

Maize U.S.D. #266
Bus Storage Building

Bid Package

Bid Documents & Specifications

MARCH 2026

Schaefer Project: 5537.50



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- 1. AIA A101 - 2017 Exhibit A, Insurance and Bonds

AIA A201 General Conditions of the Contract For Construction - 2017, with amendments

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- AIA A310 Bid Bond - 2010
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END OF SECTION

SECTION 00 21 13 - INSTRUCTIONS TO BIDDERS**INVITATION****1.01 BID SUBMISSION**

- A. **BID DATE, TIME AND LOCATION:** Lump Sum Bids signed and under seal, executed, and dated will be received in accordance with the following:

DATE: THURSDAY, 9 APRIL 2026

LOCATION: Schaefer Architecture, Inc.

257 North Broadway

Wichita, KS 67202

TIME: 2:00 p.m. local time

1. Bids (proposals) shall include furnishing all labor, materials, equipment and performing the Work for the above described project in strict accordance with the Bidding Documents.
- B. Offers submitted after the above time will be returned to the bidder unopened.
- C. Offers will be opened publicly immediately after the time for receipt of bids.

1.02 INTENT

- A. The intent of this Bid request is to obtain an offer to perform work to complete the construction of (1) metal storage building for buses located behind (west) the Maize USD 266 Maintenance Building at 4750 N. 119th St. W., Maize, KS 67101 for a Stipulated Sum contract, in accordance with Contract Documents.
- B. Work shall be included under a Single Contract.
- C. Each General Contractor shall select the various sub-contractors and suppliers with whom they wish to work.
 1. The Owner urges General Contractors to consider local vendors and sub contractors in the bidding process.

1.03 WORK IDENTIFIED IN THE CONTRACT DOCUMENTS

- A. Work of this proposed Contract comprises building construction and site development, including general construction and structural Work.

1.04 CONTRACT TIME

- A. Identify Contract Time to be Substantially Complete in the Bid Form. The completion date in the Agreement shall be the Contract Time added to the commencement date.
- B. The Work shall be completed within thirty calendar days following the date of Substantial Completion, unless specifically agreed otherwise, in writing, on the Certificate of Substantial Completion.

BID DOCUMENTS AND CONTRACT DOCUMENTS**2.01 DEFINITIONS**

- A. All definitions set forth in the General Conditions of the Contract for Construction (AIA Document A201 - 2017 Edition) or in other Contract Documents are applicable to the Bidding Documents.
- B. Addenda - Written or graphic instruments issued by the Architect before the acceptance of Bids that modify or interpret the Bidding Documents, including drawings and Project Manual by additions, deletions, clarifications, or corrections. Addenda become part of

the Contract Documents when the Owner accepts the Bid, as well as part of the Bidding Documents.

- C. Alternate Bid (or Alternate) - an amount stated in the Bid to be added to or deducted from the amount of the Base Bid if the corresponding change in project scope or materials or methods of construction described in the Bidding Documents is accepted.
- D. Base Bid - the sum stated in the Bid for which the Bidder offers to perform the Work described as the Base, to which Work may be added or deducted for sums stated in Alternate Bids.
- E. Bid - a Bidder's complete and properly signed proposal to do the Work or designated portion thereof for the sums stipulated therein supported by data called for by the Bidding Documents.
- F. Bidder - One who submits a Bid for the Work to the Owner.
- G. Bid Documents: Contract Documents supplemented with Invitation To Bid, Instructions to Bidders, Bid Form, Supplements To Bid Forms and Appendices identified including any addenda issued prior to receipt of bids.
- H. Bid Security - A Bid Bond with a Surety licensed in the State of Kansas.
- I. Contract - Standard Form of Agreement Between Owner and Contractor (AIA Document A101 - 2017 Edition), as supplemented, together with all documents incorporated therein by reference or amendment.
- J. Contract Documents: Defined in AIA A201 Article 1 including issued Addenda.
- K. Project Manual - The volume(s) which binds together the Bidding Documents, General and Supplementary Conditions, and Specifications identified for this Contract. The several parts of the volume(s) are listed in the Table of Contents of the volume(s).
- L. Sub-bidder (or Sub-contractor) - One who submits a bid to a Bidder for materials and/or labor for a portion of the Work.
- M. Unit Price - an amount stated in the Bid as a price per unit of measurement for materials or services as described in the Contract Documents

2.02 CONTRACT DOCUMENTS IDENTIFICATION

- A. The Contract Documents are identified as Project Number Schaefer #5537.50, as prepared by Schaefer Architecture <>who is located at 257 N. Broadway, Wichita, KS, 67202 and with contents as identified in the Table of Contents.

