRESSURE GAUGES

- A. Pressure Gauges: ASME B40.100, UL 393 drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.
 - 1. Case: Steel with brass bourdon tube.
 - 2. Size: 4-1/2 inch diameter.
 - 3. Mid-Scale Accuracy: One percent.
 - 4. Scale: Psi.

2.02 PRESSURE GAUGE TAPPINGS

- A. Gauge Cock: Tee or lever handle, brass for maximum 150 psi.

2.03 SOLAR POWERED DIGITAL THERMOMETERS

- A. Omega SPT10 or equivalent.
- B. Case: Hi-impact ABS
- C. Range: -40 to 150°C (-40 to 300°F)
- D. Display: 9.5 mm (3/8") High LCD digits
- E. Case: Hi-impact ABS
- F. Range: -40 to 150°C (-40 to 300°F)
- G. Display: 9.5 mm (3/8") High LCD digits
- H. Accuracy: 1% of reading or 1°, whichever is greater
- I. Autorange Resolution:
 - 1. 1°: -40 to 27°C (-40 to 19°F)
 - 2. 0.1°: -28.0 to 93.0°C (-19.9 to 199.9°F)
 - 3. 1°: 94 to 150°C (200 to 300°F)
- J. Recalibration: Internal potentiometer
- K. Lux Rating: 10 Lux (1' candle)

- L. Display Update: 10 seconds
- M. Ambient Operating: -30 to 140°F
- N. Ambient Temp Error: Zero
- O. Humidity: 95% RH non-condensing
- P. Sensor: Glass passivated thermistor
- Q. Stem interchangeable with industrial glass thermometers.

2.04 TEST PLUGS

- A. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with neoprene core for temperatures up to 200 degrees F.

2.05 STATIC PRESSURE GAUGES

- A. 3-1/2 inch diameter dial in metal case, diaphragm actuated, black figures on white background, front recalibration adjustment, 2 percent of full scale accuracy.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide one pressure gauge per pump, installing taps before strainers and on suction and discharge of pump. Pipe to gauge.
- C. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inch for installation of thermometer sockets. Ensure sockets allow clearance from insulation.
- D. Install thermometer sockets adjacent to controls system thermostat, transmitter, or sensor sockets. Where thermometers are provided on local panels, duct or pipe mounted thermometers are not required.
- E. Provide instruments with scale ranges selected according to service with largest appropriate scale.
- F. Install gauges and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
- G. Adjust gauges and thermometers to final angle, clean windows and lenses, and calibrate to zero.
- H. Locate test plugs adjacent thermometers and thermometer sockets.

END OF SECTION

SECTION 23 0553
HVAC IDENTIFICATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Adhesive Film Labels.
- C. Tags.
- D. Stencils.

1.02 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2015.

1.03 SUBMITTALS

- A. Chart and Schedule: Submit a valve chart and schedule, including valve tag number, location and function.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Identification of Equipment Outside the Building:
 - 1. **All equipment provided by Division 23 outside the building shall be identified with laminated engraved plastic nameplates. Printed labels will not be accepted. Equipment outside the building may be on the roof, mounted on the exterior wall, set on grade, or other locations exposed to weather. Common equipment outside the building may include, but is not limited to, the following: exhaust fans, packaged rooftop units, make-up air units, condensing units, air cooled chillers, cooling towers, drycoolers, dust collectors, and pumps.**
- B. Identification Inside the Building:
 - 1. Air Handling Units, Energy Recovery Units, Heat Pumps, Furnaces, Fan Coil Units, Exhaust Fans and similar fan systems: Adhesive film labels..
 - 2. Automatic Controls: Tags or Adhesive film labels. Key to control schematic.
 - 3. Control Panels: Adhesive film labels.
 - 4. Dampers: Tags or adhesive film labels on the actuator.
 - 5. Piping: Stencilled painting.
 - 6. Small-sized Equipment: Tags.
 - 7. Thermostats: Adhesive film labels behind the cover.
 - 8. Valves: Tags . Key to the plans and the valve schedule.
 - 9. Balancing Valves: Tags indicating design gpm and pressure drop. Key to the equipment served.

2.02 NAMEPLATES

- A. Description: Laminated three-layer plastic with engraved letters.
 - 1. Letter Color: White.
 - 2. Letter Height: 1/2 inch.
 - 3. Background Color: Black.

2.03 ADHESIVE FILM LABELS

- A. Description: Machine printed, black letters, by thermal transfer or equivalent process on a white background. Minimum letter height shall be 1/2 inch. The laminated label shall provide a durable surface resistant to water, glycol, heat and cold.

2.04 TAGS

- A. Metal Tags: Aluminum or brass with stamped letters or with an adhesive film label; tag size minimum 1-1/2 inch diameter with smooth edges.
- B. Chart: Typewritten letter size list in anodized aluminum frame. Either a floor plan of the building indicating location of valve or describe location by room number, etc. Also include description of service and duty of valve, unless obvious from location on the floor plan.

2.05 STENCILS

- A. Stencils: With clean cut symbols and letters of following size:
 - 1. 3/4 to 1-1/4 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 1/2 inch high letters.
 - 2. 1-1/2 to 2 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 3/4 inch high letters.
 - 3. 2-1/2 to 6 inch Outside Diameter of Insulation or Pipe: 12 inch long color field, 1-1/4 inch high letters.
 - 4. 8 to 10 inch Outside Diameter of Insulation or Pipe: 24 inch long color field, 2-1/2 inch high letters.
 - 5. Over 10 inch Outside Diameter of Insulation or Pipe: 32 inch long color field, 3-1/2 inch high letters.
 - 6. Ductwork and Equipment: 2-1/2 inch high letters.
- B. Stencil Paint: As specified in Section 09 9123, semi-gloss enamel, colors complying with ASME A13.1.

PART 3 EXECUTION**3.01 PREPARATION**

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Section 09 9123 for stencil painting.

3.02 INSTALLATION

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install identification labels at locations for the most convenient viewing without interference with operation and maintenance of equipment.
- C. Install tags with corrosion resistant chain.
- D. Apply stencil painting in accordance with Section 09 9123.
- E. Tag automatic controls, instruments, and relays. Key to control schematic.
- F. Identify piping concealed above accessible ceilings with stencilled painting. Piping in equipment rooms, garages, tunnels and similar un-finished type spaces shall be identified with stencilled painting. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with the axis of piping. Location of identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION

SECTION 23 0593
TESTING, ADJUSTING, AND BALANCING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Testing, adjustment, and balancing of air systems.
- B. Testing, adjustment, and balancing of hydronic and plumbing recirculating hot water systems.

1.02 REFERENCE STANDARDS

- A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition; 2016.
- B. AABC MN-1 - AABC National Standards for Total System Balance; 2002.
- C. NEBB (TAB) - Procedural Standard for Testing, Adjusting and Balancing of Environmental Systems; 2019, with Errata (2022).
- D. SMACNA - HVAC Air Duct Leakage Test Manual, current edition.

1.03 SUBMITTALS

- A. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
 - 1. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
 - 2. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
 - 3. Form of Test Reports: Reports in accordance with one of the referenced standards.
 - 4. Units of Measure: Report data in I-P (inch-pound) units only.

PART 2 EXECUTION

2.01 GENERAL REQUIREMENTS

- A. Perform total system balance in accordance with one of the following:
 - 1. AABC (NSTSB), AABC National Standards for Total System Balance.
 - 2. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
 - 3. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute.
 - 4. SMACNA (TAB).
- B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
- C. TAB Agency Qualifications:
 - 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
 - 2. Certified by one of the following:
 - a. AABC, Associated Air Balance Council: upon completion submit AABC National Performance Guaranty.
 - b. NEBB, National Environmental Balancing Bureau.
 - c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute.
- D. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

2.02 EXAMINATION

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

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

2.03 ADJUSTMENT TOLERANCES

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

2.04 RECORDING AND ADJUSTING

- A. Ensure recorded data represents actual measured or observed conditions.
- B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- C. Mark on drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.
- D. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- E. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- F. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.

2.05 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities.
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct. A pitot tube traverse shall be required at each supply, return, exhaust, outside air, and relief air fan unless otherwise noted.
- C. Measure air quantities at air inlets and outlets.

- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
- F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- G. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
- H. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- I. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.
- J. For variable air volume system powered units set volume controller to air flow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable air volume temperature control.
- K. For variable air volume system, report the minimum required duct static pressure at the pressure transducer location(s) in order to provide design supply air quantities. Transmit in writing the required minimum pressure to the temperature controls subcontractor for programming the variable speed drive.
- L. Test air handling system in economizer mode. Verify proper operation and adjust, if necessary.

2.06 WATER SYSTEM PROCEDURE

- A. Adjust water systems to provide required or design quantities.
- B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gages to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.
- C. Effect system balance with automatic control valves fully open to heat transfer elements.
- D. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.
- E. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.
- F. For variable volume hydronic systems, report the minimum required pipe pressure at the pressure transducer location(s) in order to provide design supply water flows. Transmit in writing the required minimum pressure to the temperature controls subcontractor for programming the variable speed drive.

2.07 SCOPE

- A. Test, adjust, and balance all mechanical and plumbing equipment indicated on the drawings and specifications. Submit reports on NEBB or AABC forms.

END OF SECTION

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**SECTION 23 0713
DUCT INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Duct insulation.

1.02 REFERENCE STANDARDS

- A. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).
- B. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014 (Reapproved 2019).
- C. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2019.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2020.
- E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- F. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Revised 2009).
- G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 QUALITY ASSURANCE

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

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.05 FIELD CONDITIONS

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

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

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

2.02 GLASS FIBER, FLEXIBLE

- A. Insulation: ASTM C553; flexible, noncombustible blanket.
 - 1. 'K' value: maximum 0.31 at 75 degrees F, when tested in accordance with ASTM C 518. Lower 'K' values may be required in some cases to meet the required R-value in the schedule.
 - 2. Maximum Water Vapor Absorption: 5.0 percent by weight.

- B. Vapor Barrier Jacket:
 - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
 - 2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
 - 3. Secure with pressure sensitive tape.
- C. Tie Wire: Annealed steel, 16 gage, 0.0508 inch diameter.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Test ductwork for design pressure prior to applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Insulated Duct Application:
 - 1. Provide insulation with vapor barrier jackets.
 - 2. Finish with tape and vapor barrier jacket.
 - 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
 - 4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- D. Duct and Plenum Liner Application:
 - 1. Adhere insulation with adhesive for 100 percent coverage.
 - 2. Secure insulation with mechanical liner fasteners. Refer to SMACNA (DCS) for spacing.
 - 3. Seal and smooth joints. Seal and coat transverse joints.
 - 4. Seal liner surface penetrations with adhesive.
 - 5. Duct dimensions indicated are clear inside dimensions. Upsize duct as needed for thickness of liner.
 - 6. Ductwork indicated as lined on the drawings shall also be provided with external insulation as scheduled unless specifically excluded.

3.03 SCHEDULES

- A. R-values listed in the schedule are minimum values. The requirement is for installed R-value assuming 25% compression of the insulation. PCF is an abbreviation for pounds per cubic foot.
- B. Exhaust Ducts Within 10 ft of Exterior Openings:
 - 1. Flexible Glass Fiber: 2 inches thick, 1.50 pcf
- C. Outside Air Intake, Relief Ducts & Outside/Return Mixed Air Ducts:
 - 1. Flexible Glass Fiber: 2 inches thick, 1.50 pcf
- D. Supply Ducts in concealed spaces:
 - 1. Flexible Glass Fiber: 2 inches thick, 0.75 pcf (R-5)
- E. Insulated Flexible Ducts: R-5

END OF SECTION

SECTION 23 0719
HVAC PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping insulation.

1.02 REFERENCE STANDARDS

- A. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2013).
- B. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation; 2017.
- C. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2020.
- D. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2019.
- E. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2017, with Editorial Revision (2018).
- F. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2019.
- G. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2018).
- H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2020.
- I. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- J. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum five years of experience.

1.04 DELIVERY, STORAGE, AND HANDLING

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

1.05 FIELD CONDITIONS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

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

2.02 GLASS FIBER

- A. Insulation: ASTM C547 and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
 - 1. Maximum Service Temperature: 650 degrees F.
 - 2. Maximum Moisture Absorption: 0.2 percent by volume.

- B. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.

2.03 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
 - 1. Minimum Service Temperature: Minus 40 degrees F.
 - 2. Maximum Service Temperature: 180 degrees F.
 - 3. Connection: Waterproof vapor barrier adhesive.
- B. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Test piping for design pressure, liquid tightness, and continuity prior to applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- D. Insulated Pipes Conveying Fluids Below Ambient Temperature:
 - 1. Insulate entire system, including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- E. Glass Fiber Insulated Pipes Conveying Fluids Below Ambient Temperature:
 - 1. Provide vapor barrier jackets, factory-applied or field-applied; secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- F. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- G. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
- H. Glass Fiber Insulated Pipes Conveying Fluids Above Ambient Temperature:
 - 1. Provide standard jackets, with or without vapor barrier, factory-applied, or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples.
 - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- I. Inserts and Shields:
 - 1. Application: Piping 1-1/2 inches diameter or larger.
 - 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 - 3. Insert location: Between support shield and piping and under the finish jacket.
 - 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
 - 5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

- J. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions.
- K. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping. Provide two coats of UV resistant finish for flexible elastomeric cellular insulation without jacketing.

3.03 SCHEDULE

- A. Heating Systems:
 - 1. Heating Supply and Return (Glycol and Non-Glycol):
 - a. Glass Fiber
 - 1) 1-1/4" and less: 1 1/2 inch
 - 2) 1-1/2" and larger: 2 inch
- B. Cooling Systems:
 - 1. Chilled Water:
 - a. Glass Fiber
 - 1) 4" and less: 1 1/2 inch
 - 2) 5" and larger: 2 inch
 - 2. Refrigerant Suction:
 - a. Flexible Elastomeric
 - 1) 1" and less: 1/2 inch
 - 2) 1 1/4" and larger: 1 inch
 - 3. Refrigerant Hot Gas:
 - a. Flexible Elastomeric
 - 1) 1" and less: 1/2 inch
 - 2) 1 1/4" and larger: 1 inch

END OF SECTION

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**SECTION 23 0913
INSTRUMENTATION AND CONTROL DEVICES****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Control panels.
- B. Control Valves:
 - 1. Globe pattern.
 - 2. Electronic operators.
- C. Damper Operators:
- D. Input/Output Sensors:
 - 1. Temperature sensors.
- E. Thermostats:
 - 1. Electric room thermostats.
- F. Transmitters:
 - 1. Pressure transmitters.
 - 2. Air pressure transmitters.
- G. Nitrogen Dioxide and Carbon Monoxide Detector

1.02 REFERENCE STANDARDS

- A. AMCA 500-D - Laboratory Methods of Testing Dampers for Rating; 2018.
- B. NEMA BS 31032 - Residential Controls--Electrical Wall-Mounted Room Thermostats; 2025.
- C. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.

1.03 SUBMITTALS

- A. Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.
- B. Shop Drawings: Indicate complete operating data, system drawings, wiring diagrams, and written detailed operational description of sequences. Submit schedule of valves indicating size, flow, and pressure drop for each valve. For automatic dampers indicate arrangement, velocities, and static pressure drops for each system.

1.04 QUALITY ASSURANCE

- A. Designer Qualifications: Design system under direct supervision of a Professional Engineer experienced in design of this work and licensed in the State in which the Project is located.
- B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section with minimum five years experience approved by manufacturer.

PART 2 PRODUCTS**2.01 EQUIPMENT - GENERAL**

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

2.02 CONTROL PANELS

AFRC Bldg 3420, Minot, ND

Owner: The Adjutant General, State of ND

Section 23 0913 - 2

- A. Unitized cabinet type for each system under automatic control with relays and controls mounted in cabinet and temperature indicators, pressure gauges, pilot lights, push buttons and switches flush on cabinet panel face.
- B. NEMA EN 10250, general purpose utility enclosures with enameled finished face panel.
- C. Provide common keying for all panels.

2.03 NITROGEN DIOXIDE AND CARBON MONOXIDE DETECTOR

- A. Manufacturers:
 - 1. Brasch
 - 2. Honeywell
 - 3. Belimo
 - 4. Tox-Alert
 - 5. AGS
- B. The detector shall be an ETL listed unit containing a control board and sensor board that conforms completely to the UL 3111-1 and UL 2075 standards.
- C. The NEMA 1 enclosure shall be constructed of heavy polycarbonate plastic, which consists of two pieces, cover and chassis. The cover shall close flush with the sides of the box and shall require a special tool to open it. The sensor module shall be protected from damage inside the enclosure and the cover shall contain screened openings to allow proper sensing. The openings shall conform to the UL 3111-1 standard and UL 2075 standards.
- D. The detector shall contain an electro-chemical carbon monoxide (CO) sensor with temperature compensation circuits and an electro-chemical nitrogen dioxide (NO₂) sensor. The enclosure shall be provided with four, 1/2" pre-punched openings for connection of field conduit. The detector shall include factory-installed wiring that exits the enclosure and allows for installation without the detector being opened.
- E. The detector shall be protected against static discharge, excessive electrical noise, and tested for safety in accordance with the UL 3111-1 standard.
- F. The detector shall have a 0.5" minimum height, liquid crystal display (LCD) that will continually display the current nitrogen dioxide (NO₂) and carbon monoxide (CO) level, in parts per million. The detector shall have a green "power" LED, a yellow "sensor-active" LED, a red "low-alert" LED, a red "high-alert" LED and a red "alarm" LED.
- G. The detector shall contain a power supply fuse rated for 0.400 amp at 250 VAC, (if 24 VAC powered), or 0.125 amp at 250 VAC, (if 120 VAC powered). Each output relay shall have a fuse rated for 5 amp at 250 VAC. Fuses shall be of the time-lag type.
- H. Provide override switch to operate the make-up air unit and exhaust fan from detector.
- I. An external push button on the front of the enclosure shall be provided to silence the 106 dB internal alarm. The alarm circuit shall become active again, once the detector is no longer at alarm levels.
- J. Output relays providing a normally closed set of contacts for the low-alert and for the alarm shall be provided. These relays shall provide a fail-safe that will automatically activate ventilation equipment upon power loss to the sensor. The low-alert and high-alert relays shall be capable of being configured in the field for a two speed fan or for 50%/100% fan control operations. These relays shall be suitable for the connection of 24 VAC, 24 VA inductive circuits.
- K. Switches shall be provided for field adjustment of the gas detection level for the low-alert, and of the on/off time delay for the low-alert and high-alert. Selectable CO detection levels shall range from 20 to 55 ppm and the NO₂ detection levels shall range from 0.3 to 4.0 ppm. Selectable time delays shall range from 0 to 7 minutes, in 1 minute increments.

- L. Provide multiple sensors in the garage for the floor area and in accordance with the rating of the sensor.
- M. Provide all wiring in conduit from the sensors to the controller. Provide power to the controller from a spare circuit. Provide all relays, wiring and conduit to control the MAUs, dampers and exhaust fans from the controller.

2.04 CONTROL VALVES

- A. Globe Pattern:
 - 1. Hydronic Systems:
 - a. Rate for service pressure of 125 psig at 250 degrees F.
 - b. Size for 3 psig maximum pressure drop at design flow rate.
- B. Electronic Operators:
 - 1. Select operator for full shut off at maximum pump differential pressure.

2.05 DAMPER OPERATORS

- A. Direct Coupled Electronic Operators:
 - 1. Spring return control damper actuators shall be direct coupled type which require no crankarm and linkage and be capable of direct mounting. The actuator must provide proportional damper control in response to a 2 to 10 VDC or a 4 to 20 mA control input from an electronic controller or positioner.
 - 2. The actuators must be designed so that they may be used for either clockwise or counterclockwise fail-safe operation.
 - 3. Actuators shall have control direction of rotation switch accessible on its cover. Actuators shall use a brushless DC motor controlled by a microprocessor and be protected from overload at all angles of rotation. Run time shall be constant, and independent of torque. A 2 to 10 VDC feedback signal shall be provided for position feedback or master-slave applications.
 - 4. Actuators shall be UL listed and CSA certified, have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards.
 - 5. Verify damper operator requirements, including but not limited to voltage, with controls contractor prior to purchase of dampers.

2.06 INPUT/OUTPUT SENSORS

- A. Temperature Sensors:
 - 1. Use thermistor or RTD type temperature sensing elements with characteristics resistant to moisture, vibration, and other conditions consistent with the application without affecting accuracy and life expectancy.

2.07 THERMOSTATS

- A. Electric Room Thermostats:
 - 1. Type: NEMA BS 31032, 24 volts, with setback/setup temperature control.
 - 2. Service: Cooling and heating.

2.08 TRANSMITTERS

- A. Pressure Transmitters:
- B. Air Pressure Transmitters:
 - 1. General: Provide dry media differential pressure transducers to monitor duct and room pressure.
 - a. Accuracy: Plus/minus 1 percent f.s. (full scale) of selected range (combined linearity & hysteresis).

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that systems are ready to receive work.
- C. Beginning of installation means installer accepts existing conditions.
- D. Sequence work to ensure installation of components is complementary to installation of similar components in other systems.
- E. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.
- F. Ensure installation of components is complementary to installation of similar components.
- G. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Check and verify location of thermostats with plans and room details before installation. Locate 48 inches above floor.
- C. Provide conduit and electrical wiring in accordance with Section 26 0583. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.
- D. Provide all power, transformers, relays, control wiring, conduit and all other electrical components as required to control the mechanical equipment. Provide all wiring in conduit.

3.03 SCHEDULES

- A. Control Valve Schedule (Normal Position)
 - 1. Unit Heaters - Normally Open.
 - 2. Hot Water Coils - Normally Open.

END OF SECTION

SECTION 23 0923
DIRECT-DIGITAL CONTROL SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. System description.
- B. Operator interface.
- C. Power supplies and line filtering.
- D. System software.
- E. Controller software.