2.03 EXAMINATION

- A. Bid Documents may be viewed by coordinating with one of the select list of General Contractors.
- B. Upon receipt of Bid Documents verify that documents are complete. Notify Schaefer Architecture should the documents be incomplete.
- C. Immediately notify Schaefer Architecture upon finding discrepancies or omissions in the Bid Documents.

2.04 INQUIRIES

- A. Direct inquiries regarding Bidding Documents to:
 - 1. Architectural - Gary Holler, Schaefer Architecture, 257 N. Broadway, Wichita, KS 67202, phone (316) 684-0171, gholler@schaefer-arch.com.
 - 2. Structural - Desiree Morrell, Dudley Williams & Associates, P.A., 230 Laura, Wichita, KS, 67211, phone (316) 263-7591, dmorrell@dwase.com.

3. Mechanical - Brad Ward, Midwest Engineering, 1210 E.1st Street, Wichita, KS, 67214, phone (316) 262-9300, bward@mei-ks.com.
 4. Civil - Pat Baer, Baughman Company, 315 S. Ellis, Wichita, KS 67211, phone (316) 262-7271, fax (316) 262-0149, pbaer@baughmanco.com
- B. Verbal answers are not binding on any party.
- C. The Owner is not authorized to interpret the bidding documents.

2.05 BIDDING DOCUMENTS

- A. Complete sets of Bidding Documents shall be used in preparing Bids.
- B. Neither the Owner nor Schaefer Architecture assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

2.06 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

- A. Bidders shall promptly notify Schaefer Architecture or the Engineer of any ambiguity, inconsistency or error which they may discover upon examination of the Bidding Documents or of the site and local conditions.
- B. Bidders requiring clarification or interpretation of the Bidding Documents shall make such requests of Schaefer Architecture or the Engineer at least 3 days prior to the date for receipt of Bids in writing.
- C. Any interpretation, correction or change of the Bidding Documents will be made by Addenda only. Interpretations, corrections or changes of the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon such interpretations, corrections and changes.

2.07 ADDENDA

- A. Addenda will be mailed to all who are known by Schaefer Architecture to have received a complete set of Bidding Documents.
- B. Copies of Addenda will be made available for inspection wherever Bidding Documents are on file.
- C. Each Bidder shall ascertain prior to submitting its Bid that it has received all Addenda issued, and it shall acknowledge such receipt in his Bid.

2.08 PRODUCT/ASSEMBLY/SYSTEM SUBSTITUTIONS

- A. General Requirements for Substitution Requests:
1. Project Manual establishes standards for products, assemblies, and systems.
 2. Submit requests only for elements for which substitution is specifically allowed in the Project Manual.
 3. Provide sufficient information to determine acceptability of proposed substitutions.
 4. Provide complete information on required revisions to other work to accommodate each proposed substitution.
- B. Substitution Request Time Restrictions:
1. Where the Bid Documents stipulate a particular product, substitutions will be considered up to 3 days before receipt of bids.
- C. Review and Acceptance of Request:
1. Schaefer Architecture may approve the proposed substitution and will issue an Addendum to known bidders.
 2. For approved substitutions, include representation of changes in the bid, if any, required in the work and changes to Contract Time and Contract Sum to

accommodate such substitutions. A later claim by the bidder for an addition to the Contract Time or Contract Sum because of changes in work necessitated by use of substitutions will not be considered.

- D. Schaefer Architecture shall have the sole decision as to whether any submittal item is approved as been equal or acceptable.

SITE ASSESSMENT

3.01 SITE EXAMINATION

- A. Examine the project site before submitting a bid.
- B. The bidder is required to contact Owner at the following address and phone number in order to arrange a date and time to visit the project site: Darin Augustine - (316) 619-9021 (cell).

3.02 PREBID CONFERENCE

- A. A bidders conference has been scheduled for 2:00 p.m. on the 2nd day of April at the location of Maize USD 266 Maintenance Building, 4750 N. 119th St. W..
- B. All general contract and subcontract bidders and suppliers are invited.
- C. Representatives of Schaefer Architecture will be in attendance.
- D. Attendance is NOT MANDATORY by Contractors.
- E. Information relevant to the Bid Documents will be recorded in an Addendum, issued to Bid Document recipients.

QUALIFICATIONS

4.01 EVIDENCE OF QUALIFICATIONS

- A. To demonstrate qualification for performing the Work of this Contract, bidders may be requested to submit written evidence of financial position, previous experience, and current commitments, license to perform work in the City of Bel Aire as applicable and other information required to support the Bidder's capability to fulfill the Contract if awarded the Contract.

4.02 BIDDER'S REPRESENTATION

- A. In order to induce the Owner to accept their Bid, in addition to and not in lieu of any other representations and warranties contained in the Bidding Documents, the Bidder represents and warrants the following to the Owner:
 - 1. The Bidder and their sub-contractors are financially solvent and possess sufficient working capital to complete the Work and perform all obligations hereunder;
 - 2. The Bidder is able to provide the plant, tools, materials, supplies, equipment, and labor required to complete the Work and perform the Bidders obligations hereunder;
 - 3. The Bidder is now and will continue to be authorized to do business in the State of Kansas, and is now and will continue to be properly licensed by all necessary governmental and public and quasi-public authorities having jurisdiction over the Bidder and over the Work and the Project;
 - 4. The Bid and execution of the Bidding Documents and the Bidder's performance thereunder are within the Bidders duly authorized powers;
 - 5. The Bidder has made an exhaustive study of the Bidding Documents; understands the terms and provisions thereof; and has sought or will timely seek any and all

- necessary clarifications prior to submitting the Bid; and that the Bid is made in accordance with the foregoing;
6. The Bidder has visited the project site/existing facility and is completely familiar with the local and special conditions under which the Work is to be performed and has correlated such knowledge with the requirements of the Bidding Documents;
 7. The Bid is based upon the materials, systems and equipment described in the Bidding Documents without exception.
 8. The Bidder certifies that his Bid is submitted without collusion, fraud, or misrepresentation as to other Bidders, so that all Bids for the project result from a free, open, and competitive bidding environment.
 9. The Bidder possesses a high level of experience and expertise in the business administration, construction management, construction, and superintendence of projects of the size, complexity, and nature of this particular project, and that the Bidder will perform the Work with care, skill, and diligence of such a Contractor;
 10. The Bidder acknowledges that the Owner is relying upon the Contractor's skill and experience in connection with the Work being bid herein;
 11. That complete sets of Bidding Documents were used in preparing the Bid and that neither the Owner nor Schaefer Architecture is responsible for errors or misinterpretations resulting from the use of incomplete sets of such documents.
- B. The foregoing warranties are in addition to, and not in lieu of any and all other liability imposed upon the Contractor by law with respect to the Contractor's duties, obligations and performance of the Work and any and all other warranties, representations and certifications made in the Bidding Documents. The Contractor's liability hereunder shall survive the Owner's final acceptance of and payment for the Work. All representations and warranties set forth herein and in the Contract Documents shall survive the final completion of the Work or the earlier termination of this Agreement.

BID SUBMISSION

5.01 SUBMISSION PROCEDURE

- A. Bidders shall be solely responsible for the delivery of their bids in the manner and time prescribed.
- B. Submit one copy of the executed offer on the Bid Forms provided, signed and sealed with the required security in a closed opaque envelope, clearly identified with bidder's name and address, project name and Owner's name on the outside.
- C. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "Bid Enclosed" on the face thereof.
- D. Deposit Bids at the designated location prior to the time and date for receipt of Bids indicated in section 00 21 13 Invitation - BID SUBMISSION, or any extension thereof made by Addenda. Bids received after the time and date for receipt of bids will be returned unopened.
- E. Improperly completed information, irregularities in bid bond, may be cause not to open the Bid Form envelope and declare the bid invalid or informal.

5.02 BID INELIGIBILITY

- A. Oral, telephonic, telegraphic, internet, e-mail, or facsimile (fax) Bids are invalid and will not receive consideration.

- B. Bids that are unsigned, improperly signed or sealed, conditional, illegible, obscure, contain arithmetical errors, erasures, alterations, or irregularities of any kind, may at the discretion of the Owner, be declared unacceptable.
- C. Failure to provide security deposit, bonding or insurance requirements will, at the discretion of Owner, invalidate the bid.

BID ENCLOSURES/REQUIREMENTS

6.01 SECURITY DEPOSIT

- A. Bids shall be accompanied by a security deposit as follows:
 - 1. **Bid Bond of a sum no less than 5 percent of the Bid Amount plus all add alternates on AIA A310 Bid Bond Form.** In the event of multiple prices in a Bid or Alternate, write for the maximum possible Contract amount.
- B. Endorse the Bid Bond in the name of the Owner as obligee, signed and sealed by the principal (General Contractor) and surety.
- C. The Owner reserves the right to retain the Bid Bond of the three lowest and best Bidders.
- D. Such Bid Bonds will be returned promptly after the Owner has issued a Notice to Proceed to the successful bidder, or within forty-five days after the opening of Bids if no Notice to Proceed has been issued, or the Owner rejects all Bids.
- E. The Bid Security will be retained by the Owner until the Contract for the project has been properly executed and as a guarantee that if awarded the Contract, the Bidder will enter into a Contract, give bonds and proof of insurance as required. In the event the successful Bidder fails to timely execute and deliver to the Owner items required by CONTRACT TIME PERIOD AND NOTICE TO PROCEED contained in section 00 21 13 - Instructions to Bidders, then such Bidder shall be deemed to have abandoned its contract with the Owner, and the Bid Security shall then be retained by the Owner as liquidated damages and not as a penalty.