1.02 SUBMITTALS

- A. Product Data: Provide data for each system component and software module.
- B. Shop Drawings:
 - 1. Indicate trunk cable schematic showing programmable control unit locations, and trunk data conductors.
 - 2. Indicate system graphics indicating monitored systems, data (connected and calculated) point addresses, and operator notations. Provide demonstration digital media containing graphics.
 - 3. Show system configuration with peripheral devices, batteries, power supplies, diagrams, modems, and interconnections.
 - 4. Indicate description and sequence of operation of operating, user, and application software.
- C. Manufacturer's Instructions: Indicate manufacturer's installation instructions for all manufactured components.
- D. Designer's Qualification Statement.
- E. Installer's Qualification Statement.
- F. Project Record Documents: Record actual locations of control components, including control units, thermostats, and sensors.
- G. Operation and Maintenance Data:
 - 1. Include interconnection wiring diagrams complete field installed systems with identified and numbered, system components and devices.
 - 2. Include keyboard illustrations and step-by-step procedures indexed for each operator function.
 - 3. Include inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
- H. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.03 QUALITY ASSURANCE

- A. Perform work in accordance with NFPA 70.
- B. Designer Qualifications: Perform design of system using manufacturer's software 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.
- C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years of documented experience.
- D. Installer Qualifications: Company specializing in performing work of the type specified and with minimum five years of documented experience and approved by manufacturer.

- E. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for purpose specified and indicated.

1.04 WARRANTY

- A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.
- B. Provide five year manufacturer's warranty for field programmable micro-processor based units.

1.05 PROTECTION OF SOFTWARE RIGHTS

- A. Prior to delivery of software, the Owner and the party providing the software will enter into a software license agreement with provisions for the following:
 - 1. Limiting use of software to equipment provided under these specifications.
 - 2. Limiting copying.
 - 3. Preserving confidentiality.
 - 4. Prohibiting transfer to a third party.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Johnson Controls Metasys

2.02 SEQUENCE OF OPERATIONS:

- A. Refer to plans for sequence of operation.
- B. Provide front-end graphics for all new equipment with alarms and adjustable setpoints on the building's existing front-end controller.
- C. Remove all obsolete controls as required. Remove all obsolete graphics from front end controls.

2.03 SYSTEM DESCRIPTION

- A. Automatic temperature control field monitoring and control system using field programmable micro-processor based units.
- B. Base system on distributed system of fully intelligent, stand-alone controllers, operating in a multi-tasking, multi-user environment on token passing network, with central and remote hardware, software, and interconnecting wire and conduit.
- C. Include computer software and hardware, operator input/output devices, control units, local area networks (LAN), sensors, control devices, actuators.
- D. Controls for variable air volume terminals, radiation, reheat coils, unit heaters, fan coils, and the like when directly connected to the control units. Individual terminal unit control is specified in Section 23 0913.
- E. Provide control systems consisting of thermostats, control valves, dampers and operators, indicating devices, interface equipment and other apparatus and accessories required to operate mechanical systems, and to perform functions specified.
- F. DDC contractor to coordinate all building controls power requirements with electrical contractor. All costs associated with building controls power requirements to be by DDC contractor.
- G. Include installation and calibration, supervision, adjustments, and fine tuning necessary for complete and fully operational system.

2.04 OPERATOR INTERFACE

- A. PC Based Work Station:
 - 1. Connected to server for full access to all system information.
- B. Workstation, controllers, and control backbone to communicate using BACnet protocol and addressing.

- C. Hardware:
 - 1. Connect to existing hardware system.

2.05 CONTROLLERS

- A. Building Controllers:
 - 1. General:
 - a. Manage global strategies by one or more, independent, standalone, microprocessor based controllers.
 - b. Provide sufficient memory to support controller's operating system, database, and programming requirements.
 - c. Share data between networked controllers.
 - d. Controller operating system manages input and output communication signals allowing distributed controllers to share real and virtual object information and allowing for central monitoring and alarms.
 - e. Utilize real-time clock for scheduling.
 - f. Continuously check processor status and memory circuits for abnormal operation.
 - g. Controller to assume predetermined failure mode and generate alarm notification upon detection of abnormal operation.
 - h. Communication with other network devices to be based on assigned protocol.
 - 2. Communication:
 - a. Controller to reside on a BACnet network using ISO 8802-3 (ETHERNET) Data Link/Physical layer protocol.
 - b. Perform routing when connected to a network of custom application and application specific controllers.
 - c. Provide service communication port for connection to a portable operator's terminal or hand held device with compatible protocol.
 - 3. Anticipated Environmental Ambient Conditions:
 - a. Outdoors and/or in Wet Ambient Conditions:
 - 1) Mount within waterproof enclosures.
 - 2) Rated for operation at 40 to 150 degrees F.
 - b. Conditioned Space:
 - 1) Mount within dustproof enclosures.
 - 2) Rated for operation at 32 to 120 degrees F.
 - 4. Provisions for Serviceability:
 - a. Diagnostic LEDs for power, communication, and processor.
 - b. Make all wiring connections to field removable, modular terminal strips, or to a termination card connected by a ribbon cable.
 - 5. Memory: In the event of a power loss, maintain all BIOS and programming information for a minimum of 72 hours.
 - 6. Power and Noise Immunity:
 - a. Maintain operation at 90 to 110 percent of nominal voltage rating.
 - b. Perform orderly shutdown below 80 percent of nominal voltage.
 - c. Operation protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W. at 3 feet.
- B. Input/Output Interface:
 - 1. Hardwired inputs and outputs tie into the DDC system through building, custom application, or application specific controllers.
 - 2. All Input/Output Points:
 - a. Protect controller from damage resulting from any point short-circuiting or grounding and from voltage up to 24 volts of any duration.

- b. Provide universal type for building and custom application controllers where input or output is software designated as either binary or analog type with appropriate properties.
- 3. Binary Inputs:
 - a. Allow monitoring of On/Off signals from remote devices.
 - b. Provide wetting current of 12 mA minimum, compatible with commonly available control devices and protected against the effects of contact bounce and noise.
 - c. Sense dry contact closure with power provided only by the controller.
- 4. Pulse Accumulation Input Objects: Comply with all requirements of binary input objects and accept up to 10 pulses per second.
- 5. Analog Inputs:
 - a. Allow for monitoring of low voltage 0 to 10 VDC, 4 to 20 mA current, or resistance signals (thermistor, RTD).
 - b. Compatible with and field configurable to commonly available sensing devices.
- 6. Binary Outputs:
 - a. Used for On/Off operation or a pulsed low-voltage signal for pulse width modulation control.
 - b. Outputs provided with three position (On/Off/Auto) override switches.
 - c. Status lights for building and custom application controllers to be selectable for normally open or normally closed operation.
- 7. Analog Outputs:
 - a. Monitoring signal provides a 0 to 10 VDC or a 4 to 20 mA output signal for end device control.
 - b. Provide status lights and two position (AUTO/MANUAL) switch for building and custom application controllers with manually adjustable potentiometer for manual override on building and custom application controllers.
 - c. Drift to not exceed 0.4 percent of range per year.
- 8. Tri State Outputs:
 - a. Coordinate two binary outputs to control three point, floating type, electronic actuators without feedback.
 - b. Limit the use of three point, floating devices to the following zone and terminal unit control applications:
 - c. Control algorithms run the zone actuator to one end of its stroke once every 24 hours for verification of operator tracking.
- 9. System Object Capacity:
 - a. System size to be expandable to twice the number of input output objects required by providing additional controllers, including associated devices and wiring.
 - b. Hardware additions or software revisions for the installed operator interfaces are not to be required for future, system expansions.

2.06 POWER SUPPLIES AND LINE FILTERING

- A. Power Supplies:
 - 1. Provide UL listed control transformers with Class 2 current limiting type or over-current protection in both primary and secondary circuits for Class 2 service as required by the NEC.
 - 2. Limit connected loads to 80 percent of rated capacity.
 - 3. Match DC power supply to current output and voltage requirements.
 - 4. Unit to be full wave rectifier type with output ripple of 5.0 mV maximum peak to peak.
 - 5. Regulation to be 1 percent combined line and load with 100 microsecond response time for 50 percent load changes.
 - 6. Provide over-voltage and over-current protection to withstand a 150 percent current overload for 3 seconds minimum without trip-out or failure.

7. Operational Ambient Conditions: 32 to 120 degrees F.
 8. EM/RF meets FCC Class B and VDE 0871 for Class B and MIL-STD-810 for shock and vibration.
 9. Line voltage units UL recognized and CSA approved.
- B. Power Line Filtering:
1. Provide external or internal transient voltage and surge suppression component for all workstations and controllers.
 2. Minimum surge protection attributes:
 - a. Dielectric strength of 1000 volts minimum.
 - b. Response time of 10 nanoseconds or less.
 - c. Transverse mode noise attenuation of 65 dB or greater.
 - d. Common mode noise attenuation of 150 dB or greater at 40 to 100 Hz.

2.07 LOCAL AREA NETWORK (LAN)

- A. Provide communication between control units over local area network (LAN).
- B. LAN Capacity: Not less than 60 stations or nodes.
- C. Break in Communication Path: Alarm and automatically initiate LAN reconfiguration.
- D. LAN Data Speed: Minimum 19.2 Kb.
- E. Communication Techniques: Allow interface into network by multiple operation stations and by auto-answer/auto-dial modems. Support communication over telephone lines utilizing modems.
- F. Network Support: Time for global point to be received by any station, shall be less than 3 seconds. Provide automatic reconfiguration if any station is added or lost. If transmission cable is cut, reconfigure two sections with no disruption to system's operation, without operator intervention.

2.08 SYSTEM SOFTWARE

- A. Operating System:
1. Concurrent, multi-tasking capability.
 - a. Common Software Applications Supported: Microsoft Excel.
 2. System Graphics:
 - a. Allow up to 10 graphic screens, simultaneously displayed for comparison and monitoring of system status.
 - b. Animation displayed by shifting image files based on object status.
 - c. Provide method for operator with password to perform the following:
 - 1) Move between, change size, and change location of graphic displays.
 - 2) Modify on-line.
 - 3) Add, delete, or change dynamic objects consisting of:
 - (a) Analog and binary values.
 - (b) Dynamic text.
 - (c) Static text.
 - (d) Animation files.
 3. Custom Graphics Generation Package:
 - a. Create, modify, and save graphic files and visio format graphics in PCX formats.
 - b. HTML graphics to support web browser compatible formats.
 - c. Capture or convert graphics from AutoCAD.
 4. Standard HVAC Graphics Library:
 - a. All HVAC Equipment
 - b. All Ancillary Equipment
- B. Workstation System Applications:

1. Automatic System Database Save and Restore Functions:
 - a. Current database copy of each Building Controller is automatically stored on hard disk.
 - b. Automatic update occurs upon change in any system panel.
 - c. In the event of database loss in any system panel, the first workstation to detect the loss automatically restores the database for that panel unless disabled by the operator.
2. Manual System Database Save and Restore Functions by Operator with Password Clearance:
 - a. Save database from any system panel.
 - b. Clear a panel database.
 - c. Initiate a download of a specified database to any system panel.
3. Software provided allows system configuration and future changes or additions by operators under proper password protection.
4. On-line Help:
 - a. Context-sensitive system assists operator in operation and editing.
 - b. Available for all applications.
 - c. Relevant screen data provided for particular screen display.
 - d. Additional help available via hypertext.
5. Security:
 - a. Operator log-on requires user name and password to view, edit, add, or delete data.
 - b. System security selectable for each operator.
 - c. System supervisor sets passwords and security levels for all other operators.
 - d. Operator passwords to restrict functions accessible to viewing and/or changing system applications, editor, and object.
 - e. Automatic, operator log-off results from keyboard or mouse inactivity during user-adjustable, time period.
 - f. All system security data stored in encrypted format.
6. System Diagnostics:
 - a. Operations Automatically Monitored:
 - 1) Workstations.
 - 2) Printers.
 - 3) Modems.
 - 4) Network connections.
 - 5) Building management panels.
 - 6) Controllers.
 - b. Device failure is annunciated to the operator.
7. Alarm Processing:
 - a. All system objects are configurable to "alarm in" and "alarm out" of normal state.
 - b. Configurable Objects:
 - 1) Alarm limits.
 - 2) Alarm limit differentials.
 - 3) States.
 - 4) Reactions for each object.
8. Alarm Messages:
 - a. Descriptor: English language.
 - b. Recognizable Features:
 - 1) Source.
 - 2) Location.
 - 3) Nature.
9. Configurable Alarm Reactions by Workstation and Time of Day:

- a. Logging.
 - b. Printing.
 - c. Starting programs.
 - d. Displaying messages.
 - e. Dialing out to remote locations.
 - f. Paging.
 - g. Providing audible annunciation.
 - h. Displaying specific system graphics.
10. Custom Trend Logs:
- a. Definable for any data object in the system including interval, start time, and stop time.
 - b. Trend Data:
 - 1) Sampled and stored on the building controller panel.
 - 2) Archivable on hard disk.
 - 3) Retrievable for use in reports, spreadsheets and standard database programs.
 - 4) Archival on LAN accessible storage media including hard disk, tape, Raid array drive, and virtual cloud environment.
 - 5) Protected and encrypted format to prevent manipulation, or editing of historical data and event logs.
11. Alarm and Event Log:
- a. View all system alarms and change of states from any system location.
 - b. Events listed chronologically.
 - c. Operator with proper security acknowledges and clears alarms.
 - d. Alarms not cleared by operator are archived to the workstation hard disk.
12. Object, Property Status and Control:
- a. Provide a method to view, edit if applicable, the status of any object and property in the system.
 - b. Status Available by the Following Methods:
 - 1) Menu.
 - 2) Graphics.
 - 3) Custom Programs.
13. Reports and Logs:
- a. Reporting Package:
 - 1) Allows operator to select, modify, or create reports.
 - 2) Definable as to data content, format, interval, and date.
 - 3) Archivable to hard disk.
 - b. Real-time logs available by type or status such as alarm, lockout, normal, etc.
 - c. Stored on hard disk and readily accessible by standard software applications, including spreadsheets and word processing.
 - d. Set to be printed on operator command or specific time(s).
14. Reports:
- a. Standard:
 - 1) Objects with current values.
 - 2) Current alarms not locked out.
 - 3) Disabled and overridden objects, points and SNVTs.
 - 4) Objects in manual or automatic alarm lockout.
 - 5) Objects in alarm lockout currently in alarm.
 - 6) Logs:
 - (a) Alarm History.
 - (b) System messages.
 - (c) System events.

- (d) Trends.
 - b. Custom:
 - 1) Daily.
 - 2) Weekly.
 - 3) Monthly.
 - 4) Annual.
 - 5) Time and date stamped.
 - 6) Title.
 - 7) Facility name.
 - c. Tenant Override:
 - 1) Monthly report showing total, requested, after-hours HVAC and lighting services on a daily basis for each tenant.
 - 2) Annual report showing override usage on a monthly basis.
 - d. Electrical, Fuel, and Weather:
 - 1) Electrical Meter(s):
 - (a) Monthly showing daily electrical consumption and peak electrical demand with time and date stamp for each meter.
 - (b) Annual summary showing monthly electrical consumption and peak demand with time and date stamp for each meter.
 - 2) Fuel Meter(s):
 - (a) Monthly showing daily natural gas consumption for each meter.
 - (b) Annual summary showing monthly consumption for each meter.
 - 3) Weather:
 - (a) Monthly showing minimum, maximum, average outdoor air temperature and heating/cooling degree-days for the month.
- C. Workstation Applications Editors:
- 1. Provide editing software for each system application at PC workstation.
 - 2. Downloaded application is executed at controller panel.
 - 3. Full screen editor for each application allows operator to view and change:
 - a. Configuration.
 - b. Name.
 - c. Control parameters.
 - d. Set-points.
 - 4. Scheduling:
 - a. Monthly calendar indicates schedules, holidays, and exceptions.
 - b. Allows several related objects to be scheduled and copied to other objects or dates.
 - c. Start and stop times adjustable from master schedule.
 - 5. Custom Application Programming:
 - a. Create, modify, debug, edit, compile, and download custom application programming during operation and without disruption of all other system applications.
 - b. Programming Features:
 - 1) English oriented language, based on BASIC, FORTRAN, C, or PASCAL syntax allowing for free form programming.
 - 2) Alternative language graphically based using appropriate function blocks suitable for all required functions and amenable to customizing or compounding.
 - 3) Insert, add, modify, and delete custom programming code that incorporates word processing features such as cut/paste and find/replace.
 - 4) Allows the development of independently, executing, program modules designed to enable and disable other modules.
 - 5) Debugging/simulation capability that displays intermediate values and/or results including syntax/execution error messages.

- 6) Support for conditional statements (IF/THEN/ELSE/ELSE-F) using compound Boolean (AND, OR, and NOT) and/or relations (EQUAL, LESS THAN, GREATER THAN, NOT EQUAL) comparisons.
- 7) Support for floating-point arithmetic utilizing plus, minus, divide, times, square root operators; including absolute value; minimum/maximum value from a list of values for mathematical functions.
- 8) Language consisting of resettable, predefined, variables representing time of day, day of the week, month of the year, date; and elapsed time in seconds, minutes, hours, and days where the variable values can be used in IF/THEN comparisons, calculations, programming statement logic, etc.
- 9) Language having predefined variables representing status and results of the system software enables, disables, and changes the set points of the controller software.

2.09 CONTROLLER SOFTWARE

- A. All applications reside and operate in the system controllers and editing of all applications occurs at the operator workstation.
- B. System Security:
 1. User access secured via user passwords and user names.
 2. Passwords restrict user to the objects, applications, and system functions as assigned by the system manager.
 3. User Log On/Log Off attempts are recorded.
 4. Automatic Log Off occurs following the last keystroke after a user defined delay time.
- C. Object or Object Group Scheduling:
 1. Weekly Schedules Based on Separate, Daily Schedules:
 - a. Include start, stop, optimal stop, and night economizer.
 - b. 10 events maximum per schedule.
 - c. Start/stop times adjustable for each group object.
- D. Provide standard application for equipment coordination and grouping based on function and location to be used for scheduling and other applications.
- E. Alarms:
 1. Binary object is set to alarm based on the operator specified state.
 2. Analog object to have high/low alarm limits.
 3. All alarming is capable of being automatically and manually disabled.
 4. Alarm Reporting:
 - a. Operator determines action to be taken for alarm event.
 - b. Alarms to be routed to appropriate workstation.
 - c. Reporting Options:
- F. Maintenance Management: System monitors equipment status and generates maintenance messages based upon user-designated run-time limits.
- G. Sequencing: Application software based upon specified sequences of operation in Section 23 0993.
- H. PID Control Characteristics:
 1. Direct or reverse action.
 2. Anti-windup.
 3. Calculated, time-varying, analog value, positions an output or stages a series of outputs.
 4. User selectable controlled variable, set-point, and PED gains.
- I. Staggered Start Application:
 1. Prevents all controlled equipment from simultaneously restarting after power outage.

2. Order of equipment startup is user selectable.
- J. Energy Calculations:
 1. Accumulated instantaneous power or flow rates are converted to energy use data.
 2. Algorithm calculates a rolling average and allows window of time to be user specified in minute intervals.
 3. Algorithm calculates a fixed window average with a digital input signal from a utility meter defining the start of the window period that in turn synchronizes the fixed-window average with that used by the power company.
- K. Anti-Short Cycling:
 1. All binary output objects protected from short-cycling.
 2. Allows minimum on-time and off-time to be selected.
- L. On-Off Control with Differential:
 1. Algorithm allows binary output to be cycled based on a controlled variable and set-point.
 2. Algorithm to be direct-acting or reverse-acting incorporating an adjustable differential.
- M. Run-Time Totalization:
 1. Totalize run-times for all binary input objects.
 2. Provides operator with capability to assign high run-time alarm.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that conditioned power supply is available to the control units and to the operator work station. Verify that field end devices, wiring, and pneumatic tubing is installed prior to installation proceeding.

3.02 INSTALLATION

- A. Install control units and other hardware in position on permanent walls where not subject to excessive vibration.
- B. Install software in control units and in operator work station. Implement all features of programs to specified requirements and appropriate to sequence of operation.
- C. Provide with 120v AC, 15 amp dedicated emergency power circuit to each programmable control unit.
- D. Provide conduit and electrical wiring in accordance with Section 26. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.
- E. Check and verify location of thermostats with plans and room details before installation. Locate 48 inches above floor.
- F. All control wiring routed in exposed areas to be in conduit. Refer to electrical specifications for additional requirements. Contractor's option to route control wiring above ceilings and in concealed space using J-hooks.
- G. Provide all power, transformers, relays, control wiring, conduit and all other electrical components as required to control the mechanical equipment. Provide all wiring in conduit.

3.03 MANUFACTURER'S FIELD SERVICES

- A. Start and commission systems. Allow sufficient time for start-up and commissioning prior to placing control systems in permanent operation.
- B. Provide basic operator training for 4 persons on data display, alarm and status descriptors, requesting data, execution of commands and request of logs. Include a minimum of 2 hours dedicated instructor time. Provide training on site.

3.04 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate complete and operating system to Owner.

END OF SECTION

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**SECTION 23 2113
HYDRONIC PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hydronic system requirements.
- B. Heating water and glycol piping, above grade.
- C. Pipe hangers and supports.
- D. Unions, flanges, mechanical couplings, and dielectric connections.
- E. Valves:
 - 1. Ball valves.
 - 2. Gate Valves
 - 3. Butterfly valves.
- F. Manual Balancing Valves.

1.02 REFERENCE STANDARDS

- A. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2016.
- B. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2018.
- C. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2018.
- D. ASME B31.9 - Building Services Piping; 2017.
- E. ASME BPVC-IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators - Welding Brazing and Fusing Qualifications; 2019.
- F. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2018.
- G. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2019.
- H. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- I. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2016.
- J. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers; 2024.
- K. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018.

1.03 SYSTEM DESCRIPTION

- A. Where more than one piping system material is specified, ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
- B. Use unions and flanges downstream of valves and at equipment or apparatus connections. Do not use direct welded or threaded connections to valves, equipment or other apparatus.
- C. Use ball or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- D. Use ball or butterfly valves for throttling, bypass, or manual flow control services.
- E. Use 3/4 inch ball valves with cap for drains at main shut-off valves, low points of piping, bases of vertical risers, and at equipment. Pipe to nearest floor drain.

1.04 SUBMITTALS

- A. Welders Certificate: Include welders certification of compliance with ASME BPVC-IX.
- B. Product Data:
 - 1. Indicate balancing valve data and ratings.
- C. Project Record Documents: Record actual locations of valves.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified in this section with minimum ten years of experience.
- C. All welding of pipe shall be performed by AWS certified welders.

1.06 REGULATORY REQUIREMENTS

- A. Conform to ASME B31.9 code for installation of piping system.
- B. All welding of pipe shall be performed by AWS certified welders.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.08 FIELD CONDITIONS

- A. Do not install underground piping when bedding is wet or frozen.

1.09 EXTRA MATERIALS

- A. Provide two repacking kits for each size and valve type.

1.10 WARRANTIES

PART 2 PRODUCTS

2.01 HYDRONIC SYSTEM REQUIREMENTS

- A. Comply with ASME B31.9 and applicable federal, state, and local regulations.
- B. Valves: Provide valves where indicated:

2.02 HEATING WATER AND GLYCOL PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53/A53M, Schedule 40, black, using one of the following joint types:
 - 1. Fittings: ASTM B 16.3, malleable iron or ASTM A 234/A 234M, wrought steel welding type fittings.
 - 2. Joints: Threaded, or AWS D1.1 welded.
 - 3. Pressed Joints and Fittings: Viega MegaPress.
- B. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), drawn, using one of the following joint types:
 - 1. Solder Joints for 2 inch and smaller/Brazed Joints for 2-1/2 inch and larger: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings.
 - a. Solder: ASTM B32 lead-free solder, HB alloy (91-5 tin-antimony) or tin and silver.
 - 2. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.

3. Mechanical Press Sealed Fittings: Copper and copper alloy press fittings shall conform to material requirements of ASME B16.18 or ASME B16.22 and performance criteria of ASME B16.51 and IAPMO PS 117. Sealing elements for press fittings shall be EPDM. Sealing elements shall be factory installed or an alternative supplied by fitting manufacturer.
4. Joints: Solder, lead free, 95-5 tin-antimony, or tin and silver.

2.03 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
- B. Provide oversized hangers on insulated pipe to allow insulation at full thickness to be provided on the piping.
- C. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.
- D. Hangers for Cold Pipe Sizes 2 Inches and Greater: Carbon steel, adjustable, clevis.
- E. Hangers for Hot Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.
- F. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- G. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
- H. Wall Support for Pipe Sizes 4 Inches and Greater: Welded steel bracket and wrought steel clamp.
- I. Vertical Support: Steel riser clamp.
- J. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- K. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.

2.04 UNIONS, FLANGES, MECHANICAL COUPLINGS, AND DIELECTRIC CONNECTIONS

- A. Unions for Pipe 2 Inches and Less:
 1. Ferrous Piping: 150 psig malleable iron, threaded.
 2. Copper Pipe: Bronze, soldered joints.
- B. Flanges for Pipe 2 Inches and Greater:
 1. Ferrous Piping: 150 psig forged steel, slip-on.
 2. Copper Piping: Bronze.
 3. Gaskets: 1/16 inch thick preformed neoprene.

2.05 GATE VALVES

- A. Manufacturers:
 1. Conbraco Industries: www.apollovalves.com.
 2. Jomar.
 3. Milwaukee
 4. Stockham
 5. Apollo
- B. Up To and Including 2 Inches:
 1. Class 125, bronze body, bronze trim, screwed bonnet, non-rising stem, handwheel, inside screw with backseating stem, solid wedge disc, alloy seat rings, solder ends.
- C. Over 2 Inches:
 1. Class 125, iron body, bronze trim, bolted bonnet, rising stem, handwheel, outside screw and yoke, solid wedge disc with bronze seat rings, flanged ends.

2.06 BALL VALVES

- A. Manufacturers:
 - 1. Apollo Valves: www.apollovalves.com
 - 2. Nibco
 - 3. Jomar.
 - 4. Milwaukee.
 - 5. Viega LLC: www.viega.us/#sle.
 - 6. Stockham
- B. Up To and Including 2 Inches:
 - 1. Bronze one piece body, chrome plated brass ball, full port, teflon seats and stuffing box ring, lever handle, solder ends with union.

2.07 BUTTERFLY VALVES

- A. Manufacturers:
 - 1. Apollo Valves: www.apollovalves.com/#sle.
 - 2. Milwaukee
 - 3. Nibco, Inc: www.nibco.com.
 - 4. Stockham
- B. Disc: Construct of aluminum bronze, chrome plated ductile iron, stainless steel, ductile iron with EPDM encapsulation, or Buna-N encapsulation.
- C. Body: Class 150, cast or ductile iron with resilient replaceable EPDM seat, lug ends, extended neck. Body shall be grooved end black enamel coated ductile iron where grooved piping is allowed.
- D. Operator: 10 position lever handle.
- E. For use in pipes 2-1/2 inch and larger.

2.08 MANUAL BALANCING VALVE

- A. Manufacturers:
 - 1. Griswold Controls: www.griswoldcontrols.com.
 - 2. Tour & Andersson / IMI TA
 - 3. Armstrong
 - 4. ITT Bell & Gossett: www.bellgossett.com.
 - 5. Pro Hydronics Specialties
 - 6. Gerand.
 - 7. Taco, Inc: www.taco-hvac.com.
 - 8. Nexus
 - 9. Hydronic Components Inc
 - 10. Stockham
- B. Manual Balancing Valves:
 - 1. Construction Option 1: Class 125, brass body housing including a full port isolation ball valve with memory stop, venturi measurement device, dual pressure/temperature test valves, and unions on inlet and outlet.
 - 2. Construction Option 2: Class 125, brass body housing including a y-pattern globe style calibrated port balancing valve design, dual pressure/temperature test valves, and unions on inlet and outlet. Provide wheel handle with memory stop for balancing adjustments.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment using jointing system specified.
- D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.
- E. After completion, fill, clean, and treat systems.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Radiant Heating and Tubing:
 - 1. Tubing shall not be exposed to sunlight for more than 14 days.
 - 2. Provide pressure testing of between 50 and 100 psi for a minimum of 24 hours prior to, and during the pour of concrete applications and while other trades are working in the same area.
 - 3. Slab-on-grade installation shall be fastened to flat mesh provided by the contractor installing the tubing, unless insulation is specified under the tubing. Flat mesh shall be placed on top of vapor barrier or sand so that it will be in the bottom of the concrete slab. If insulation is specified, the tubing shall be attached to the insulation board with staples provided by the tubing manufacturer. Verify with the concrete contractor that there will be sufficient clearance to avoid control joint cuts. Coordinate tubing to go under expansion joints.
- C. Install heating water, glycol, chilled water, condenser water, and engine exhaust piping to ASME B31.9 requirements. Install chilled water piping to ASME B31.5 requirements.
 - 1. Sleeve pipe passing through partitions, walls and floors.
 - 2. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified ____.
 - 3. Slope piping and arrange to drain at low points. Provide 1/2" ball valve and cap at each high point for manual air vent. Provide 1/2" ball valve and cap at each low point for drain.
 - 4. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
 - 5. Install temperature controls devices furnished by the controls contractor. Review requirements with the controls contractor. Provide thermo-wells for temperature sensors.
- D. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9, ASTM F708, or MSS SP-58.
 - 2. Support horizontal piping as required by code and piping manufacturer.
 - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches of each horizontal elbow.
 - 5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 - 7. Provide copper plated hangers and supports for copper piping.
- E. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- F. Provide handle stand-off extensions on valves to provide a minimum of 3/4" clearance between valve handle and piping insulation.
- G. Provide oversized hangers on insulated pipe to allow insulation at full thickness to be provided on all cold temperature piping and hot temperature piping 2 inch and larger.

- H. Provide access panels where valves and fittings are not exposed. Coordinate with general contractor.
- I. Use eccentric reducers to maintain top of pipe level.
- J. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.
- K. Install valves with stems upright or horizontal, not inverted.
- L. All new hydronic heating/cooling system piping shall be pressure tested at 1-1/2 times the maximum system design pressure; but not less than 100 psi (hydrostatically) for 15 minutes (minimum).
- M. Press connections: copper and copper alloy press connections shall be made in accordance with the manufacturer's installation instructions. The tubing shall be fully inserted into the fitting and the tubing marked at the shoulder of the fitting. The fitting alignment shall be checked against the mark on the tubing to assure the tubing is fully engaged (inserted) in the fitting. The joints shall be pressed using the tool(s) approved by the manufacturer.

END OF SECTION

**SECTION 23 2114
HYDRONIC SPECIALTIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air vents.
- B. Strainers.
- C. Pressure-temperature test plugs.

1.02 REFERENCE STANDARDS

1.03 SUBMITTALS

- A. Product Data: Provide product data for manufactured products and assemblies required for this project. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description and model.

1.04 QUALITY ASSURANCE

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

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 AIR VENTS

- A. Manual Type: Short vertical section of pipe to form air chamber, with 1/2" ball valve, 3/4" hose thread and cap.
 - 1. Under Finned Tube Radiation Cover Only: Contactors option to provide manual coin operated vent with brass needle valve.

2.02 STRAINERS

- A. Manufacturers:
 - 1. Armstrong International, Inc: www.armstronginternational.com/#sle.
 - 2. Keckley
 - 3. Titan FCI
- B. Size 2 inch and Under:
 - 1. Screwed brass or iron body for 175 psi working pressure, Y pattern with 1/32 inch stainless steel perforated screen.
- C. Size 2-1/2 inch to 4 inch:
 - 1. Provide flanged or grooved iron body for 175 psi working pressure, Y pattern with 1/16 inch stainless steel perforated screen.

2.03 PRESSURE-TEMPERATURE TEST PLUGS

- A. Construction: Brass body designed to receive temperature or pressure probe with removable protective cap, and Neoprene rated for minimum 200 degrees F.
- B. Application: Use extended length plugs to clear insulated piping.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install specialties in accordance with manufacturer's instructions.
- B. Provide manual air vents at system high points and as indicated.
- C. Provide valved drain and hose connection on strainer blow down connection.

END OF SECTION

SECTION 23 2500
CHEMICAL WATER TREATMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Materials.
 - 1. System cleaner.
 - 2. Closed system treatment (water).
- B. Glycol.

1.02 SUBMITTALS

- A. Product Data: Provide chemical treatment materials, chemicals, and equipment including electrical characteristics and connection requirements.
- B. Manufacturer's Field Reports: Indicate start-up of treatment systems when completed and operating properly. Indicate analysis of system water after cleaning and after treatment.
- C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Sufficient chemicals for treatment and testing during required maintenance period.

1.03 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum three years of experience and approved by manufacturer.

1.04 MAINTENANCE SERVICE

- A. Furnish service and maintenance of treatment systems for one year from Date of Substantial Completion.
- B. Provide semi-annual technical service visits to perform field inspections and make water analysis on site. Detail findings in writing on proper practices, chemical treating requirements, and corrective actions needed. Submit two copies of field service report after each visit.
- C. Provide laboratory and technical assistance services during this maintenance period.
- D. Include two hour training course for operating personnel, instructing them on installation, care, maintenance, testing, and operation of water treatment systems. Arrange course at start up of systems.

1.05 MAINTENANCE MATERIALS

- A. Supply sufficient chemicals for treatment and testing during warranty period.

PART 2 PRODUCTS

2.01 GLYCOL SYSTEM

- A. Glycol Solution:
 - 1. Manufacturers:
 - a. DOW
 - b. Rhomar Water Management
 - c. Interstate
 - 2. Inhibited ethylene glycol and water solution mixed 50 percent glycol - 50 percent water, suitable for operating temperatures from -30 degrees F to 200 degrees F. The solution shall have a pH between 8.0 and 9.0, a reserve alkalinity of 6.6ml HCl/10ml, no flash point, no silicates and a fluorescent color.
 - 3. The de-ionized water used to dilute the concentrate and the pre-mixed solutions, if necessary, shall contain less than: 100 ppm calcium carbonate hardness 40 ppm calcium plus magnesium ions 50 ppm chloride plus sulfate ions.

4. The heat transfer fluid shall be an inhibited glycol-based industrial heat transfer fluid specifically formulated for use in HVAC SYSTEMS. The fluid must contain corrosion inhibitors and buffers and an antifoam agent, necessary for long fluid and system life.
5. COMMERCIAL AUTOMOBILE ANTIFREEZE SOLUTIONS, UNINHIBITED GLYCOL OR FIELD INHIBITED GLYCOL IS NOT ACCEPTABLE.
6. The system shall have a nameplate and shall contain the following information:
 - a. Date of original Heat Transfer Fluid charge
 - b. Description of Heat Transfer Fluid
 - c. Manufacture's Name, Address and Telephone
 - d. Percentage and Type of Glycol
 - e. Freeze Point & Burst Point
 - f. Total System Gallons
 - g. Reference to Material Safety Sheet
 - h. Instructions for Sampling of Fluid
 - i. Month for Annual Sampling
 - j. Mailing Instructions to independent testing laboratory
7. Provide additional inhibitors as recommended by manufacturer if glycol percentage is below manufacturers recommendations.
8. **Existing glycol hot water system mixture is 50% ethylene glycol. Contractor's option to reuse existing glycol mixture as well as provide additional glycol mixture for new glycol hot water system and piping. Drain down existing glycol system as required and store on site during construction. Contractor to verify existing system glycol manufacturer and match new glycol to existing if re-using glycol mixture.**

2.02 MATERIALS

- A. System Cleaner:
 1. Liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products; sodiumtripoly phosphate and sodium molybdate.
- B. Closed System Treatment (Water):
 1. Sequestering agent to reduce deposits and adjust pH; polyphosphate.
 2. Corrosion inhibitors; boron-nitrite, sodium nitrite and borax, sodium totyltriazole, low molecular weight polymers, phosphonates, sodium molybdate, or sulphites.
 3. Conductivity enhancers; phosphates or phosphonates.

PART 3 EXECUTION

3.01 PREPARATION

- A. Systems shall be operational, filled, started, and vented prior to cleaning. Use water meter to record capacity in each system.
- B. Place terminal control valves in open position during cleaning.
- C. Verify that electric power is available and of the correct characteristics.

3.02 FLUSHING SEQUENCE

- A. Flush all dirt and debris using potable water flowing at twice the normal operating flow rate (velocities of 8 feet per second, minimum) for a minimum of four hours or until no dirt or debris is visible, whichever is longer. If the building system pumps are used for flushing of the system, new pump seals shall be provided after system water treatment has been completed.

3.03 CLEANING SEQUENCE

- A. Concentration:
 1. As recommended by manufacturer.
- B. Hot Water Heating Systems:

1. Apply heat while circulating, slowly raising temperature to 160 degrees F and maintain for 12 hours minimum.
 2. Remove heat and circulate to 100 degrees F or less; drain systems as quickly as possible and refill with clean water.
 3. Circulate for 6 hours at design temperatures, then drain.
 4. Refill with clean water and repeat until system cleaner is removed.
- C. Flush open systems and glycol filled closed systems with clean water for one hour minimum. Drain completely and refill.
- D. Remove, clean, and replace strainer screens.
- E. Inspect, remove sludge, and flush low points with clean water after cleaning process is completed. Include disassembly of components as required.

3.04 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.05 CLOSED SYSTEM TREATMENT

- A. Provide minimum of one system fill location for each system. Install isolating and drain valves and necessary piping. Install around balancing valve downstream of circulating pumps unless indicated otherwise.
- B. After the system is filled and the air is properly purged, allow the fluid to circulate for minimum 24 hours. Then, pull a sample using the sample kit provided by the manufacturer.
- C. The analysis from the manufacturer should list the following:
1. pH, Color, Clarity
 2. Reserve Alkalinity, ml
 3. Inhibitors: Ferrous, Copper & Brass Corrosion Products
 4. Degradation Products
 5. Corrosives
 6. Scale Promoters
 7. Contaminants

3.06 GLYCOL SYSTEMS

- A. **Remodel Projects with existing systems: Prior to the start of construction, pull a sample of the existing system solution and send to a testing lab for analysis. Provide a test report to the Engineer and to the Owner. Identify any concerns about the condition of the system solution.**
- B. Clean and flush glycol system before adding glycol solution.
- C. Feed glycol solution to system through make-up line with pressure regulator, venting system high points.
- D. After the system is filled and the air is properly purged, allow the fluid to circulate for minimum 24 hours. Then, pull a sample using the sample kit provided by the manufacturer. Provide report to Engineer and Architect.
- E. Contractor shall pull a second sample six months after the initial fill, and on the anniversary of the fill. Samples shall be sent to the manufacturer for analysis.
- F. The flushing, filling and glycol for the entire hydronic system including the ground coupled heat exchanger shall be responsibility of section 23 2500 HVAC Water Treatment.
- G. The analysis from the manufacturer should list the following:
1. Concentration, vol %
 2. Freeze Point, Degrees F
 3. pH, Color, Clarity

4. Reserve Alkalinity, ml
 5. Inhibitors: Ferrous, Copper & Brass Corrosion Products
 6. Degradation Products
 7. Corrosives
 8. Scale Promoters
 9. Contaminants
- H. Manufacturer report shall be submitted to the Engineer for the inclusion in the building submittal records for distribution to the Owner.

END OF SECTION

SECTION 23 3100
HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal ductwork.
- B. Nonmetal ductwork.

1.02 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2015.
- C. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2015.
- D. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2018.
- E. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2018.
- F. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Revised 2009).
- G. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual; 2012.
- H. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; current edition, including all revisions.

1.03 SUBMITTALS

- A. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA (LEAK).
- B. Duct Construction Report: Provide submittal detailing duct construction requirements. Provide duct fittings, duct gages, internal/external reinforcements, drives, etc. to meet SMACNA (DCS) construction criteria for each pressure class listed in this section. Provide with applicable SMACNA tables.
- C. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum five years of documented experience.

1.05 FIELD CONDITIONS

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
- B. Aluminum for Ducts: ASTM B 209 (ASTM B 209M); aluminum sheet, alloy 3003-H14.
Aluminum Connectors and Bar Stock: Alloy 6061-T651 or of equivalent strength.
- C. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

- D. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
 - 1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
 - 2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
 - 3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
 - 4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
- E. Insulated Flexible Ducts:
 - 1. UL 181, Class 1, aluminum laminate and polyester film with latex adhesive supported by helically wound spring steel wire; fiberglass insulation; polyethylene vapor barrier film.
 - a. Pressure Rating: 10 inches WG positive and 1.0 inches WG negative.
 - b. Maximum Velocity: 4000 fpm.
 - c. Temperature Range: -20 degrees F to 210 degrees F.
 - d. Insulation: Refer to HVAC Insulation Spec Section for insulation requirements.
- F. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
 - 1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
 - 2. Surface Burning Characteristics: Flame spread of zero, smoke developed of zero, when tested in accordance with ASTM E 84.

2.02 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- B. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- C. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.
- D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- E. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

2.03 MANUFACTURED DUCTWORK AND FITTINGS

- A. Manufacture in accordance with SMANCA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing and sealing for operating pressures indicated.
- B. Spiral Ducts: Round spiral lockseam duct with galvanized steel outer wall.
 - 1. Manufacture in accordance with SMACNA (DCS).

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. Install in accordance with manufacturer's instructions.
- C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- D. Duct sizes indicated are inside clear dimensions.

- E. Install and seal metal and flexible ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- F. Provide turning veins in all rectangular elbows as indicated on plans and/or if either duct dimension is 12" or larger . Transfer duct elbows do not require turning veins.
- G. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- H. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.
- I. Use double nuts and lock washers on threaded rod supports.
- J. Do not use flexible duct to change direction.
- K. Connect diffusers or light troffer boots to low pressure ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp.
- L. Connect flexible ducts to metal ducts per detail located on drawings
- M. Set plenum doors 6 to 12 inches above floor. Arrange door swings so that fan static pressure holds door in closed position.
- N. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- O. At exterior wall louvers, seal duct to louver frame and install blank-out panels.
- P. If test and balance report shows the duct traverse at the fan to be 10% or higher than the sum of the outlets, the contractor shall be required to re-seal ductwork to reduce leakage to less than 10%. Contractor shall be responsible for removing and replacing ceiling tiles, removing and replacing duct insulation and all other work required to re-seal ductwork.

3.02 SCHEDULES

- A. Ductwork Pressure Class:
 - 1. Constant Volume Air Handling Unit Systems
 - a. Supply main ducts, 2 inch w.g.
 - b. Return main ducts, 1 inch w.g.
 - c. Branch ductwork, 0.5 inch w.g.
 - d. Outside air and relief air ductwork, 1 inch w.g.
 - 2. Exhaust Fans
 - a. Main central exhaust ducts, 1 inch w.g.
 - b. Branch ductwork and ceiling exhaust fans, 0.5 inch w.g

END OF SECTION

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**SECTION 23 3300
AIR DUCT ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air turning devices/extractors.
- B. Backdraft dampers.
- C. Control dampers.
- D. Duct access doors.
- E. Duct test holes.
- F. Flexible duct connectors.
- G. Volume control dampers.

1.02 REFERENCE STANDARDS

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2018.
- B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Revised 2009).

1.03 SUBMITTALS

- A. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.
- B. Manufacturer's Installation Instructions: Provide instructions for fire dampers, smoke dampers, combination fire and smoke dampers, and smoke dampers.
- C. Project Record Drawings: Record actual locations of access doors and test holes.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Fusible Links: One of each type and size.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.01 AIR TURNING DEVICES/EXTRACTORS

- A. Multi-blade device with blades aligned in short dimension; steel construction; with individually adjustable blades, mounting straps.