6.02 BID FORM REQUIREMENTS

- A. Complete all requested information in the Bid Form and Appendices.
- B. All blanks on the Bid Form shall be printed digitally or written manually in ink.
- C. Where so indicated by the makeup of the Bid Form, amounts shall be expressed in both words and figures, and in case of discrepancy between the two, the written amount shall govern.

6.03 SALES TAX

- A. Refer to the AIA A201 General Conditions of the Contract for the requirements of sales tax to not be included in the Bid.

6.04 TIME OF COMPLETION AND LIQUIDATED DAMAGES

- A. Bidders shall begin the Work on receipt of the Notice to Proceed and shall complete the Work within the Contract Time. Work is not subjected to liquidated damages.

6.05 FEES FOR CHANGES IN THE WORK

- A. Included on the Bid Form, the overhead and profit fees on own Work and Work by subcontractors, applicable for Changes in the Work, whether additions to or deductions from the Work on which the Bid Amount is based.

6.06 BID FORM SIGNATURE

- A. The Bid Form shall be signed by the bidder, as follows:

1. Each copy of Bid shall include the legal name of Bidder and a statement whether Bidder is a sole proprietor, a partnership, a corporation, or any other legal entity, and each copy shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further give the state of incorporation and have the corporate seal affixed. Attach certifying agents authority to bind Bidder if Bid is signed by an agent for the Bidder.

6.07 MODIFICATION OR WITHDRAWAL OF BID

- A. A Bid may not be modified, withdrawn or canceled by the Bidder during the time period indicated in section 00 21 13 - Duration of Offer that a Bidder's bid security is held following the time and date designated for the receipt of Bids. The Bidder so agrees in submitting its Bid.
- B. Prior to the time and date designated for receipt of Bids, Bids submitted early may be modified or withdrawn only by notice to the party receiving Bids at the place and prior to the time designated for receipt of Bids. Such notice shall be in writing over the signature of the Bidder.
- C. Withdrawn Bids may be resubmitted up to the time designated for the receipt of bids provided that they are then fully in conformance with these Instructions to Bidders.

6.08 SELECTION AND AWARD OF Alternates

- A. Indicate variation of bid price for Alternates listed on the Bid Form. Unless otherwise indicated, indicate Alternates as a difference in bid price by adding to or deducting from the base bid price.
- B. Bids will be evaluated on the total of the base bid price and the chosen alternatives. After evaluation of the budget and the needed or priority alternates, the successful bidder will be determined.
- C. Alternates will be accepted by the Owner as indicated in Section 01 23 00 Alternates.

OFFER ACCEPTANCE/REJECTION

7.01 DURATION OF OFFER

- A. Bids shall remain open to acceptance and shall be irrevocable for a period of forty-five (45) days after the bid closing date.

7.02 ACCEPTANCE OF OFFER

- A. Owner reserves the right to accept or reject any or all offers.
- B. Owner may wave any informality or irregularity in any bid received.
- C. Owner may reject a Bid if the Bidder failed to comply in any way with the requirements of these Bidding Documents.
- D. Owner intends to award a Contract using the following criteria:
 1. The Bid conforms to and has been submitted according to the requirements of the Bidding Documents,
 2. The Bid is judged to be reasonable,
 3. The Bid does not exceed the funds available,
 4. The Bid complies with the Instructions to Bidders,
 5. The completion time is satisfactory to the Owner, and
 6. Contractor qualifications are met.

- E. No negotiations, decisions, or actions shall be initiated by any Bidder as a result of any verbal discussion with the Owner, employee of the Owner, or Schaefer Architecture or Engineer prior to the execution of the Contract by the Owner.
- F. After acceptance by Owner, Schaefer Architecture on behalf of Owner, will issue to the successful bidder, a written Notice To Proceed.