2.02 BACKDRAFT DAMPERS

- A. Manufacturers:
 - 1. Greenheck
 - 2. Nailor Industries Inc: www.nailor.com.
 - 3. Ruskin Company: www.ruskin.com.
 - 4. Pottorff: www.pottorff.com.
 - 5. Aire Technologies, Inc.
 - 6. Tamco

- B. Multi-Blade, Parallel Action Gravity Balanced Backdraft Dampers: Galvanized steel, with center pivoted blades of maximum 6 inch width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.

2.03 OUTSIDE AIR AND RELIEF AIR CONTROL DAMPERS

- A. Approved Manufacturers:
 - 1. Greenheck
 - 2. Ruskin
 - 3. Tamco
 - 4. Nailor
- B. Dampers larger than 10"x10" or 10"Ø shall meet the following requirements:
 - 1. Basis of design: Greenheck ICD-45.
 - 2. Construction:
 - a. Rectangular dampers shall consist of: .125 (3.2mm) aluminum channel frame insulated with polystyrene on four sides and thermally broken with dual polyurethane resin gaps; aluminum airfoil blade internally insulated polyurethane foam and thermally broken. Blades shall be completely symmetrical relative to their axle pivot point, presenting identical resistance to airflow in either direction or pressure on either side of the damper. Axle will be 1/2 in. (13mm) diameter plated steel; bearings are dual bearing with acetal inner sleeve, flanged outer bearing resulting in no metal-to-metal or metal-to-plastic contact.
 - b. Blade and jamb seals to be silicone rubber and external (out of the airstream) blade-to-blade linkage.
 - 3. Ratings:
 - a. Dampers manufacturer's printed application and performance data including pressure, velocity, leakage, and temperature limitations shall be submitted for approval showing damper suitable for pressures to 8 in. wg (1993 Pa), velocities to 4000 fpm (20.3 m/s), standard air leakage less than 8 cfm/sq. ft. @ 4 in. wg and temperatures to 200 °F
 - b. Damper air performance data shall be developed in accordance with the latest edition of AMCA Standard 500-D.
- C. Round dampers sized 10"Ø or smaller shall meet the following requirements:
 - 1. Basis of design: Greenheck VCDR-53.
 - 2. Construction:
 - a. Frame and sleeve: The damper frame and sleeve shall be of one piece design, made with 20 ga. galvanized steel and a groove for added strength.
 - b. Blade: Galvanized steel with silicone blade seal.
 - c. Mounting: Vertical or horizontal
 - 3. Ratings:
 - a. Leakage: Dampers shall have a rating of 4 cfm/sq. ft @ 1 in wg.
 - b. Differential pressure: Dampers shall have a minimum differential pressure rating of 4 in. wg.
 - c. Velocity: Dampers shall have a minimum velocity rating of 3000 fpm

2.04 DUCT ACCESS DOORS

- A. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ducts, install minimum 1 inch thick insulation with sheet metal cover.
 - 1. Up to 24 inches square: Provide paired camlocks.
 - 2. Larger than 24 inches: Provide hinge and compression latches.

- B. Access doors with sheet metal screw fasteners are not acceptable.

2.05 DUCT TEST HOLES

- A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
- B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

2.06 FLEXIBLE DUCT CONNECTORS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Flexible Duct Connections: Fabric crimped into metal edging strip.
 - 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd.
 - a. Net Fabric Width: Approximately 2 inches wide.

2.07 VOLUME CONTROL DAMPERS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Single Blade Dampers:
- C. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 by 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
- D. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon, thermoplastic elastomer, or sintered bronze bearings.
- E. Quadrants:
 - 1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
 - 2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
 - 3. Where rod lengths exceed 30 inches provide regulator at both ends.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 3100 for duct construction and pressure class.
- B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
- C. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. If there are conflicts to this minimum access for any damper, contact the Engineer for review. Refer to the drawings and details for size of panels. Where no size is indicated on the drawings, hand access shall be minimum 8" x 8" and shoulder access shall be minimum 24" x 24".
- D. Provide turning veins in all rectangular elbows as indicated on plans and/or if either duct dimension is 12" or larger. Transfer duct elbows do not require turning veins.
- E. Provide duct test holes where indicated and required for testing and balancing purposes.
- F. Verify operation of all smoke and combination fire/smoke dampers. Provide documentation of testing.
- G. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.

- H. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
- I. For fans developing static pressures of 5.0 inches and over, cover flexible connections with leaded vinyl sheet, held in place with metal straps.
- J. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.
- K. Provide control dampers as indicated on the drawings.
- L. Provide mixing dampers of opposed blade construction arranged to mix streams.
- M. Provide isolation (two-position) dampers of parallel blade construction.
- N. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION

SECTION 23 3423
HVAC POWER VENTILATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Inline centrifugal fans.
- B. Ceiling exhaust fans

1.02 REFERENCE STANDARDS

- A. AMCA (DIR) - (Directory of) Products Licensed Under AMCA International Certified Ratings Program; 2015.
- B. AMCA 99 - Standards Handbook; 2016.
- C. AMCA 204 - Balance Quality and Vibration Levels for Fans; 2005 (Reaffirmed 2012).
- D. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; 2016.
- E. AMCA 300 - Reverberant Room Method for Sound Testing of Fans; 2014.
- F. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data; 2014.
- G. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2017.
- H. UL 705 - Power Ventilators; Current Edition, Including All Revisions.
- I. UL 762 - Outline of Investigation for Power Roof Ventilators for Restaurant Exhaust Appliances; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.
- B. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Fan Belts: One set for each individual fan.

1.04 FIELD CONDITIONS

- A. Permanent ventilators may not be used for ventilation during construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Greenheck / Accurex
- B. Loren Cook Company: www.lorencook.com.
- C. Twin City Fan & Blower: www.tcf.com/#sle.

2.02 POWER VENTILATORS - GENERAL

- A. Static and Dynamically Balanced: AMCA 204 - Balance Quality and Vibration Levels for Fans.
- B. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.
- C. Sound Ratings: AMCA 301, tested to AMCA 300 and bearing AMCA Certified Sound Rating Seal.
- D. Fabrication: Comply with AMCA 99.
- E. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.

- F. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- G. Provide phase monitors and brown out protection on all three phase units.
- H. Hood Exhaust Fans: Comply with requirements of NFPA 96.

2.03 CEILING EXHAUST FANS

- A. Performance Ratings: Refer to drawings.
- B. Centrifugal Fan Unit: Direct driven with galvanized steel housing resilient mounted motor, gravity backdraft damper in discharge, permanently lubricated motor designed for continuous operation.
- C. Disconnect Switch: Cord and plug in housing for thermal overload protected motor and wall mounted switch.
- D. Grille: Aluminum with baked white enamel finish.
- E. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

2.04 INLINE CENTRIFUGAL FANS

- A. Centrifugal Fan Unit: V-belt or direct driven with galvanized steel housing lined with acoustic insulation, resilient mounted motor, gravity backdraft damper in discharge.
- B. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide sheaves required for final air balance.
- C. Install backdraft dampers on inlet to roof and wall exhausters.

END OF SECTION

SECTION 23 3700
AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Louvers:

1.02 REFERENCE STANDARDS

- A. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2015.
- B. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Inlets; 2006 (Reaffirmed 2011).
- C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Revised 2009).

1.03 SUBMITTALS

- A. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

1.04 QUALITY ASSURANCE

- A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.
- B. Test and rate louver performance in accordance with AMCA 500-L.

PART 2 PRODUCTS

2.01 LOUVERS

- A. Manufacturers:
 - 1. Greenheck
 - 2. Ruskin
 - 3. Arrow
 - 4. Louvers & Dampers
 - 5. Nailor
 - 6. Pottorff
- B. Type: 4 inch deep with blades on 45 degree slope with heavy channel frame and birdscreen attached to the back of the louver.
- C. Fabrication: 12 gage thick extruded aluminum, welded assembly, with factory baked enamel finish custom color to be selected.
 - 1. Each louver may be selected in a different color.
- D. Mounting: Furnish with interior flat flange for installation.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Check location of outlets and inlets and make necessary adjustments in position to comply with architectural features, symmetry, and lighting arrangement.
- C. Install diffusers to ductwork with air tight connection.
- D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers.
- E. Paint ductwork visible behind air outlets and inlets matte black.

- F. Inside the building, where sidewall return or exhaust grilles are mounted entirely above six feet above finished floor, install them in inverted position for sight-proof.

END OF SECTION

**SECTION 23 7313
AIR-HANDLING UNITS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Casing construction.
- B. Fan section.
- C. Coil section.
- D. Filter and air cleaner section.
- E. Access section.

1.02 REFERENCE STANDARDS

- A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings; 2015.
- B. AHRI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils; 2001, with Addendum (2011).
- C. AMCA (DIR) - (Directory of) Products Licensed Under AMCA International Certified Ratings Program; 2015.
- D. AMCA 99 - Standards Handbook; 2016.
- E. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; 2016.
- F. AMCA 300 - Reverberant Room Method for Sound Testing of Fans; 2014.
- G. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data; 2014.
- H. ASHRAE Std 62.1 - Ventilation for Acceptable Indoor Air Quality; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Revised 2009).

1.03 SUBMITTALS

- A. Product Data:
 - 1. Published Literature: Indicate dimensions, weights, capacities, ratings, gauges and finishes of materials, and electrical characteristics and connection requirements.
 - 2. Fans: Performance and fan curves with specified operating point clearly plotted, power, RPM.
 - 3. Sound Power Level Data: Fan outlet and casing radiation at rated capacity.
- B. Shop Drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, and electrical characteristics and connection requirements.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Accept products on site in factory-fabricated protective containers, with factory-installed shipping skids and lifting lugs. Inspect for damage.
- B. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.
- C. Do not operate units until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

1.05 EXTRA MATERIALS

- A. Supply one set for each unit of filters.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Daikin Applied: www.daikinapplied.com/#sle.
- B. Trane Inc: www.trane.com/#sle.
- C. York International Corporation / Johnson Controls Inc: www.york.com/#sle.

2.02 CASING CONSTRUCTION

- A. Full Perimeter Base Rail:
 - 1. Construct of galvanized steel.
 - 2. Provide base rail of sufficient height to raise unit for external trapping of condensate drain pans.
- B. Drain Pan Construction:
 - 1. Provide cooling coil and humidifier sections with an insulated, double wall, stainless steel drain pan complying with ASHRAE Std 62.1 for indoor air quality and sufficiently sized to collect all condensate.
 - 2. Slope in two planes to promote positive drainage and eliminate stagnate water conditions.
 - 3. Locate outlet of sufficient diameter at lowest point of pan to prevent overflow at normal operating conditions.
 - 4. Provide threaded drain connections constructed of drain pan material, extended sufficient distance beyond the base to accommodate field installed, condensate drain trapping.
- C. Construction: Fabricate on channel base and drain pan of welded stainless steel. Assemble sections with gaskets and bolts. Outside and inside casing shall be solid galvanized steel. Insulation between the casings shall be foam with minimum R-13.
- D. Access Doors: galvanized steel insulated sandwich construction, for flush mounting, with hinges, gasket, latch, and handle assemblies,
- E. Drain Pans: Construct from double thickness stainless steel with insulation between layers with welded corners. Cross break and pitch to drain connection. Provide drain pans under cooling coil section .
- F. Strength: Provide structure to brace casings for suction pressure of 2.5 inch wg, with maximum deflection of 1 in 200.
- G. Performace: Case leakage rates shall not exceed 1% of supply air volume at design static pressure up to +- 8" w.c.
- H. Finish:
 - 1. Indoor Units
 - a. Baked Enamel Finish
 - b. Galvanized Finish

2.03 FAN SECTION

- A. Type: Refer to the drawings for fan type.
- B. Performance Ratings: Determined in accordance with AMCA 210 and labeled with AMCA Certified Rating Seal.
- C. Sound Ratings: AMCA 301; tested to AMCA 300 and label with AMCA Certified Sound Rating Seal.
- D. Bearings: Self-aligning, grease lubricated, with lubrication fittings extended to exterior of casing with plastic tube and grease fitting rigidly attached to casing.
- E. External Motor Junction Box: Factory mount NEMA 4 external junction box and connect to extended motor leads from internally mounted motors.

- F. Motor Wiring Conduit: Factory wire fan motor wiring to the unit mounted starter-disconnect, variable frequency drive, and external motor junction box.
- G. Drives:
 - 1. Comply with AMCA 99.
 - 2. Bearings: Heavy duty pillow block type, ball bearings with ABMA STD 9 L-10 life at 50 000 hours.
- H. Shafts: Solid, hot rolled steel, ground and polished, with key-way, and protectively coated with lubricating oil.
- I. V-Belt Drive: Cast iron or steel sheaves, dynamically balanced, bored to fit shafts, and keyed. Variable and adjustable pitch sheaves for motors 15 hp and under selected so required rpm is obtained with sheaves set at mid-position; fixed sheave for 20 hp and over, matched belts, and drive rated as recommended by manufacturer or minimum 1.5 times nameplate rating of the motor.
- J. Belt Guard: Fabricate to SMACNA (DCS); 0.106 inch thick, 3/4 inch diamond mesh wire screen welded to steel angle frame or equivalent, prime coated. Secure to fan or fan supports without short circuiting vibration isolation, with provision for adjustment of belt tension, lubrication, and use of tachometer with guard in place.

2.04 COIL SECTION

- A. Casing: Provide access to both sides of coils. Enclose coils with headers and return bends exposed outside casing. Slide coils into casing through removable end panel with blank off sheets and sealing collars at connection penetrations.
- B. Drain Pans: 24 inch downstream of coil and down spouts for cooling coil banks more than one coil high.
- C. Eliminators: Three break of galvanized steel, mounted over drain pan.
- D. Air Coils:
 - 1. Certify capacities, pressure drops, and selection procedures in accordance with AHRI 410.
- E. Fabrication:
 - 1. Tubes: 1/2 inch or 5/8 inch OD seamless copper expanded into fins, brazed joints.
 - 2. Fins: Aluminum.
 - 3. Casing: Die formed channel frame of galvanized steel.

2.05 FILTER AND AIR CLEANER SECTION

- A. General: Provide filter sections with filter racks, minimum of one access door for filter removal, and filter block-offs to prevent air bypass.
- B. Refer to plans for filter requirements.
- C. Filter Gages:
 - 1. 3-1/2 inch diameter diaphragm actuated dial in metal case with static pressure tips.

2.06 ACCESS SECTION

- A. Provide as required and where indicated on drawings and of sufficient size to allow for inspection, cleaning, and maintenance of field-installed components.
- B. Construct access doors same as previously specified within this Section.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Bolt sections together with gaskets.

- C. Install flexible duct connections between fan inlet and discharge ductwork and air handling unit sections. Ensure that metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.
- D. Install neoprene vibrations isolation pads under air handling unit.
- E. Provide fixed sheaves required for final air balance.
- F. Make connections to coils with unions or flanges.
- G. Route condensate line from unit to nearest floor drain.
- H. Hydronic Coils:
 - 1. Hydronic Coils: Connect water supply to leaving air side of coil (counterflow arrangement).
 - 2. Provide shut-off valve on supply line and lockshield balancing valve with memory stop on return line.
 - 3. Locate water supply at bottom of supply header and return water connection at top.
 - 4. Provide manual air vents at high points complete with stop valve.
 - 5. Ensure water coils are drainable and provide drain connection at low points.
- I. Insulate Coil Headers Located Outside Air Flow as Specified for Piping: Refer to Section 22 0719.
- J. Field-wire each factory provided control for field installation.

3.02 FIELD QUALITY CONTROL

- A. Final Acceptance Requirements:
 - 1. Use dial indicator gauges to demonstrate fan and motor are aligned.
 - 2. Verify compliance with specifications using vibration analysis.

3.03 SYSTEM STARTUP

- A. Prepare and start equipment and systems in accordance with manufacturers' instructions and recommendations.
- B. Adjust for proper operation within manufacturer's published tolerances.

3.04 CLOSEOUT ACTIVITIES

- A. Demonstration: Demonstrate operation of system to Owner's personnel.
 - 1. Use operation and maintenance data as reference during demonstration.
 - 2. Briefly describe function, operation, and maintenance of each component.
- B. Training: Train Owner's personnel on operation and maintenance of system.
 - 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. Location: At project site.

3.05 DEMONSTRATION

- A. Provide on-site training course of 4 hours shall be provided by a representative of the unit manufacturer to plant and/or maintenance personnel.

END OF SECTION

SECTION 23 8101
TERMINAL HEAT TRANSFER UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Unit heaters.

1.02 SUBMITTALS

- A. Product Data: Provide typical catalog of information including arrangements.
- B. Shop Drawings:
 - 1. Indicate cross sections of cabinets, grilles, bracing and reinforcing, and typical elevations.
 - 2. Submit schedules of equipment and enclosures typically indicating length and number of pieces of element and enclosure, corner pieces, end caps, cap strips, access doors, pilaster covers, and comparison of specified heat required to actual heat output provided.
 - 3. Indicate mechanical and electrical service locations and requirements.,
- C. Manufacturer's Instructions: Indicate installation instructions and recommendations.
- D. Operation and Maintenance Data: Include manufacturers descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.

1.03 QUALITY ASSURANCE

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 FINNED TUBE RADIATION

- A. Manufacturers:
 - 1. Rittling
 - 2. Sterling Radiator Company
 - 3. Slant/Fin Corporation: www.slantfin.com.
 - 4. Sigma Radiation
 - 5. Vulcan Radiator
 - 6. Trane Inc: www.trane.com.
 - 7. Modine.
- B. Heating Elements: 3/4 inch ID seamless copper tubing, mechanically expanded into evenly spaced aluminum fins sized 4 x 4 inches, suitable for soldered fittings.
- C. Element Hangers: Quiet operating, ball bearing cradle type providing unrestricted longitudinal movement, on enclosure brackets.
- D. Enclosures: 16 gauge cold rolled steel with reinforced welded gussets and easily jointed components for wall to wall installation.
- E. Finish: Factory applied powder coat finish with color selected by architect.
- F. Capacity: See schedule.

2.02 UNIT HEATERS

- A. Manufacturers:
 - 1. Slant/Fin Corporation: www.slantfin.com.
 - 2. Sterling Hydronics/Mestek Technology, Inc: www.sterlingheat.com.
 - 3. Sigma
 - 4. Trane Inc: www.trane.com.
 - 5. Modine

6. Rittling
 7. McQuay
 8. Airtherm
 9. Reznor
 10. Vulcan
- B. Coils: Seamless copper tubing, silver brazed to steel headers, and with evenly spaced aluminum fins mechanically bonded to tubing.
 - C. Casing: 18-gauge steel with threaded pipe connections for hanger rods.
 - D. Finish: Factory applied powder coat.
 - E. Fan: Direct drive propeller type, statically and dynamically balanced, with fan guard; horizontal models with permanently lubricated sleeve bearings; vertical models with grease lubricated ball bearings.
 - F. Air Outlet: Adjustable pattern diffuser on projection models and two way louvers on horizontal throw models.
 - G. Motor: Permanently lubricated sleeve bearings on horizontal models, grease lubricated ball bearings on vertical models.
 - H. Capacity: See schedule.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install equipment exposed to finished areas after walls and ceiling are finished and painted. Do not damage equipment or finishes.
- C. Finned Tube Radiation: Locate on outside walls and run cover wall-to-wall unless otherwise indicated. Center elements under windows. Where multiple windows occur over units, divide element into equal segments centered under each window. Align cabinet joints with window mullions. Install wall angles where units butt against walls.
- D. Finned Tube Radiation: Coordinate finned tube radiation installation with electrical boxes, windows, furniture and all other wall mounted equipment.
- E. Unit Heaters: Hang from building structure, with pipe hangers anchored to building, not from piping. Mount as high as possible to maintain greatest headroom unless otherwise indicated.
- F. Hydronic Units: Refer to plans for piping requirements.

3.02 CLEANING

- A. After construction is completed, including painting, clean exposed surfaces of units. Vacuum clean coils and inside of cabinets.
- B. Touch-up marred or scratched surfaces of factory-finished cabinets, using finish materials furnished by manufacturer.

END OF SECTION

SECTION 26 0500
BASIC ELECTRICAL REQUIREMENTS

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Basic Electrical Requirements applicable to Division 26 and Division 1 - General Requirements.

1.02 REFERENCES

- A. NFPA 70 - National Electrical Code; National Fire Protection Association; 2026

1.03 DEFINITIONS

- A. The meaning and intent of the word "provide" as used in these specifications is the same as the words "The Contractor (and/or Bidder) shall provide."
B. The word "provide" shall carry the same meaning as "furnish and install."
C. The word "Contractor" shall mean the "Electrical Contractor."

1.04 PERFORMANCE REQUIREMENTS

- A. Conform to all applicable Building Codes, ordinances, laws and regulations.
B. Electrical: Conform to NFPA 70 - National Electrical Code.
C. Furnish products listed and classified by Underwriters Laboratories Inc.®, as suitable for the purpose specified and shown.
D. Obtain permits, and request inspections from authority having jurisdiction.
E. If the drawings and/or specifications conflict with any regulatory requirement, the regulatory requirement shall be followed. This does not relieve the Contractor from complying with items in the drawings and/or specifications in excess of the regulatory requirements.
F. Test Standards:
1. All materials and equipment shall be listed, labeled or certified by a nationally recognized testing laboratory to meet Underwriters Laboratories, Inc.®, standards where test standards have been established. Equipment and materials which are not covered by UL® Standards will be accepted provided the equipment and material is listed, labeled, certified or otherwise determined to meet safety requirements of a nationally recognized testing laboratory acceptable to the authority having jurisdiction.
2. Definitions:
a. Listed; equipment or device of a kind mentioned which:
1) Is published by a nationally recognized laboratory which makes periodic inspection of production of such equipment.
2) States that such equipment meets nationally recognized standards or has been tested and found safe for use in a specified manner.
b. Labeled; equipment or device is when:
1) It embodies a valid label, symbol, or other identifying mark of a nationally recognized testing laboratory such as Underwriters Laboratories Inc.®
2) The laboratory makes periodic inspections of the production of such equipment.
3) The labeling indicates compliance with nationally recognized standards or tests to determine safe use in a specified manner.
c. Certified; equipment or product is which:
1) Has been tested and found by a nationally recognized testing laboratory to meet nationally recognized standards or to be safe for use in a specified manner.

- 2) Production of equipment or product is periodically inspected by a nationally recognized testing laboratory.
- 3) Bears a label, tag, or other record of certification.
- d. Nationally recognized testing laboratory; laboratory which is approved by the authority having jurisdiction.

1.05 PROJECT/SITE CONDITIONS

- A. Install Work in locations shown on Drawings, unless prevented by Project conditions.
- B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of Architect/Engineer before proceeding.

1.06 SUBMITTALS

- A. See Section 01 30 00 for submittal procedures.
- B. Product Data: Submit product data grouped to include complete submittals of related systems, products, and accessories.
- C. Shop Drawings: Submit Shop Drawings grouped to include complete submittals of related systems, products, and accessories.
- D. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- E. Mark dimensions and values in units to match those specified.

1.07 DRAWINGS

- A. The drawings indicate the general arrangement and extent of electrical work. Do not scale off the drawings. All data shall be field verified with actual field conditions. Contractor shall be responsible to field measure and confirm mounting heights and location of equipment with respect to existing structures and field conditions.
- B. The drawings and specifications are complementary each to the other. What is called for by one shall be as binding as if called for by both.
- C. Omissions or discrepancies between different drawings or between drawings and specifications or between contract documents and regulations and/or codes shall be brought to the attention of the Architect/Engineer for a decision in writing. Interpretation before the bid shall be by addendum only. If an interpretation is not given by addendum, bid the greater quantity or better quality.

1.08 PERMITS AND LICENSES

- A. Obtain and pay for required licenses and permits. Pay for fees and charges for connection to outside services. Coordinate costs for electrical service including transformers, telephone service, cable TV service during the bidding phase of the project. Pay for use of property other than the site of the work for storage of materials or other purposes.
- B. Installation shall be performed by persons licensed and skilled in the trade, and shall be done under the supervision of a master electrician licensed by the State.

1.09 PROGRESS OF WORK

- A. Organize electrical work such that the progress of the work will conform to the progress of other trades, and complete the entire installation as soon as the conditions of the building will permit. Any cost resulting from defective or ill-timed work performed under this section shall be borne by this Contractor.

- B. Portions of work will be required to be accomplished during other than normal working hours.

1.10 CORRELATION OF WORK

- A. Organize work so that it will not interfere with the work of other trades. Consult the drawings and specifications for work of other trades to correlate information, and consult the architectural and structural drawings for details and dimensions. Verify the location of all outlets. If interference develops, bring it to the attention of the Architect/Engineer for a decision. No additional compensation will be allowed for the moving of misplaced outlets, wiring or equipment.
- B. Before roughing-in for electrical equipment furnished by others, verify the voltage and current characteristics and control connections of this equipment, and provide the proper feeders and connections as recommended by the manufacturer of the equipment.

1.11 CUTTING AND PATCHING

- A. Lay out all work in advance and where removal of door frames, portions of walls, ceilings or floors are required, and cutting, channeling, chasing, or drilling of building surfaces is necessary for the proper installation of electrical equipment, carefully perform this work in a manner which does not weaken floors and walls. Damaged surfaces shall be repaired at no cost to the Owner.
- B. Concrete shall be cut only with rotary type drilling tools. Electrical equipment shall not be cut with torches, and shall be joined only by bolting (i.e., do not weld wireways to panels).
- C. Patching, when required, shall be finished to match adjoining surfaces and is subject to approval by the Architect/Engineer.

1.12 EXAMINATION OF SITE

- A. Before submitting a bid, each bidder shall examine the site, check the means of installing electrical equipment and shall be familiar with the existing conditions and limitations. No extras will be allowed because of the Contractor's misunderstanding of the amount of work involved or lack of knowledge of any site conditions which may affect the work. Any apparent variance of the drawings or specifications from the existing conditions at the site shall be called to the attention of the Architect/Engineer before submitting a bid.

1.13 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 01 3000 and 01 7800.

1.14 DELIVERY, STORAGE AND HANDLING

- A. The Contractor is responsible for receiving all deliveries and proper storage and protection of all products. Storage of products on site shall be coordinated with the Owner prior to beginning work.

1.15 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01 30 00 and Section 01 7800.
- B. Include all changes and deviations from contract documents. Clearly mark in red colored pencil. Include all addendum items and approved change orders.

1.16 MINIMUM REQUIREMENTS

- A. References to the National Electrical Code (NEC), Underwriters Laboratories, Inc. (UL), National Fire Protection Association (NFPA), National Electrical Installation Standards (NEIS), and any other applicable standards are minimum installation requirement standards.
- B. Drawings and other specification sections shall govern in those instances where requirements are greater than those specified in the above standards.

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**SECTION 26 0501
ELECTRICAL DEMOLITION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical demolition.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify field measurements and circuiting arrangements are as shown on Drawings.
- 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.

3.02 PREPARATION

- A. Field verify exact locations of devices and disconnect existing lightning protection systems 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.
- D. Existing Electrical Services and Panelboards: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
 - 1. Obtain permission from Owner at least 2 weeks before partially or completely disabling system.
 - 2. Make temporary connections to maintain service in areas adjacent to work area.
 - 3. Work may need to be done outside normal working hours to avoid disruption of power to any critical areas. Coordinate required work hours with the Owner.
- E. Existing Telecommunications System: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
- F. Ceiling Remodel: In areas where the ceilings are being removed and replaced, all existing conduit and cabling that remains shall be resupported in accordance with these specifications. Provide new cable support hangers in accordance with section 27 10 05 to resupport existing cables and new conduit straps and supports in accordance with Section 26 05 34.
- G. Ceiling & HVAC Remodel: In areas where the ceilings are being removed and replaced, all existing conduit and cabling that remains shall be resupported in accordance with these specifications. In areas where existing HVAC ductwork and piping are being removed and replaced, relocate existing conduit and boxes that are to remain to accommodate installation of new ductwork and piping. Coordinate with mechanical contractor. Provide new cable support hangers in accordance with Section 27-1005 to resupport existing cables and new conduit straps and supports in accordance with section 26 05 29.

3.03 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 unless noted otherwise.
- 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 which are not removed.
- E. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
- 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 which remain active. Modify installation or provide access panel as appropriate.
- I. Install junction boxes in walls, ceilings or floors if required to continue wiring.
- J. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

3.04 CLEANING AND REPAIR

- A. Clean and repair existing materials and equipment which remain or are to be reused.
- B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

3.05 MATERIAL DISPOSAL

- A. Material and equipment deemed salvageable by the Owner shall remain the property of Owner. Contractor shall dismantle these items to manageable size and deliver to designated storage area on site. The Owner shall have first right of refusal on all material and equipment.
- B. All other materials and equipment shall become property of Contractor and must be removed from site and disposed of by approved method.
- C. Fluorescent lamps and high intensity discharge lamps shall be packed in suitable shipping cartons and broken lamps shall be put in suitable sealed shipping containers. Store lamps in an area and in a manner that will prevent breakage. Label the lamp storage area and each lamp container as universal waste. Provide a universal waste manifest and ship to an approved disposal site. The maximum quantity of lamps that can be stored on site before shipping is 1,000 lamps. Comply with all regulations of the State Pollution Control Agency.
- D. If light fixtures are to be removed from the jobsite intact, remove the light fixture from the jobsite as a unit. Do not remove lamps or ballasts on the jobsite.
- E. For disposed light fixtures, remove the lamps and ballasts from fluorescent light fixtures and high intensity discharge light fixtures. Dispose of the lamps and ballasts as indicated above.

END OF SECTION

SECTION 26 0519
LOW-VOLTAGE CONDUCTORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single conductor building wire.
- B. Manufactured wiring systems.
- C. Wiring connectors.
- D. Electrical tape.
- E. Heat shrink tubing.
- F. Wire pulling lubricant.
- G. Cable ties.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding.
- B. Section 26 0553 - Electrical Identification: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.
- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010 (Reapproved 2014).
- D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2014).
- E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2010.
- F. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.
- G. NEMA WC 70 - Nonshielded Power Cable 2000 V or Less for the Distribution of Electrical Energy; 2009.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.
- J. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.
- K. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.
- L. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.
- M. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.

2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.07 FIELD CONDITIONS

- A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.
- B. Products: Furnish products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
- C. Nonmetallic-sheathed cable is not permitted.
- D. Underground feeder and branch-circuit cable is not permitted.
- E. Service entrance cable is not permitted.
- F. Armored cable is not permitted.
- G. Metal-clad cable is not permitted.
 1. Where not otherwise restricted, may be used:
 - a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
 - 1) Maximum Length: 6 feet.
 - b. Where concealed in hollow stud walls, above accessible ceilings, and under raised floors for branch circuits up to 20 A.
- 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. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- D. Comply with NEMA WC 70.
- E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- F. Conductors for Grounding and Bonding: Also comply with Section 26 0526.

-
- G. Conductor Material:
1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
 2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
 3. Tinned Copper Conductors: Comply with ASTM B33.
- H. Minimum Conductor Size:
1. Branch Circuits: 12 AWG.
 - a. Exceptions:
 - 1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
 - 2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.
 2. Control Circuits: 14 AWG.
- I. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- J. Conductor Color Coding:
1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
 2. Color Coding Method: Integrally colored insulation.
 - a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
 3. Color Code:
 - a. 480Y/277 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - 4) Neutral/Grounded: Gray.
 - b. 208Y/120 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - 4) Neutral/Grounded: White.
 - c. Equipment Ground, All Systems: Green.
 - d. Travelers for 3-Way and 4-Way Switching: Pink.
 - e. For modifications or additions to existing wiring systems, comply with existing color code when existing code complies with NFPA 70 and is approved by the authority having jurisdiction.
 - f. For control circuits, comply with manufacturer's recommended color code.

2.03 SINGLE CONDUCTOR BUILDING WIRE

- A. Manufacturers:
1. Copper Building Wire:
 - a. Cerro Wire LLC: www.cerrowire.com/#sle.
 - b. Encore Wire Corporation: www.encorewire.com/#sle.
 - c. Southwire Company: www.southwire.com/#sle.
 - d. Or Equal.
- B. Description: Single conductor insulated wire.
- C. Conductor Stranding:

1. Feeders and Branch Circuits:
 - a. Size 10 AWG and Smaller: Solid.
 - b. Size 8 AWG and Larger: Stranded.
2. Control Circuits: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation:
 1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2.

2.04 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. Wiring Connectors for Splices and Taps:
 1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
 2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
- C. Wiring Connectors for Terminations:
 1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
 2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
 3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
 4. Provide motor pigtail connectors for connecting motor leads in order to facilitate disconnection.
 5. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
 6. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.
 7. Conductors for Control Circuits: Use crimped terminals for all connections.
- D. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
- E. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.
- F. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
 1. Manufacturers:
 - a. 3M: www.3m.com/#sle.
 - b. Ideal Industries, Inc: www.idealindustries.com/#sle.
 - c. NSI Industries LLC: www.nsiindustries.com/#sle.
- G. Mechanical Connectors: Provide bolted type or set-screw type.
 1. Manufacturers:
 - a. Burndy: www.burndy.com.
 - b. IlSCO: www.ilSCO.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
- H. Compression Connectors: Provide circumferential type or hex type crimp configuration.
 1. Manufacturers:

- a. Burndy: www.burndy.com.
 - b. IlSCO: www.ilsco.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
- I. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.
- 1. Manufacturers:
 - a. Burndy: www.burndy.com.
 - b. IlSCO: www.ilsco.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.

2.05 WIRING ACCESSORIES

- A. Electrical Tape:
- 1. Manufacturers:
 - a. 3M: www.3m.com/#sle.
 - b. Plymouth Rubber Europa: www.plymouthrubber.com/#sle.
 - 2. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
 - 3. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
 - 4. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil.
- B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
- C. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
- 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. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that work likely to damage wire and cable has been completed.
- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- D. Verify that field measurements are as indicated.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

- A. Circuiting Requirements:

-
1. Unless dimensioned, circuit routing indicated is diagrammatic.
 2. When circuit destination is indicated without specific routing, determine exact routing required.
 3. Arrange circuiting to minimize splices.
 4. Include circuit lengths required to install connected devices within 10 ft of location indicated.
 5. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
 6. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
 7. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is not permitted.
 - 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.
 8. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.
- B. Install products in accordance with manufacturer's instructions.
- C. Perform work in accordance with NECA 1 (general workmanship).
- D. Installation in Raceway:
1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
 2. Pull all conductors and cables together into raceway at same time.
 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- E. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- F. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.
 2. Installation in Vertical Raceways: Provide supports where vertical rise exceeds permissible limits.
- G. Install conductors with a minimum of 12 inches of slack at each outlet.
- H. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet of slack.
- I. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- J. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

- K. Make wiring connections using specified wiring connectors.
 - 1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
 - 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
 - 3. Do not remove conductor strands to facilitate insertion into connector.
 - 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
 - 5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- L. 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 or heat shrink tubing.
 - 2. Damp Locations: Use insulating covers specifically designed for the connectors or heat shrink tubing.
 - a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
 - 3. Wet Locations: Use heat shrink tubing.
- M. Insulate ends of spare conductors using vinyl insulating electrical tape.
- N. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.
- O. Color Code Legend: Provide identification label identifying color code for ungrounded conductors at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
- P. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.04 FIELD QUALITY CONTROL

- A. Correct deficiencies and replace damaged or defective conductors and cables.
- B. Inspect wire for physical damage and proper connection.
- C. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.
- D. Verify continuity of each branch circuit conductor.

END OF SECTION

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**SECTION 26 0526
GROUNDING AND BONDING**

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. Grounding and bonding components for electrical systems.

1.02 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- B. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.04 PERFORMANCE REQUIREMENTS

- A. Grounding System Resistance: 5 ohms.

1.05 SUBMITTALS

- A. See Section 01 3000 Submittals and Substitutions for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Field quality control test reports.
- E. Project Record Documents: Record actual locations of components and grounding electrodes.
- F. Certificate of Compliance: Indicate approval of installation by authority having jurisdiction.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instruction.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- C. Comply with UL 467.
- D. Comply with NECA's "Standard of Installation."

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

- A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.
- B. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- E. Bonding and Equipment Grounding:
 - 1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
 - 2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
 - 3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
 - 4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
 - 5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.

2.02 GROUNDING AND BONDING COMPONENTS

- A. General Requirements:
 - 1. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) or testing firm acceptable to authority having jurisdiction as suitable for the purpose indicated.
 - 2. Provide products listed and labeled as complying with UL 467 and IEEE 837 where applicable.
- B. Conductors for Grounding and Bonding:
 - 1. Use insulated copper conductors unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that conditions are satisfactory for installation prior to starting work.
- B. Verify existing conditions prior to beginning work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install grounding and bonding system components in a neat and workmanlike manner in accordance with NECA 1.
- C. Make grounding and bonding connections using specified connectors.

1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
 4. Mechanical Connectors: Secure connections using silicone bronze hardware, according to manufacturer's recommended torque settings.
 5. Irreversible Compression Connectors: Secure connections using manufacturer's recommended tools and dies. Irreversible compression grounding connectors must be factory filled with an oxide inhibitor and installed using a 14 ton or larger hydraulic tool, matching the manufacturer's die to the connector. Connectors must be fully crimped, allowing visible inspection of the embossed index number on the crimped connector, which should match the same index number on the die.
- D. Identify grounding and bonding system components in accordance with Section 26 0553.
- E. Comply with NEC
1. Article 250 for types, sizes, and quantities of equipment grounding conductors, except where specific types, larger sizes, or more conductors than required by NEC are indicated.
- F. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing. Comply with NEC Article 250 for types, sizes, and quantities of equipment grounding conductors, except where specific types, larger sizes, or more conductors than required by NEC are indicated.
1. Install equipment grounding conductor with circuit conductors for the items below in addition to those required by Code:
 - a. Feeders and branch circuits.
 - b. Receptacle circuits.
 - c. Single-phase motor or appliance branch circuits.
- G. Connections
1. General: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
 2. Equipment Grounding-Wire Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs, SLUH type as manufactured by Ilsco. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.
 3. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. Where these requirements are not available, use those specified in UL 486A and UL 486B.

3.03 FIELD QUALITY CONTROL

- A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

END OF SECTION

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**SECTION 26 0529
HANGERS AND SUPPORTS**

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 26 0533.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.
- B. Section 26 0533.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2013.
- D. MFMA-4 - Metal Framing Standards Publication; 2004.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 5B - Strut-Type Channel Raceways and Fittings; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
 - 4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 QUALITY ASSURANCE

- A. Comply with NFPA 70.
- B. Comply with applicable building code.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 - 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
 - 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
 - 3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of 10. Include consideration for vibration, equipment operation, and shock loads where applicable.
 - 4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
 - 5. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
 - 6. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
 - b. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - c. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
 - 1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
 - 2. Conduit Clamps: Bolted type unless otherwise indicated.
 - 3. Manufacturers:
 - a. Cooper Crouse-Hinds, a division of Eaton Corporation: www.cooperindustries.com.
 - b. Erico International Corporation: www.erico.com.
 - c. Thomas & Betts Corporation: www.tnb.com.
- C. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
 - 1. Comply with MFMA-4.
 - 2. Channel Material:
 - a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
 - 3. Minimum Channel Thickness: Steel sheet, 12 gage, 0.1046 inch.
 - 4. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.
 - 5. Manufacturers:
 - a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com/#sle.
 - b. Thomas & Betts Corporation: www.tnb.com/#sle.
 - c. Unistrut, a brand of Atkore International Inc: www.unistrut.com/#sle.
 - d. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.
- D. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
 - 1. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Equipment Supports: 1/2 inch diameter.

- b. Single Conduit up to 1 inch (27 mm) trade size: 1/4 inch diameter.
 - c. Single Conduit larger than 1 inch (27 mm) trade size: 3/8 inch diameter.
 - d. Trapeze Support for Multiple Conduits: 3/8 inch diameter.
 - e. Outlet Boxes: 1/4 inch diameter.
 - f. Luminaires: 1/4 inch diameter.
- E. Anchors and Fasteners:
- 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
 - 2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
 - 3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
 - 4. Hollow Masonry: Use toggle bolts.
 - 5. Steel: Use beam clamps, machine bolts, or welded threaded studs.
 - 6. Sheet Metal: Use sheet metal screws.
 - 7. Wood: Use wood screws.
 - 8. Plastic and lead anchors are not permitted.
 - 9. Manufacturers - Mechanical Anchors:
 - a. Hilti, Inc: www.us.hilti.com/#sle.
 - b. ITW Red Head, a division of Illinois Tool Works, Inc: www.itwredhead.com/#sle.
 - c. Powers Fasteners, Inc: www.powers.com/#sle.
 - d. Simpson Strong-Tie Company Inc: www.strongtie.com/#sle.

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. Perform work in accordance with NECA 1 (general workmanship).
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- G. Equipment Support and Attachment:
 - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 - 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- H. Conduit Support and Attachment: Also comply with Section 26 0533.13.

- I. Box Support and Attachment: Also comply with Section 26 0533.16.
- J. Secure fasteners according to manufacturer's recommended torque settings.
- K. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

- A. Inspect support and attachment components for damage and defects.
- B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- C. Correct deficiencies and replace damaged or defective support and attachment components.
- D. Install hangers and supports as required to adequately and securely support electrical system components, in a neat and workmanlike manner, as specified in NECA 1. Size metal framing system as required for the application and structural requirements.

END OF SECTION

**SECTION 26 0533.13
CONDUIT FOR ELECTRICAL SYSTEMS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Galvanized steel rigid metal conduit (RMC).
- B. Flexible metal conduit (FMC).
- C. Liquidtight flexible metal conduit (LFMC).
- D. Electrical metallic tubing (EMT).
- E. Conduit fittings.
- F. Accessories.
- G. Conduit, fittings and conduit bodies.

1.02 RELATED REQUIREMENTS

- A. Section 26 0529 - Hangers and Supports.
- B. Section 26 0533.16 - Boxes for Electrical Systems.
- C. Section 26 0553 - Electrical Identification: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2005.
- B. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT); 2005.
- C. ANSI C80.5 - American National Standard for Electrical Rigid Aluminum Conduit (ERAC); 2005.
- D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.
- E. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2013.
- F. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); 2003.
- G. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.
- H. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2013.
- I. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2015.
- J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- K. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.
- L. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
- M. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
- N. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.
- O. UL 1660 - Liquid-Tight Flexible Nonmetallic Conduit; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.

2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
 4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
 5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Sequencing:
1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittals procedures.
- B. Project Record Documents: Record actual routing for conduits installed underground, conduits embedded within concrete slabs, and conduits 2 inch (53 mm) trade size and larger.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and shown.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.
- B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.
- C. Concealed Within Masonry Walls: Use electrical metallic tubing (EMT) or flexible metal conduit..
- D. Concealed Within Hollow Stud Walls: Use electrical metallic tubing (EMT) or flexible metal conduit..
- E. Concealed Above Accessible Ceilings: Use electrical metallic tubing (EMT).
- F. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
- G. Connections to Vibrating Equipment:
 1. Dry Locations: Use flexible metal conduit.
 2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
 3. Maximum Length: 6 feet unless otherwise indicated.

4. Vibrating equipment includes, but is not limited to:
 - a. Transformers.
 - b. Motors.

H. Fished in Existing Walls, Where Necessary: Use flexible metal conduit.

2.02 CONDUIT REQUIREMENTS

- A. Existing Work: Where existing conduits are indicated to be reused, they may be reused only where they comply with specified requirements, are free from corrosion, and integrity is verified by pulling a mandrel through them.
- B. Fittings for Grounding and Bonding: Also comply with Section 26 0526.
- C. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
- D. Provide products listed, classified, and labeled as suitable for the purpose intended.
- E. Minimum Conduit Size, Unless Otherwise Indicated:
 1. Branch Circuits: 1/2 inch trade size.
 2. Control Circuits: 1/2 inch trade size.
 3. Underground, Exterior: 1 inch (27 mm) trade size.
- F. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Manufacturers:
 1. Allied Tube & Conduit: www.alliedeg.com/#sle.
 2. Republic Conduit: www.republic-conduit.com/#sle.
 3. Wheatland Tube, a Division of Zekelman Industries: www.wheatland.com/#sle.
- B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- C. Fittings:
 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
 2. Non-Hazardous Locations: Use 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 threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 FLEXIBLE METAL CONDUIT (FMC)

- A. Manufacturers:
 1. AFC Cable Systems, Inc: www.afcweb.com/#sle.
 2. Electri-Flex Company: www.electriflex.com/#sle.
 3. International Metal Hose: www.metalhose.com/#sle.
 4. Or Equal.
- 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 to be used.

C. Fittings:

1. Manufacturers:

- a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
- b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
- c. Thomas & Betts Corporation: www.tnb.com/#sle.

2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.

3. Material: Use steel.

- a. Do not use die cast zinc fittings.

D. Description: Interlocked steel construction.

E. Fittings: NEMA FB 1.

2.05 ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers:

- 1. Allied Tube & Conduit: www.alliedeg.com/#sle.
- 2. Republic Conduit: www.republic-conduit.com/#sle.
- 3. Wheatland Tube, a Division of Zekelman Industries: www.wheatland.com/#sle.
- 4. Or Equal.

B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

C. Fittings:

1. Manufacturers:

- a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
- b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
- c. Thomas & Betts Corporation: www.tnb.com/#sle.

2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.

3. Material: Use steel.

- a. Do not use die cast zinc fittings.

4. Connectors and Couplings: Use compression (gland) or set-screw type.

- a. Do not use indenter type connectors and couplings.

5. Damp or Wet Locations (where permitted): Use fittings listed for use in wet locations.

2.06 LIQUIDTIGHT FLEXIBLE NONMETALLIC CONDUIT (LFNC)

A. Description: NFPA 70, Type LFNC liquidtight flexible nonmetallic conduit listed and labeled as complying with UL 1660.

B. Fittings:

- 1. Manufacturer: Same as manufacturer of conduit to be connected.
- 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B; suitable for the type of conduit to be connected.

2.07 ACCESSORIES

A. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.

B. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force.

C. Sealing Compound for Sealing Fittings: Listed for use with the particular fittings to be installed.

- D. Modular Seals for Conduit Penetrations: Rated for minimum of 40 psig; Suitable for the conduits to be installed.

2.08 FIRESTOP

- A. Provide a firestop system with an "F" rating as determined by UL 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.
1. For penetrations by non-combustible items including steel pipe, copper pipe, rigid steel conduit, and electrical metallic tubing (EMT), the following are acceptable:
 - a. Hilti FS 601 electrometric firestop sealant or Fs 605 HP firestop sealant.
 - b. 3M fire barrier CP25.
 - c. Nelson CLK firestop sealant
 2. For fire-rated construction joints and other gaps, the following may be used:
 - a. Hilti FS 601.
 - b. 3M fire barrier CP25.
 - c. Nelson CLK firestop sealant.
 3. For penetrations by non-combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable, or cable bundles, and plastic pipe (closed piping systems), the following are acceptable:
 - a. Hilti FS 611A intumescent firestop sealant.
 - b. 3M barrier CP 25.
 - c. 3M fire barrier FS-195 wrap strip.
 - d. Nelson FSP firestop putty, PCS pipe choke system.
 4. For large complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways or raceways, the following are acceptable:
 - a. Hilti FS 635, trowelable firestop compound.
 - b. 3M fire barrier CS-195 composite sheet.
 - c. Nelson CPS composite sheet, CMP firestop compound.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.
- D. Verify routing and termination locations of conduit prior to rough-in.
- E. Conduit routing is shown on drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install liquidtight flexible nonmetallic conduit (LFNC) in accordance with NECA 111.
- E. Conduit Routing:
 1. Unless dimensioned, conduit routing indicated is diagrammatic.
 2. When conduit destination is indicated without specific routing, determine exact routing required.
 3. Conceal all conduits unless specifically indicated to be exposed.

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4. Conduits in the following areas may be exposed, unless otherwise indicated:
 - a. Electrical rooms.
 - b. Mechanical equipment rooms.
 - c. Within joists in areas with no ceiling.
 5. Unless otherwise approved, do not route conduits exposed:
 - a. Across floors.
 - b. Across roofs.
 - c. Across top of parapet walls.
 - d. Across building exterior surfaces.
 - e. In any finished areas.
 6. Arrange conduit to maintain adequate headroom, clearances, and access.
 7. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
 8. Route conduits above water and drain piping where possible.
 9. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
 10. Maintain minimum clearance of 12 inches between conduits and hot surfaces. This includes, but is not limited to:
 - a. Heaters.
 - b. Hot water piping.
 - c. Flues.
 11. Group parallel conduits in the same area together on a common rack.
- F. Conduit Support:
1. Secure and support conduits in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
 3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
 4. Use conduit strap to support single surface-mounted conduit.
 - a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
 5. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.
 6. Use conduit clamp to support single conduit from beam clamp or threaded rod.
 7. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.
 8. Use non-penetrating rooftop supports to support conduits routed across rooftops (only where approved).
 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.
 11. Where conduit support intervals specified in NFPA 70 and NECA standards differ, comply with the most stringent requirements.
- G. Connections and Terminations:
1. Use approved zinc-rich paint or conduit joint compound such as Thomas & Betts Kopr-Shield on field-cut threads of galvanized steel conduits prior to making connections per NEC article 300.6.

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 a box or enclosure, provide threaded couplings equipped with threaded plugs set flush with finished floor.
 7. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
 8. Secure joints and connections to provide maximum mechanical strength and electrical continuity.
- H. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
 2. Make penetrations perpendicular to surfaces unless otherwise indicated.
 3. Provide sleeves 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. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
 6. Provide suitable mechanical sleeves (link seal) where conduits penetrate exterior wall below grade.
 7. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
 8. 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. Include proposed locations of penetrations and methods for sealing with submittals.
 9. Provide metal escutcheon plates for conduit penetrations exposed to public view.
- I. 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.
- J. Provide pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.
- K. Provide grounding and bonding in accordance with Section 26 0526.
- L. Identify conduits in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

- A. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

- B. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

- A. Clean interior of conduits to remove moisture and foreign matter.

3.05 PROTECTION

- A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.
- B. All conduit in finished areas shall be installed concealed in walls, floors or ceilings unless noted otherwise on the drawings. Unfinished areas are considered mechanical rooms, electrical rooms and utility spaces only.
- C. Route exposed conduit parallel and perpendicular to walls.
- D. Route conduit installed above accessible ceilings parallel and perpendicular to walls.
- E. Route conduit continuous from outlet to outlet, outlet to cabinets, outlet to pull or junction boxes. Secure conduit to all boxes with locknuts and bushings in such manner that each system is mechanically and electrically continuous throughout.
- F. Install all conduit within the building except where specifically noted or shown otherwise on the drawings.
- G. Conduit systems must be installed complete before conductors are pulled in.
- H. Repair any damage done to insulation or interior vapor barrier.
- I. Fill conduits which can admit air to or release air from air plenums through the connecting conduit system with sealing compound.
- J. Seal around all conduits passing through partitions such as walls, floor slabs and other elements. For non-rated partitions, sealant to match surrounding surface. For rated partitions, provide fireproofing sealant which preserves the fire resistant rating of the partition. Use materials and methods as directed by the manufacturer of the fireproofing and approved by the Architect/Engineer. See Architectural drawings and existing building drawings for location of new and existing fire-rated partitions.

END OF SECTION

SECTION 26 0533.16
BOXES FOR ELECTRICAL SYSTEMS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.
- B. Wall and ceiling outlet boxes.
- C. Pull and junction boxes.

1.02 RELATED REQUIREMENTS

- A. Section 26 0529 - Hangers and Supports.
- B. Section 26 0533.13 - Conduit for Electrical Systems:
 - 1. Conduit bodies and other fittings.
 - 2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.
- C. Section 26 0553 - Electrical Identification: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.
- C. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- D. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.
- E. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013.
- F. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports; 2013.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. 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 the contract documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Project Record Documents: Record actual locations and mounting heights of outlet, pull, and junction boxes on project record documents.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 BOXES

- A. General Requirements:
 1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
 2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
 3. Provide products listed, classified, and labeled as suitable for the purpose intended.
 4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
 5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
 1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
 2. Use cast 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 is used.
 4. Use suitable masonry type boxes where flush-mounted in masonry walls.
 5. Use raised covers suitable for the type of wall construction and device configuration where required.
 6. Use shallow boxes where required by the type of wall construction.
 7. Do not use "through-wall" boxes designed for access from both sides of wall.
 8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
 9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
 10. Minimum Box Size, Unless Otherwise Indicated:
 - a. Wiring Devices: 4 inch square by 1-1/2 inch deep (100 by 38 mm) trade size.
 - b. Communications Systems Outlets: 4 inch square by 2-1/8 inch (100 by 54 mm) trade size.
 - c. Ceiling Outlets: 4 inch octagonal or square by 1-1/2 inch deep (100 by 38 mm) trade size.

2.02 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
 - 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch male fixture studs where required.
 - 2. Concrete Ceiling Boxes: Concrete type.
- B. Cast Boxes: NEMA FB 1, Type FD, aluminum. Provide gasketed cover by box manufacturer. Provide threaded hubs.
- C. Two-Gang Outlet and Smaller: Utilize 4-inch square box with tile ring or concrete-block type box. 2-1/8 inch deep minimum.
- D. Ceiling Boxes: 4 inches square, 1-1/2 inches deep, with a round tile ring.
- E. Surface Mounted Outlets: Exterior or Wet Locations.
 - 1. Type: Die cast aluminum with threaded hubs.
 - 2. Utilize for outlet boxes on exposed conduit runs.
- F. Surface Mounted Outlets: Interior Dry Locations.
 - 1. Type: 4-inch square boxes with matching raised covers.
 - 2. Utilize for outlet boxes on exposed conduit runs.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive boxes.
- C. Verify that conditions are satisfactory for installation prior to starting work.
- D. Verify locations of floor boxes and outlets in offices and work areas prior to rough-in.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
- E. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.
- F. Box Locations:
 - 1. Locate boxes to be accessible. Provide access panels in accordance with Section 08 3100 as required where approved by the Architect.
 - 2. Unless dimensioned, box locations indicated are approximate.
 - 3. Locate boxes so that wall plates do not span different building finishes.
 - 4. Locate boxes so that wall plates do not cross masonry joints.
 - 5. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
 - 6. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.

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7. 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 0533.13.
 8. 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.
- G. Box Supports:
1. Secure and support boxes in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
 2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
 3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
 4. Use far-side support to secure flush-mounted boxes supported from single stud in hollow stud walls. Repair or replace supports for boxes that permit excessive movement.
- H. Install boxes plumb and level.
- I. Flush-Mounted Boxes:
1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.
- J. Install firestopping to preserve fire resistance ratings of partitions and other elements.
- K. Close unused box openings.
- L. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- M. Provide grounding and bonding in accordance with Section 26 0526.
- N. All boxes shall be installed flush in finished spaces unless noted otherwise. Unfinished spaces include mechanical, electrical and utility rooms only.
- O. Install boxes securely, in a neat and workmanlike manner, as specified in NECA 1.
- P. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and as required by NFPA 70.
- Q. Set wall mounted boxes at elevations to accommodate mounting heights indicated on the drawings or specified unless noted otherwise.
- R. Electrical boxes are shown on Drawings in approximate locations unless dimensioned.
 1. Adjust box locations up to 10 feet if required to accommodate intended purpose.
- S. Maintain headroom and present neat mechanical appearance.

- T. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- U. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- V. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes and mechanical radiation.
- W. Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan.
- X. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
- Y. Use flush mounting outlet box in finished areas.
- Z. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
- AA. Use adjustable steel channel fasteners for hung ceiling outlet box.
- BB. Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits both supported within 12 inches of box.
- CC. Use surface mounted 4-inch square box with matching raised cover on exposed conduit runs.
- DD. Use gang box where more than one device is mounted together. Do not use sectional box. Do not use handy box.
- EE. Use cast outlet box in exterior locations exposed to the weather and wet locations.
- FF. Set floor boxes level.
- GG. Surface mounted outlets are permitted only in mechanical and electrical rooms and above removable ceilings.
- HH. Boxes protruding from the finished wall will not be accepted.
- II. Install outlets in similar rooms in the same relative location in each room.
- JJ. Locate outlets to clear piping, duct work and other obstructions.
- KK. Install switch outlets within 6 inches of latch side of door except where type of construction dictates otherwise.
- LL. Mounting heights indicated on Drawings are to center line of outlet unless indicated otherwise.
- MM. Mount duplex receptacle outlets noted to be "A.C." (above counter) 3 inches above the top of the countertop backsplash. Adjust outlet mounting height to agree with required location for equipment served.
- NN. Pull boxes and junction boxes are not indicated on Drawings except for special requirements. Install as required to facilitate pulling wire. Size as required by National Electric Code. Install above removable ceilings, electrical rooms, utility rooms or storage areas in accessible locations. Installation in finished spaces not permitted without approval of the Architect/Engineer.
- OO. Do not mount junction boxes or pull boxes to duct work, ceiling system or other piping. Mount from structural system only. Mount independent of conduit system. Junction boxes supported only from conduit system will not be permitted.
- PP. Label all junction box covers with panelboard name and circuit numbers for circuits in junction box. Label all junction box covers with the type of communication systems contained within; example: "Nurse Call," "Security," etc. See section 26 0553 - Electrical Identification.

3.03 ADJUSTING

- A. Adjust floor boxes flush with finish flooring material.

- B. Adjust flush-mounting outlets to make front flush with finished wall material.
- C. Install knockout closures in unused box openings.

3.04 CLEANING

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

END OF SECTION

SECTION 26 0553
ELECTRICAL IDENTIFICATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Device and Junction Box Labels

1.02 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.
- B. Sequencing:
 - 1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
 - 2. Do not install identification products until final surface finishes and painting are complete.

1.04 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

1.05 FIELD CONDITIONS

- A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and shown.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

- A. Existing Work: Unless specifically excluded, identify existing elements to remain that are not already identified in accordance with specified requirements.
- B. Identification for Equipment:
 - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
 - a. Enclosed switches:
 - 1) Identify voltage and phase.
 - 2) Identify power source and circuit number. Include location when not within sight of equipment.
 - 3) Identify load(s) served. Include location when not within sight of equipment.
- C. Identification for Raceways:
 - 1. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify spare conduits at each end. Identify purpose and termination location.
- D. Identification for Boxes:
 - 1. Use identification labels to identify circuits enclosed.
- E. Identification for Devices:

1. Communications Systems: Use identification label to indicate system contained within, 'Public Address, 'Television', etc.
2. Use identification label to identify serving branch circuit for all receptacles.
3. Use identification label or engraved wallplate to identify load controlled for wall-mounted control devices controlling loads that are not visible from the control location and for multiple wall-mounted control devices installed at one location.

2.02 MANUFACTURERS

- A. Brady Corporation: www.bradycorp.com.
- B. Seton Identification Products: www.seton.com/aec.
- C. HellermannTyton: www.hellermanntyton.com.
- D. Or Equal.

2.03 IDENTIFICATION NAMEPLATES AND LABELS

- A. Identification Nameplates:
 1. Manufacturers:
 - a. Brimar Industries, Inc: www.brimar.com.
 - b. Kolbi Pipe Marker Co: www.kolbipipemarkers.com.
 - c. Seton Identification Products: www.seton.com.
 2. Materials:
 - a. Indoor Clean, Dry Locations: Use plastic nameplates.
 - b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
- B. Identification Labels:
 1. Manufacturers:
 - a. Brady Corporation: www.bradyid.com.
 - b. Brother International Corporation: www.brother-usa.com.
 - c. Panduit Corp: www.panduit.com.
 2. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
 3. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.
- C. Format for Equipment Identification:
 1. Minimum Size: 1 inch by 2.5 inches.
 2. Legend:
 - a. System designation where applicable:
 - 1) Fire Alarm System: Identify with text "FIRE ALARM".
 - b. Equipment designation or other approved description.
 - c. Other information as indicated.
 3. Text: All capitalized unless otherwise indicated.
 4. Minimum Text Height:
 - a. System Designation: 1 inch.
 - b. Equipment Designation: 1/2 inch.
 - c. Other Information: 1/4 inch.
 - d. Exception: Provide minimum text height of 1 inch for equipment located more than 10 feet above floor or working platform.
 5. Color:
 - a. Normal Power System: White text on black background.

- D. Format for Receptacle Identification:
 - 1. Minimum Size: 3/8 inch by 1.5 inches.
 - 2. Legend: Power source and circuit number or other designation indicated.
 - 3. Text: All capitalized unless otherwise indicated.
 - 4. Minimum Text Height: 3/16 inch.
 - 5. Color: Black text on clear background.
- E. Format for Control Device Identification:
 - 1. Minimum Size: 3/8 inch by 1.5 inches.
 - 2. Legend: Load controlled or other designation indicated.
 - 3. Text: All capitalized unless otherwise indicated.
 - 4. Minimum Text Height: 3/16 inch.
 - 5. Color: Black text on clear background.

PART 3 EXECUTION

3.01 PREPARATION

- A. Clean surfaces to receive adhesive products according to manufacturer's instructions.
- B. Degrease and clean surfaces to receive nameplates and labels.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
 - 1. Surface-Mounted Equipment: Enclosure front.
 - 2. Interior Components: Legible from the point of access.
 - 3. Boxes: Outside face of cover.
 - 4. Conductors and Cables: Legible from the point of access.
 - 5. Devices: Outside face of cover.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
- F. Mark all handwritten text, where permitted, to be neat and legible.

3.03 FIELD QUALITY CONTROL

- A. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.
- B. Provide self-adhesive labels on all receptacles by identifying the panel name and circuit number, example: H1-24.
- C. Provide self-adhesive labels on all junction box covers to identify the circuits contained within for all power circuits or the system contained within for all communications systems. Example: 'Paging System'.

END OF SECTION

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**SECTION 26 0583
WIRING CONNECTIONS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical connections to Division 22 and 23 mechanical equipment.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - Low-Voltage Conductors.
- B. Section 26 0533.13 - Conduit for Electrical Systems.
- C. Section 26 0533.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

- A. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (R 2010).
- B. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2012.
- 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 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.06 COORDINATION

- A. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
- B. Determine connection locations and requirements.
- C. Sequence rough-in of electrical connections to coordinate with installation of equipment.
- D. Sequence electrical connections to coordinate with start-up of equipment.
- E. Install controllers and disconnect switches in mechanical rooms in accessible locations. Coordination installation locations with the Division 22 or Division 23 contractor.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
 - 1. Colors: Conform to NEMA WD 1.
 - 2. Cord Construction: NFPA 70, Type SO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.

- 3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.
- B. Flexible Conduit: As specified in Section 26 0533.13.
 - 1. Provide flexible conduit connections to equipment that must be removed for repair or maintenance.
 - 2. Where moist conditions are encountered such as in dishwashing areas, provide PVC jacketed flexible conduit.
- C. Wire and Cable: As specified in Section 26 0519.
- D. Boxes: As specified in Section 26 0533.16.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that equipment is ready for electrical connection, wiring, and energization.
- B. Verify mounting locations for controllers and disconnect switches. Coordinate with Division 23 equipment locations.

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. Do not use wire having a rating less than 90 degrees C.
- 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.
- J. Review floor plan drawings and motor and equipment schedule on the plans. The floor plans indicate the location of the equipment only, the schedule calls out all connection, disconnect and controller requirements.
- K. Provide a disconnecting means within sight of all motors and equipment as required by the latest edition of the NEC.

END OF SECTION

SECTION 26 0943
LIGHTING CONTROL SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

- A. Lighting control system.
- B. Standalone lighting control devices.

1.02 RELATED SECTIONS

- A. Section 26 51 00 - Lighting.

1.03 REFERENCES

- A. NFPA 70 - National Electrical Code; National Fire Protection Association.
- B. NEMA - National Electrical Manufacturers Association
- C. FCC emission standards
- D. UL - Underwriters Laboratories, Inc. Listings
- E. UL 2043 - Standard for Fire Test for Heat and Visible Smoke Release for Discrete Products Installed in Air-Handling Spaces.
- F. UL 924 - Standard for Emergency Lighting and Power Equipment
- G. ULC - Underwriter Laboratories of Canada Listings

1.04 PERFORMANCE REQUIREMENTS

- A. Lighting Control System shall accommodate the square-footage coverage requirements for each area controlled, utilizing room controllers, digital occupancy sensors, switches, daylighting sensors and accessories that suit the required lighting and electrical system parameters.
- B. System shall conform to requirements of NFPA 70.
- C. System shall comply with FCC emission standards specified in part 15, sub-part J for commercial and residential application.
- D. System shall be listed under UL sections 916 and/or 508.

1.05 SUBMITTALS

- A. Submit under provisions of Section 01 3000.
- B. Product Data: For each type of product (general device descriptions, dimensions, individual wiring details, nomenclature).
 - 1. Bill of Materials: Complete list of all parts needed to fully install selected system components.
- C. Shop Drawings:
 - 1. Floor Plans: Location, orientation, and coverage area of each sensor; groups; zones; scenes; and other specific design symbols and designations as required to define the installation, location, and configuration of all control devices.
 - 2. Point List and Data Bus Devices: Summary list of all control devices, sensors, and other devices connected to each data bus. Include remaining future device capacity of data bus.
 - 3. Wire Termination Diagrams and Schedules: Coordinate nomenclature and presentation with Drawings and block diagram. Differentiate between manufacturer-installed and field-installed wiring.
 - 4. Coordination Drawings: Submit evidence that lighting controls are compatible with connected monitoring and control devices and systems specified in other Sections.

- 5. Show interconnecting signal and control wiring, and interface devices that prove compatibility of inputs and outputs.
- 6. Room Interconnection Diagrams: Typical per room type (detailed drawings showing device interconnectivity of devices).
- D. Example Contractor Startup/Commissioning Worksheet: Must be completed prior to factory start-up.
- E. Field quality-control reports.
- F. Software licenses and upgrades required by and installed for operation and programming of digital and analog devices.

1.06 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals.
- B. As-Built Drawings: Shop drawings upgrade to reflect installed conditions.

1.07 QUALITY ASSURANCE

- A. In high humidity or cold environments, the sensors shall be rated for condensing humidity and -40 deg F operation.
- B. All applicable products must be UL/CUL Listed or other acceptable national testing organization.
- C. Contractor shall ensure that lighting system control devices and assemblies are fully compatible and can be integrated into a system that operates as described in the lighting control notes on drawings and as described within this specification. Any incompatibilities between devices, fixtures, and system controllers shall be resolved between the Contractor and the system provider, as required to ensure proper system operation and maintainability.

1.08 COORDINATION

- A. Coordinate lighting control components to form an integrated interconnection of compatible components.
- B. The installing contractor shall be responsible for a complete and functional system in accordance with all applicable local and national codes.
- C. Comply with UL 916.

1.09 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of lighting controls that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Software: Failure of input and output to execute switching or dimming commands.
 - b. Failure of modular relays to operate under manual or software commands.
 - c. Device failure.
 - d. Damage of electronic components due to transient voltage surges.
 - 2. Warranty Periods:
 - a. Control Components: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 LIGHTING CONTROL SYSTEM

- A. MANUFACTURERS
 - 1. nLight® Network Control System from Sensor Switch.
 - 2. Cooper Controls.

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3. Wattstopper.
 4. Approval prior to bid required for other manufacturers.
- B. SYSTEM REQUIREMENTS
1. Operation: Input signal from digital signal sources, switches, sensors, or other devices associated with signal input.
 - a. Each input and control device is connected to a digital data bus.
 - b. Each device has a digital address and can be operated by a digital signal.
 - c. Each device can be assigned to any or all groups connected to a single data bus.
 - d. Each dimming device may have as many as 20 lighting levels in 5 percent increments.
 - e. Scenes can be programmed to devices and may be applied to groups.
 2. System Requirements:
 - a. Components: Individually addressable control devices (such as relays, dimmers, and switches) that are operated from digital signals received through a data bus, from data-entry and -retrieval devices (such as PCs, hand-held infrared programming devices, and wired network connections). Devices also report status to data-entry and -retrieval devices through the bus.
 - b. Fixture Independence: Addressable control devices shall be mounted separately from the fixture and shall not be integrated into the fixture in manufacturing/assembly. Future removal of the addressable control device shall not require removal of the fixture, and future removal of the fixture shall not require removal of the addressable control device.
 - c. Digital Control: Use peer-to-peer communication and distributed logic, where the failure of any single component within a scope shall be automatically isolated and not affect function of other spaces.
- C. System shall have an architecture that is based upon three main concepts:
1. Intelligent lighting control device.
 2. Standalone lighting control zones.
 3. Network backbone for remote or time based operation.
- D. Lighting control zones shall consist of one or more intelligent lighting control components, be capable of stand-alone operation, and be capable of being connected to a higher level network backbone.
- E. Each lighting control zone shall be set for default stand-alone operation without any start-up programming.
- F. Individual lighting zones must continue to provide a user defined default level of lighting control in the event of a system communication failure with the backbone network or the management software becoming unavailable.
- G. System shall be capable of operating a lighting control zone according to several sequences of operation. System shall be able to change a spaces sequence of operation according to a time schedule so as to enable customized time-of-day, day-of-week utilization of a space. Note operating modes should be utilized only in manners consistent with local energy codes.
1. Auto-On/Auto-Off (via occupancy sensors):
 - a. Zones with occupancy sensors automatically turn lights on when occupant is detected.
 - b. Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.
 - c. Pressing a switch will turn lights off. The lights will remain off regardless of occupancy until switch is pressed again or the occupancy sensor times out, restoring the sensor to Automatic On functionality.

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2. Manual-On/Auto-Off (also called Semi-Automatic):
 - a. Pushing a switch will turn lights on.
 - b. Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.
 3. Manual-On to Auto-On/Auto-Off:
 - a. Pushing a switch will turn lights on.
 - b. After initial lights on, zones with occupancy and/or photocell sensors turn lights on/off according to occupancy/vacancy and/or daylight conditions.
 - c. Sequence can be reset via scheduled (ex. daily each morning) events
 4. Auto-to-Override On:
 - a. Zones with occupancy sensors automatically turn lights on when occupant is detected.
 - b. Zone lighting then goes into an override on state for a set amount of time or until the next time event returns the lighting to an auto-off style of control.
 - c. Sequence can be reset via scheduled (ex. daily each morning) events
 5. Manual-to-Override On:
 - a. Pushing a switch will turn lights on.
 - b. Zone lighting then goes into an override on state for a set amount of time or until the next time event returns the lighting to an auto-off style of control.
 - c. Sequence can be reset via scheduled (ex. daily each morning) events
 - H. System software interface shall have the ability to notify communication failures to system users via system and e-mail messages. E-mail messages shall be available in html and text formats.
 - I. All system devices shall be capable of being given user defined names.
 - J. All devices within the network shall be able to have their firmware reprogrammed remotely and without being physically uninstalled for purposes of upgrading functionality at a later date.
 - K. All sensor devices shall have the ability to detect improper communication wiring and blink it's LED in a specific cadence as to alert installation/startup personnel.
 - L. LED FIXTURE SWITCHING AND DIMMING
 1. Each device or zone shall be addressable and shall include on/off, fade, dimming, scene settings, and other standard control functions as required to meet the Lighting Control Schedule functions. Control outlet and wiring shall be compatible with fixtures specified.
 2. Drivers: Comply with requirements in Division 26 "Interior Lighting" for LED and the following:
 - a. Dimming Range: 100 to 5 percent of rated lumens, unless fixture specified is capable of lower outlet (match fixture).
 - b. Input Voltage Range: 108 to 305V.
 - M. DIGITAL OCCUPANCY SENSORS
 1. Sensors may be powered directly from the lighting control network. All sensors shall be digital.
 2. General Description: Ceiling-mounting, solid-state low voltage units.
 - a. Operation: Unless otherwise indicated, turn lights on when covered area is occupied and off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 20 minutes. Automatic sensitivity adjustment.
 - b. Sensor Type: Sensors shall be dual-technology type (unless noted otherwise).
 - 1) Corridors and Vestibules: PIR type sensors are acceptable.
 - c. Mounting:
 - 1) Sensor: Suitable for mounting on a standard box.

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- 2) Time-Delay and Sensitivity Adjustments: Recessed and concealed behind accessible cover.
 - d. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.
 - e. Bypass Switch: Override the on function in case of sensor failure.
 - 3. Connection to lighting control local network.
 - 4. PIR Type: Ceiling mounting; detect occupancy by sensing a combination of heat and movement in area of coverage.
 - a. Detector Sensitivity: Detect occurrences of 6-inch-minimum movement of any portion of a human body that presents a target of not less than 36 sq. in..
 - 5. Dual-Technology Type: Ceiling mounting; detect occupancy by using a combination of PIR and ultrasonic/microphonic detection methods in area of coverage. Particular technology or combination of technologies that controls on-off functions shall be selectable in the field by operating controls on unit.
 - a. Sensitivity Adjustment: Separate for each sensing technology.
 - b. Detector Sensitivity: Detect occurrences of 6-inch-minimum movement of any portion of a human body that presents a target of not less than 36 sq. in., and detect a person of average size and weight moving not less than 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.
 - 6. BACnet object information shall be available for the following objects:
 - a. Detection state
 - 7. Units shall not have any dip switches or potentiometers for field primary settings.
- N. MANUAL SWITCHES AND PLATES
- 1. Push-Button Switches: Modular, operating over the digital data bus.
 - a. Each switch shall control the following functions, in coordination with lighting control schedule functions:
 - 1) On.
 - 2) Off.
 - 3) Dimming, increase light level.
 - 4) Dimming, decrease light level.
 - 5) Return to preset light level.
 - b. Match color and style specified in Division 26 Section "Wiring Devices."
 - c. Integral IR receiver for programming.
 - 2. Wall Plates: Single and multigang plates as specified in Division 26 Section "Wiring Devices."
- O. CONDUCTORS AND CABLES
- 1. Power Wiring to Supply Side of Class 2 Power Source: Not smaller than No. 12 AWG, complying with Division 26 Section "Conductors and Cables for Electrical."
 - 2. Class 2 Control Cables: Multiconductor cable with copper conductors sized per manufacturer for circuit load and voltage conditions.
 - 3. Class 1 Control Cables: Multiconductor cable with copper conductors sized per manufacturer for circuit load and voltage conditions.
 - 4. Digital and Multiplexed Signal Cables: Unshielded, twisted-pair cable with copper conductors, complying with TIA/EIA-568-B.2, for horizontal copper cable. Manufacturer may select cable Category (5e, 6, etc.).
 - 5. All cables shall be plenum rated.
 - 6. Where composite cables require more than two conductors, provide manufacturer's factory pre-terminated cable to connected lighting control devices. Cabling shall be plenum rated.

7. Cable Color Code: Coordinate cable color to be unique from other building systems and match existing when applicable.
8. Provide minimum 8 ft. slack in each cable segment for flexibility of device location adjustment.

2.02 STANDALONE CONTROL DEVICES

A. LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

1. Provide products listed, classified, and labeled as suitable for the purpose intended.
2. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

B. MANUFACTURERS

1. Sensor Switch Inc: www.sensorswitch.com.
2. WattStopper: www.wattstopper.com.
3. Cooper Controls.
4. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.

C. 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.
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. Passive Infrared Lens Field of View: Field customizable by addition of factory masking material, adjustment of integral blinders, or similar means to block motion detection in selected areas.
6. Turn-Off Delay: Field adjustable.
7. Sensitivity: Field adjustable.
8. Integral Photocell: For field selectable and adjustable inhibition of automatic turn-on of load when ambient lighting is above the selected level.
9. Compatibility (Non-Dimming Sensors): Suitable for controlling incandescent lighting, low-voltage lighting with electronic and magnetic transformers,
10. Load Rating for Line Voltage Occupancy Sensors: As required to control the load indicated on the drawings.
11. Isolated Relay for Low Voltage Occupancy Sensors: SPDT dry contacts, ratings as required for interface with system indicated.

D. 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 the drawings, provide low voltage units, for use with separate compatible accessory power packs.
 - c. Provide field selectable setting for disabling LED motion detector visual indicator.

- d. Occupancy sensor to be field selectable as either manual-on/automatic-off or automatic on/off.
 - e. Finish: White unless otherwise indicated.
 - 2. Ultrasonic Ceiling Mounted Occupancy Sensors:
 - a. Standard Range Sensors: Capable of detecting motion within an area of 500 square feet at a mounting height of 9 feet, with a field of view of 360 degrees.
- E. ROOM CONTROLLERS
 - 1. Room Controllers: Digital controllers for lighting zones, fixtures and/or plug loads automatically bind room loads to the connected control devices in the space without commissioning or the use of any tools. Provide controllers to match the room lighting and plug load control requirements. Controllers are simple to install, and do not have dip switches/potentiometers, or require special configuration for standard Plug n' Go applications. Control units include the following features
 - a. Automatic room configuration to the most energy-efficient sequence of operation based upon the devices in the room or factory preprogrammed.
 - b. Simple replacement using the default automatic configuration capabilities, a room controller may be replaced with an off-the-shelf device.
 - c. Multiple room controllers connected together in a local network must automatically or be factory preprogrammed arbitrate with each other, without requiring any configuration or setup, so that individual load numbers are assigned starting with load 1 to a maximum of 64, assigned based on each controller's device ID's from highest to lowest.
 - d. Device Status LEDs to indicate:
 - 1) Data transmission
 - 2) Device has power
 - 3) Configuration status
 - e. Quick installation features including:
 - 1) Standard junction box mounting
 - 2) Quick low voltage connections using standard RJ-45 patch cable
 - f. Based on individual configuration, each load shall be capable of the following behavior on power up following the loss of normal power:
 - 1) Turn on to 100 percent
 - 2) Turn off
 - 3) Turn on to last level
 - g. Each load be configurable to operate in the following sequences based on occupancy:
 - 1) Auto-on/Auto-off (Follow on and off)
 - 2) Manual-on/Auto-off (Follow off only)
 - h. UL 2043 plenum rated
 - i. Manual override and LED indication for each load
 - j. Zero cross circuitry for each load
 - k. All digital parameter data programmed into an individual room controller or plug load controller shall be retained in non-volatile FLASH memory within the controller itself. Memory shall have an expected life of no less than 10 years.
 - 2. On/Off/0-10V Dimming Room Controllers shall include:
 - a. Dual voltage (120/277 VAC, 60 Hz) capable or 347 VAC, 60 Hz. 120/277 volt models rated for 20A total load; 347 volt models rated for 15A total load
 - b. Built in real time current monitoring
 - c. One, two or three relays configurations
 - d. Four RJ-45 local network ports or screw terminals. Provide integral strain relief

- e. One dimming output per relay
 - 1) 0-10V Dimming - Where indicated, one 0-10 volt analog output per relay for control of compatible ballasts and LED drivers. The 0-10 volt output shall automatically open upon loss of power to the Room Controller to assure full light output from the controlled lighting.
- f. Provide (2) extra.
- 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 the drawings.
 - 3. Input Supply Voltage: Dual rated for 120/277 VAC.
 - 4. Load Rating: As required to control the load indicated on the drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Engage manufacturer's representative to select devices, quantities, locations, and interconnecting cabling to achieve the control sequence specified in the lighting control schedule.
- B. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of lighting control devices provided under this section.
 - 1. Mounting Heights: Unless otherwise indicated, as follows:
 - a. Wall Switch Occupancy Sensors: 48 inches above finished floor.
 - 2. Orient outlet boxes for vertical installation of lighting control devices unless otherwise indicated.
 - 3. Locate wall switch occupancy sensors on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
- C. Wiring:
 - 1. Comply with NECA 1.
 - 2. Wiring Method: Install cables in raceways except where installed in accessible ceilings. Conceal raceway and cables except in unfinished spaces. Support cables at intervals not exceeding 30".
 - 3. Route all low voltage cables separate from line-voltage conductors.
 - 4. Conductor/Cable Coordination: Verify and coordinate quantity and configuration of line voltage conductors and/or low voltage cables needed to interconnect dimming control devices with associated lighting fixtures. Control method shall match. Note that dimming methods may require different conductor/cable configurations be used for different fixtures.
 - 5. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- D. Wall Devices:
 - 1. Provide junction box in wall with conduit stubbed up above nearest accessible ceiling space.
 - 2. Where cabling is routed in inaccessible locations (above hard ceilings, within floors, within walls), provide conduit routed from device to nearest accessible ceiling space.
- E. Sensors:

1. Select, install, and aim sensors to achieve not less than 90 percent coverage of installed areas. Do not exceed coverage limited specified in manufacturer's written instructions.
 2. Adjust location of sensors to minimize activation of interior rooms from adjacent corridor activity per manufacturer's direction.
 3. Arrange control zones per plans and details. Individual rooms (defined by full height wall partitions or doors) shall be controlled independent of adjacent rooms. Multiple occupancy sensors in the same room or zone shall control all lighting fixtures associated with that room or zone. Rooms or zones shown with multiple branch circuits shall be provided with multiple control devices to accommodate control sequence.
 4. 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.
 5. Locate ultrasonic occupancy sensors a minimum of 4 feet from air supply ducts or other sources of heavy air flow and as per manufacturer's recommendations, in order to minimize false triggers.
 6. Unless otherwise indicated, install power packs for lighting control devices above accessible ceiling or above access panel in inaccessible ceiling near the sensor location.
- F. Emergency Lighting Interface:
1. Install emergency relay on life safety lighting circuits indicated with automatic controls. Relay shall bypass automatic controls and illuminate life safety lighting circuit upon loss of adjacent normal branch lighting circuit source voltage. Locate in associated source electrical room within NEMA-1 enclosure.

3.02 IDENTIFICATION

- A. Identify system components, wiring, cabling, boxes, cabinets, and terminals. Comply with identification requirements specified in Division 26 Section "Electrical Identification."
- B. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with Division 26 Section "Electrical Identification."
- C. Identify all ceiling-mounted controls with data bus number and device address.
- D. Label each device cable within 6 inches of connection to wiring terminals/ports.

3.03 FIELD QUALITY CONTROL

- A. Acceptance Testing Preparation:
 1. Test continuity of each circuit.
- B. Engage a factory-authorized service representative to perform startup service.
 1. Complete installation and startup checks according to manufacturer's written instructions.
 2. Activate light fixtures and verify that all fixtures are operating at 100 percent.
 3. Confirm correct communications wiring, initiate communications between devices and controller/gateways, and program the lighting control system according to approved configuration schedules, time-of-day schedules, and input override assignments.
 4. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- C. Field Test Reports:
 1. Printed list of all points created from actual queries of all addressed control points to include ballasts, manual controls, and sensors.
 2. Event log verifying the performance of all devices generating event messages to include occupancy sensors, control buttons, alarm messages, and any other change of value messages.

- D. Lighting controls will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports, including a certified report that identifies bus controllers included and describes query results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.
- F. Test and Inspection Report:
 - 1. Perform tests/inspections and submit report prior to Engineer's final punch inspection.
 - 2. Report shall consist of any developed test result data and shall, at minimum, include a copy of this "Field Quality Control" Section of the specification to illustrate Contractor acknowledgement of tests and inspections.
 - a. Contractor shall indicate successful completion by initialing individual test and inspection requirements listed above on the copy. Initialing indicates that tests and inspections were performed for specified work with a successful outcome. Work not found to be in compliance was corrected and retested/reinspected successfully or has been specifically clarified and noted above by the Contractor.
- G. Upon completion of initial programming, engage engineer, architect, and Owner while on site to confirm time and scene controls/adjustments prior to final programming. Provide 2 weeks notice. Time may be required outside of normal business hours to confirm lighting for those hours of operation.

3.04 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting sensors to suit occupied conditions and to assist Owner's personnel in making program changes. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.
- B. Adjust devices and wall plates to be flush and level.
- C. Adjust occupancy sensor settings to minimize undesired activations while optimizing energy savings, and to achieve desired function as indicated or as directed by Architect.

3.05 DEMONSTRATION

- A. Training: Train owner's personnel on operation, adjustment, programming, and maintenance of lighting control devices.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Location: At project site.

END OF SECTION 26 0943

SECTION 26 2726
WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall switches.
- B. Receptacles.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 0533.16 - Boxes for Electrical Systems.
- C. Section 26 0533.16 - Boxes for Electrical Systems.
- D. Section 26 0553 - Electrical Identification: Identification products and requirements.
- E. Section 26 0923 - Lighting Control Devices: Devices for automatic control of lighting, including occupancy sensors, in-wall time switches, and in-wall interval timers.

1.03 REFERENCE STANDARDS

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for; Federal Specification; Revision G, 2001.
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification); Federal Specification; Revision F, 1999.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.
- D. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.
- E. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (R 2010).
- F. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2012.
- 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.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
 - 3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
 - 4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
 - 5. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.
- B. Sequencing:

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
- C. 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.
- D. Operation and Maintenance Data:
 - 1. GFCI Receptacles: Include information on status indicators.
- E. Project Record Documents: Record actual installed locations of wiring devices.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Hubbell Incorporated: www.hubbell-wiring.com.
- B. Lutron Electronics Company, Inc: www.lutron.com.
- C. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us
- D. Cooper Wiring Devices: www.cooperwiringdevices.com.
- E. Approved equal.
- F. Source Limitations: Where possible, for each type of wiring device furnish products produced by a single manufacturer and obtained from a single supplier.

2.02 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 tamper resistant receptacles for receptacles installed in bedrooms and bathrooms. See drawings for other required locations.
- E. Provide GFCI protection for receptacles installed within 6 feet of sinks.
- F. Unless noted otherwise, do not use combination switch/receptacle devices.

2.03 WIRING DEVICE FINISHES

- A. Provide wiring device finishes as described below unless otherwise indicated.
- B. Finishes:
 - 1. Wiring Devices Installed in Finished Spaces: Ivory with stainless steel wall plate unless otherwise indicated.
 - 2. Wiring Devices Installed in Unfinished Spaces: Gray with galvanized steel wall plate unless otherwise indicated.

2.04 WALL SWITCHES

- A. 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.
- B. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings. Rated 1 horsepower at 120 volts, 2 horsepower at 277 volts

2.05 RECEPTACLES

- A. 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.
- B. Convenience Receptacles:
 - 1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
- C. GFCI Receptacles:
 - 1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
 - a. Provide test and reset buttons of same color as device.
 - 2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.

2.06 WALL PLATES

- A. Wall Plates: Comply with UL 514D.
 - 1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
 - 2. Size: Standard.
 - 3. Screws: Metal with slotted heads finished to match wall plate finish.
- B. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.
- C. Provide labeling of plate with panelboard and circuit number.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that floor boxes are adjusted properly.
- F. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

- G. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of wiring devices provided under this section.
1. Mounting Heights: Unless otherwise indicated, as follows:
 - a. Wall Switches: 48 inches above finished floor.
 - b. Receptacles: 18 inches above finished floor or 6 inches above counter.
 2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
 3. Provide minimum of 24 inches horizontal separation between flush mounted outlet boxes installed on opposite sides of fire rated walls.
 4. 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.
 5. Provide separate outlet boxes for wiring devices connected to emergency power and normal power systems.
 6. Unless otherwise indicated, provide separate outlet boxes for line voltage and low voltage devices.
 7. Locate wall switches on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
 8. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.
 9. Locate outlet boxes so that wall plate does not span different building finishes.
 10. Locate outlet boxes so that wall plate does not cross masonry joints.
- C. Install wiring devices in accordance with manufacturer's instructions.
- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.
- F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
- I. Install securely, in a neat and workmanlike manner, as specified in NECA 1.
- J. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- K. Install wall switches with OFF position down.

- L. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.
- M. Connect dimmers within same room to the same phase of power distribution system.
- N. Do not share neutral conductor on branch circuits utilizing wall dimmers.
- O. Install vertically mounted receptacles with grounding pole on bottom and horizontally mounted receptacles with grounding pole on left.
- P. 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.
- Q. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.
- R. Install identification label for wall switches and wall dimmers in accordance with Section 26 0526 indicating load served when controlling loads that are not visible from the control location or multiple wall switches or wall dimmers are installed at one location.
- S. Install identification label for all receptacles in accordance with Section 26 0526 indicating serving branch circuit.
- T. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.
- U. Install decorative plates on switch, receptacle, and blank outlets in finished areas.
- V. Connect wiring devices by wrapping conductor around screw terminal.
- W. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

3.04 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate locations of outlet boxes provided under Section 26 0537 to obtain mounting heights specified and indicated on drawings.
- B. Install convenience receptacle 18 inches above finished floor in finished areas.
- C. Install data / telephone jack 18 inches above finished floor.
- D. Install telephone jack for wall telephone to position top of telephone at 48 inches above finished floor.

3.05 FIELD QUALITY CONTROL

- A. Inspect each wiring device for damage and defects.
- B. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.
- C. Operate each wall switch with circuit energized and verify proper operation.
- D. Verify that each receptacle device is energized.
- E. Test each receptacle to verify operation and proper polarity.
- F. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- G. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.06 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.
- B. Adjust the time delays, sensitivity and other settings on occupancy sensors as directed.

3.07 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION

**SECTION 26 5100
INTERIOR LIGHTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior luminaires.
- B. LED Drivers

1.02 RELATED REQUIREMENTS

- A. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- B. Section 26 2726 - Wiring Devices: Manual wall switches and wall dimmers.

1.03 REFERENCE STANDARDS

- A. ANSI C78.379 - American National Standard for Electric Lamps -- Reflector Lamps -- Classification of Beam Patterns; 2006.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- C. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; National Electrical Contractors Association; 2006.
- D. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; National Electrical Contractors Association; 2006.
- E. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; National Electrical Manufacturers Association; 2006.
- F. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- H. 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 the contract documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 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. Lamps: Include rated life, color temperature, color rendering index (CRI), and initial and mean lumen output.
- 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. Conform to requirements of NFPA 70.
- B. Conform to requirements of NFPA 70 and the International Building Code (IBC), locally adopted version.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.08 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide a five year full warranty on all LED light fixtures including the driver.
- C. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.
- B. Substitutions: See Section 01 3000 - Administrative Requirements.

2.02 LUMINAIRES

- A. Manufacturers:
- B. Provide products that comply with requirements of NFPA 70.
- C. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- D. Provide products that comply with requirements of NFPA 70 and NFPA 101.
- E. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

- F. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- G. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- H. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- I. LED Luminaires: Listed and labeled as complying with UL 8750.
 - 1. Photometric measurements indicated on the product data shall be provided in accordance with IESNA LM-79-08 Approved Method: Electrical and Photometric Measurements of Solid-State Lighting products and shall meet the requirements specified and/or indicated on the drawings.
 - 2. Lumen data indicated on the product data sheets shall be generated in accordance with IESNA LM-80-08 Approved Method for Measuring Lumen Maintenance of LED Light Sources and shall meet the requirements specified and/or indicated on the drawings.
 - 3. Lumen depreciation shall be identified in terms of IES TM-21-11. Unless noted otherwise, luminaires shall provide a minimum L70 rating at the drive current provided product data shall indicate such.
 - 4. Correlated color temperature (CCT) indicated on the product data sheets shall be provided in accordance with ANSI C78.377-2008 American National Standard for Electric Lamps requirements specified and/or indicated on the drawings. Acceptable variation in color temperatures specified shall be +/- 275 degrees Kelvin.
 - 5. Lumen output specified shall be lumens delivered from the luminaire at the color temperature specified.
 - 6. Luminaires efficacy shall meet that specified and scheduled at the CCT specified.

2.03 LED DRIVERS

- A. Drivers shall be universal voltage (120-277 volt) or shall be 208 volt, 240 volt, or 480 volt to meet project conditions.
- B. Drivers shall be provided with protection against transients line surge.
- C. Drivers shall be equipped with a quick disconnect.
- D. Power factor shall be greater than or equal to 0.90.
- E. Harmonic distortion shall not exceed the limits set forth in IEEE Standard 519-1992, harmonic limits.
- F. Ambient temperature range shall be -30 degrees F to 104 degrees F.
- G. All drivers shall be UL listed.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- 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 branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- D. 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 products according to manufacturer's instructions.
- B. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship), NECA 500 (commercial lighting), and NECA 502 (industrial lighting).
- C. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- D. 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 pendant-mounted luminaires to building structure.
 - 4. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
 - 5. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.
- E. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- F. Install fixtures securely, in a neat and workmanlike manner, as specified in NECA 500 and 502.
- G. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.
- H. Install surface mounted luminaires plumb and adjust to align with building lines and with each other. Secure to prevent movement.
- I. Exposed Grid Ceilings: Fasten surface mounted luminaires to ceiling grid members using bolts, screws, rivets, or suitable clips.
- J. Install wall mounted luminaires at height as indicated on Drawings. Coordinate exact mounting heights with Architectural Drawings.
- K. Install accessories furnished with each luminaire.
- L. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within fixture; use flexible conduit.
- M. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
- N. Bond products and metal accessories to branch circuit equipment grounding conductor.
- O. Attach all surface mounted fixtures to ceiling or wall surface with a minimum of two attachment points besides the outlet box.
- P. Install recessed plaster frames, or other special frames where required for construction type. Install frames securely to provide adequate light fixture support.
- Q. Insure that luminaires requiring access to ballasts or junction boxes have adequate openings and clearances.
- R. Maintain required clearances between insulation and light fixtures where light fixtures are installed in an insulated ceiling. Provide barriers as needed to prevent insulation from contacting light fixture.

- S. For chain suspended and cable suspended light fixtures, use flexible metal conduit and attach to light fixture support chain or cable.
- T. Provide adequate backing and support from the structural system for all pendent supported fixtures.
- U. Coordinate light fixture installation in unfinished areas with piping, duct work and other obstructions. Exact light fixture location to be determined by field conditions. Suspend light fixture with chains or stems if necessary to avoid mounting light fixtures above ceiling mounted equipment, duct work and piping. Use trapeze style hangers to mount light fixtures under duct work piping or other equipment.

3.04 FIELD QUALITY CONTROL

- A. Inspect each product for damage and defects.
- B. Operate each luminaire after installation and connection to verify proper operation.
- C. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.
- D. Examine drawings and site conditions for ceiling construction, structural depths, piping and ductwork locations, door heights, upper cabinet heights and location, and other building elements. Coordinate to avoid conflict with luminaire installation.

3.05 CLEANING

- A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.
- B. Clean electrical parts to remove conductive and deleterious materials.
- C. Remove dirt and debris from enclosures.
- D. Clean photometric control surfaces as recommended by manufacturer.
- E. Clean finishes and touch up damage.

3.06 CLOSEOUT ACTIVITIES

- A. Demonstration: Demonstrate proper operation of luminaires to Architect, and correct deficiencies or make adjustments as directed.
- B. Just prior to Substantial Completion, replace all lamps that have failed.
- C. See Section 01 7000 for additional requirements.

3.07 PROTECTION

- A. Protect installed luminaires from subsequent construction operations.

3.08 SCHEDULE - SEE DRAWINGS

END OF SECTION

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SECTION 27 1005
TELECOMMUNICATIONS CABLING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Communications system design requirements.
- B. Communications identification.
- C. Cabling and pathways inside building(s).
- D. Distribution frames, cross-connection equipment, enclosures, and outlets.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
 - 1. Includes bonding jumpers for bonding of communications systems and electrical system grounding.
- B. Section 26 0533.13 - Conduit for Electrical Systems.
- C. Section 26 0533.16 - Boxes for Electrical Systems.
- D. Section 26 0553 - Electrical Identification: Identification products.
- E. Section 26 2726 - Wiring Devices.

1.03 REFERENCE STANDARDS

- A. ICEA S-83-596 - Indoor Optical Fiber Cables; Insulated Cable Engineers Association; 2011.
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. TIA-568-C.3 - Optical Fiber Cabling Components Standard; Rev C, 2008 (with Addenda; 2011).
- D. TIA-598-D - Optical Fiber Cable Color Coding; 2014d.
- E. UL 444 - Communications Cables; Current Edition, Including All Revisions.
- F. UL 1651 - Fiber Optic Cable; Current Edition, Including All Revisions.
- G. EIA/ECA-310 - Cabinets, Racks, Panels, and Associated Equipment; Electronic Industries Alliance/Electrical Components Association; Revision E, 2005.
- H. NECA/BICSI 568 - Standard for Installing Building Telecommunications Cabling; National Electrical Contractors Association; 2006. (ANSI/NECA/BICSI 568)
- I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. TIA-526-7 - OFSTP-7 - Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant; Telecommunications Industry Association; 2002.
- K. TIA-568 (SET) - Commercial Building Telecommunications Cabling Standard Set; 2015
- L. TIA-568-C.2 - Commercial Building Telecommunications Cabling Standard - Part 2: Balanced Twisted Pair Cabling Components; Telecommunications Industry Association; Rev C, 2009.
- M. TIA/EIA-568-B.3 - Commercial Building Telecommunications Cabling Standard - Part 3: Optical Fiber Cabling Components Standard, and Addendum 1 - Additional Transmission Performance Specifications for 50/125 um Optical Fiber Cables; Rev B, 2000; Addendum 1.
- N. TIA-569-C - Telecommunications Pathways and Spaces; Telecommunications Industry Association; Rev C, 2012 (with Addenda; 2013).

- O. TIA-606-B - Administration Standard for the Telecommunications Infrastructure; Telecommunications Industry Association; Rev B, 2012.
- P. TIA-607-B - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises; Telecommunications Industry Association; Rev B, 2012 (with Addenda; 2013).
- Q. ANSI/J-STD-607 - Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications; Rev A, 2002.
- R. UL 497 - Standard for Protectors for Paired-Conductor Communications Circuits; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate requirements for service entrance and entrance facilities with Communications Service Provider.
 - 2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for communications equipment.
 - 3. Coordinate arrangement of communications equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 4. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Arrange for Communications Service Provider to provide service.
- C. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Communications Service Provider representative.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.
 - 1. Storage and handling requirements and recommendations.
 - 2. Installation methods.
- C. Shop Drawings: Show compliance with requirements on isometric schematic diagram of network layout, showing cable routings, telecommunication closets, rack and enclosure layouts and locations, service entrance, and grounding, prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
 - 1. Provide in writing as part of the Shop Drawing Submittal that the selected wiring and device Manufacturers system Warranty meets the requirements of Paragraph 1.08 Warranty.
 - 2. Provide floorplan drawings showing suggested routing of cabling to the furthest telecommunications jack from the assigned termination rack to confirm telecommunications outlets and associated devices with telecommunications cabling connections are within rated distances of the assigned MDF/IDF Rooms. If cabling distances exceed the recommended manufacturer distances the bidder shall provide written notice to the Engineer for clarification in the shop drawing submittals.
 - 3. Confirm drawings show sufficient quantity and size of cable pathways and cable tray. Note any required revisions to pathway sizes or routing in the shop drawing submittal floorplan drawings.
- D. Manufacturer Qualifications.
- E. Evidence of qualifications for installer(s).
- F. Field Test Reports.

- G. Project Record Documents: Prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
 - 1. Record actual locations of outlet boxes and distribution frames.
 - 2. Show as-installed color coding, pair assignment, polarization, and cross-connect layout.
 - 3. Identify distribution frames and equipment rooms by room number on contract drawings.
- H. Operation and Maintenance Data: List of all components with part numbers, sources of supply, and operation and maintenance instructions; include copy of project record documents.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: At least 3 years experience manufacturing products of the type specified.
- B. Installer Qualifications: A company having at least 3 years experience in the installation and testing of the type of system specified, and:
 - 1. Employing a BICSI Registered Communications Distribution Designer (RCDD).
 - 2. Supervisors and installers factory certified by manufacturers of products to be installed.
 - 3. Employing experienced technicians for all work; show at least 3 years experience in the installation of the type of system specified, with evidence from at least 2 projects that have been in use for at least 18 months; submit project name, address, and written certification by user.
- C. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Keep stored products clean and dry.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a 1 year period after Date of Substantial Completion.
- C. Manufacturer shall warranty and provide maintenance service for 15 years minimum on the network system.

PART 2 PRODUCTS

2.01 SYSTEM DESIGN

- A. Provide a complete permanent system of cabling and pathways for voice and data communications, including cables, conduits and wireways, pull wires, support structures, enclosures and cabinets, and outlets.
 - 1. Comply with TIA-568 (cabling) and TIA-569 (pathways), latest editions (commercial standards).
 - 2. Provide fixed cables and pathways that comply with NFPA 70 and TIA-607 and are UL listed or third party independent testing laboratory certified.
 - 3. Provide connection devices that are rated for operation under conditions of 32 to 140 degrees F at relative humidity of 0 to 95 percent, noncondensing.
 - 4. In this project, the term plenum is defined as return air spaces above ceilings, inside ducts, under raised floors, and other air-handling spaces.
- B. System Description:
 - 1. Building Entrance Cabling: existing.
 - 2. Data Network Backbone: 12 strands of singlemode fiber optic cable.
- C. Cabling to Outlets: Specified horizontal cabling, wired in star topology to distribution frame located at center hub of star; also referred to as "links".

2.02 PATHWAYS

- A. Conduit: As specified in Section 26 0533.13; provide pull cords in all conduit.

2.03 FIBER OPTIC CABLE AND INTERCONNECTING DEVICES

- A. Fiber Optic Backbone Cable:
1. Description: Tight buffered, indoor/outdoor rated, non-conductive fiber optic cable complying with TIA-568-C.3, TIA-598-D, ICEA S-83-596 and listed as complying with UL 444 and UL 1651.
 2. Cable Type: Singlemode, 9/125 um (OS1), complying with TIA-492-CAAA.
 3. Cable Capacity: Quantity of fibers as indicated on drawings.
 4. Cable Applications: Use listed NFPA 70 Type OFNP plenum cable unless otherwise indicated.
 5. Cable Construction:
 - a. Interlocked armor with plenum rated non-conductive jacket.
 - b. Operating Temperature: -20 to +85 Celsius.
 - c. Bend Radius: 15X outside diameter (installation), 10X (long term).
 - d. Flex resistance: minimum 1,000 cycles.
 6. Cable Jacket Color:
 - a. Single-Mode Fiber (OS1/OS2): Yellow.
- B. Fiber Optic Adapters and Connectors: Duplex SC adaptors with zirconia ceramic alignment sleeves; complying with relevant parts and addenda to latest edition of TIA/EIA-568 and with maximum attenuation of 0.5 dB at 1300 nm with less than 0.2 dB change after 500 mating cycles when tested in accordance with TIA-455-21.

2.04 GROUNDING AND BONDING COMPONENTS

- A. Comply with TIA-607.
- B. Comply with Section 26 0526.

2.05 IDENTIFICATION PRODUCTS

- A. Comply with TIA-606.
- B. Comply with Section 26 0553.

2.06 SOURCE QUALITY CONTROL

- A. Factory test cables according to TIA-568.

2.07 CROSS-CONNECTION EQUIPMENT

- A. Patch Panels for Fiber Optic Cabling:
1. 16 gauge steel construction, powder coated with black finish.
 2. Size: for termination of fiber quantities as indicated on the drawings, plus 25% spare capacity.
 3. Adaptors: As specified above under FIBER OPTIC CONNECTORS.
 4. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with TIA/EIA-606 using encoded identifiers.
 5. Provide with incoming cable strain relief, bend radius control, and routing guides.
 6. Provide rear cable management tray at least 8 inches deep with removable cover for rack mounted enclosures.
 7. Provide dust covers for unused adaptors.
 8. Rack Mounted: Sized to fit EIA standard 19 inch wide equipment racks:
 - a. Panduit FRME Series.
 - b. OCC RTS Series.

- c. Or Equal.
- 9. Wall Mounted.
 - a. Panduit FWME Series.
 - b. OCC WTC Series.
 - c. Or Equal.

2.08 PENETRATIONS

- A. Cable Sleeves
 - 1. For fire or smoke wall penetrations provide Hilti CP 653 Speed Sleeve or approved Equal
 - 2. Provide cable sleeves at all up to 2 hour fire rated wall penetrations.
 - 3. Provide quantity and size (either 2 inch or 4 inch) of sleeves as required for 60% maximum fill of the quantity of cables being installed.
 - 4. For non-fire rated partitions, provide conduit sleeves through the partitions providing quantity and size of conduits as required for 60% maximum fill of the quantity of cables being installed.

2.09 CABLE SUPPORT HANGERS

- A. Manufacturers:
 - 1. Panduit J-Pro Series J-hook.
 - 2. CADDY CAT HP Series J-hook.
 - 3. CADDY CAT 425 Series adjustable strap hanger.
 - 4. Approved Equal.
 - a. Panduit JP2 Series j-hook shall be used for up to 46 Category 6 4-pair communications cables, 30 Category 6A cables.
 - b. Panduit JP4 Series j-hook shall be used for up to 180 Category 6 cables or 115 Category 6A cables.
 - c. Caddy CAT 425 Series adjustable cable support for up to 325 Category 6 cables, or 210 Category 6A cables.
 - d. Manufacturer guidelines shall be used for supporting/mounting the cable supports. Provide wall mount, ceiling mount, threaded rod clip, beam clamp, etc. mounting option as appropriate for the installation
 - e. Cable shall be supported at no greater than four-foot intervals for Category 6 cable. Provide a cable tie at each J-hook to retain and manage the cable bundle.
 - f. J-hooks or adjustable cable supports. to be UL listed as suitable for air handling plenum spaces.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Comply with latest editions and addenda of TIA-568 (cabling), TIA-569 (pathways), TIA-607 (grounding and bonding), NECA/BICSI 568, NFPA 70, and SYSTEM DESIGN as specified in PART 2.
- B. See Section 26 0526 Grounding and Bonding for Electrical Systems for Telecommunications systems grounding and bonding requirements.
- C. Comply with Communication Service Provider requirements.
- D. Grounding and Bonding: Perform in accordance with TIA-607 and NFPA 70.
- E. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.

3.02 INSTALLATION OF PATHWAYS

- A. Install pathways with the following minimum clearances:

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1. 48 inches from motors, generators, frequency converters, transformers, x-ray equipment, and uninterruptible power systems.
 2. 12 inches from power conduits and cables and panelboards.
 3. 5 inches from fluorescent and high frequency lighting fixtures.
 4. 6 inches from flues, hot water pipes, and steam pipes.
- B. Firestopping: Seal openings around pathway penetrations through fire-rated walls, partitions, floors, and ceilings in accordance with Section 07 8400.

3.03 INSTALLATION OF EQUIPMENT AND CABLING

- A. Cabling:
1. Do not bend cable at radius less than manufacturer's recommended bend radius; for unshielded twisted pair use bend radius of not less than 4 times cable diameter.
 2. Do not over-cinch or crush cables.
 3. Do not exceed manufacturer's recommended cable pull tension.
 4. When installing in conduit, use only lubricants approved by cable manufacturer and do not chafe or damage outer jacket.
 5. Install cable support hooks a maximum of 4'-0" on center above ceiling.
 6. Where cable tray is installed, run telecommunications cabling in cable tray.
 7. Where telecommunication cables are run exposed above accessible ceilings, support the cables to keep them from resting on ceiling tiles. Use properly sized Cable Caddies or J-Hooks on walls above the ceilings to neatly route cables between outlet and termination locations. Minimum distance between supports is 4 feet or in accordance with EIA/TIA standards, whichever is less.
- B. Service Loops (Slack or Excess Length): Provide the following minimum extra length of cable, looped neatly:
1. At Distribution Frames: 120 inches.
 2. At Outlets - Optical Fiber: 39 inches.
- C. Fiber Optic Cabling:
1. Prepare for pulling by cutting outer jacket for 10 inches from end, leaving strength members exposed. Twist strength members together and attach to pulling eye.
 2. Support vertical cable at intervals as recommended by manufacturer.
- D. Identification:
1. Use wire and cable markers to identify cables at each end.
- E. Field-Installed Labels: Comply with TIA/EIA-606 using encoded identifiers.
1. Cables: Install color coded labels on both ends.
 2. Outlets: Label each jack on its face plate as to its type and function, with a unique numerical identifier.
 3. All horizontal cabling shall be labeled with permanent tag indication from which jack the cable originated.
 4. Machine labels shall be installed on each workstation jack faceplate.
 5. All labels shall be a machine label in conformance with ANSI/EIA/TIA 606.
 6. Numbering of workstation jacks shall be consistent.
 7. Labeling to be verified with Engineer and Owner.
 8. Final room numbers to be used for labeling, room numbers on plans are not to be used.

3.04 FIELD QUALITY CONTROL

- A. Comply with inspection and testing requirements of specified installation standards.
- B. Visual Inspection:
1. Inspect cable jackets for certification markings.

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2. Inspect cable terminations for color coded labels of proper type.
 3. Inspect outlet plates and patch panels for complete labels.
- C. Testing - Fiber Optic Cabling:
1. Backbone: Perform optical fiber end-to-end attenuation test using an optical time domain reflectometer (OTDR) and manufacturer's recommended test procedures; perform verification acceptance tests and factory reel tests.
 2. Multimode Backbone: Perform tests in accordance with TIA-526-14 Method B.
 3. Single Mode Backbone: Perform tests in accordance with TIA-526-7 Method B.
- D. Final Testing: After all work is complete, including installation of telecommunications outlets, and telephone dial tone service is active, test each voice jack for dial tone.

END OF SECTION