7.03 CONTRACT TIME PERIOD AND NOTICE TO PROCEED

- A. The accepted Bidder shall assist and cooperate in preparing the Agreement and, within ten days after notification of award of Contract, execute and deliver four copies of the following required documents to Schaefer Architecture at SJCF Architecture, 257 N. Broadway, Wichita, KS 67202.
 - 1. The Contract signed by the representative with authority and ability to do so.
 - 2. Corporation Resolution of authority to sign and deliver the Contract Documents, executed by the Corporations Secretary or Assistant Secretary and dated before all other dated submittals.
 - 3. Performance and Statutory Bonds with the attached powers of attorney.
 - 4. Certificates of Insurance including Contractor' General Automotive Liability, Workers Compensation Insurance and Owner's Liability Insurance.
 - 5. List of subcontractors and major suppliers.
- B. If the preceding listed required documents are not delivered to the Owner within the ten day time limit, then such Bidder may be deemed to have abandoned its contract with the Owner, and the Owner may, solely at their discretion and without notice, award a contract to the next lowest and best bid.
- C. The Notice to Proceed will not be issued until after the Owner has received the required documents listed above and has executed the Contract. No work shall commence until after the Owner has issued a written Notice to Proceed.
- D. The successful Bidder shall not make claim either for time or money against the Owner for labor or materials performed or delivered prior to the issuance of the Notice to Proceed.

END OF SECTION

Maize USD 266

Bus Storage Buildings

March 11, 2026

Maize USD 266 is requesting bids for a new bus storage building. The term “lowest responsible bidder” is defined as allowing the school district to choose between the kinds of materials, goods, or services subject to bid. The school district may consider such factors as labor costs, service, availability of materials and supplies, maintenance costs, and experience of vendor on previous similar projects. The school district may also determine any differences or variation in quality or character of the materials, goods, or services being bid.

The item(s) contained in this bid shall conform to all standards including warning labels and safety devices, guards, and equipment required to meet the safety standards established by any jurisdiction recognized by industry safety councils or organizations to establish safety standards.

K.S.A. 75-3740(g) (The State Preferential Bid Law) may be applied against all vendors who are domiciled outside of the State of Kansas, and whose state has preferential bidding statute.

Please return this bid in a sealed envelope, with the name of the bidder and marked “**Bus Storage Building**” on the lower left-hand corner. Return the bid, the attached summary sheet no later than **2:00 pm on Thursday, April 9th, 2026** to:

Schaefer Architecture
Attn: **Gary Holler**
257 N. Broadway
Wichita, KS 67202

STANDARD CONDITIONS

- 1. Maize USD 266 reserves the right to reject any item(s) in the bid and to waive any informality in bidding. Contracts entered into on the basis of submitted bids are revocable if contrary to law.**
2. Bids of an incomplete nature, or subject to multiple interpretations may, at the option of the School District, be rejected as irregular.
3. If applicable, each bid item must show unit price and extension. In case of error, unit prices will govern. Alternate bids, and/or bids based on group or total awards may be considered.
4. The district will consider all products that are deemed equal.
5. Deliveries are to be F.O.B. to the stated location. Shipping and delivery charges will not be separate from the bid amount.
6. Certain bids, because of unique factors, may not be covered by standard conditions. Alternate or special conditions will take precedence over any standard condition previously stated.

7. Per K.S.A. 60-1111, Public Works Bonds will be required per Kansas law for bids in excess of \$100,000.
8. A performance bond is required for any bid in excess of \$40,000.
9. A bid bond of 5% of the bid total will be required on any bid in excess of \$20,000. Bond may be in the form of a cashier's check or money order in lieu of actual bond (only applies to construction projects).
10. Vendor(s) shall be in compliance with all federal, state and local laws, ordinances, and regulations.
11. A valid federal tax identification number must be provided before any purchase order can be issued.
12. A purchase order constitutes the buyer's offer to the seller upon the terms and conditions stated herein and shall become a binding contract on the terms set forth when it is accepted, either by acknowledgement or performance.
13. If the vendor fails to make deliveries or initiate performance within the time specified on the request for bid or the purchase order, USD 266 may, by written notice, terminate the right of the vendor to proceed with deliveries or performance.
14. Vendor shall certify that all supplies or equipment sold and delivered to the district are free and clear of any and all liens or claims or liens arising under and by virtue of the provisions of the General Statutes of Kansas, 1961 Supplement, Sections 58-201, et. seq., and any other lien, right or claim of any kind.
15. All items sold and delivered to the district shall be free from defects in material and workmanship and shall be subject to our inspection and approval at any time within thirty days after delivery. Rejected items shall be held at the seller's risk and expense. No replacement of defective items shall be made by the seller unless agreed to by a USD 266 authorized representative and such agreement shall be in writing.
16. The successful bidder shall not be allowed any extra compensation by reason of any matter or thing concerning which the bidder might have fully informed themselves because of their failure to do so prior to the bidding. The successful bidder must employ, so far as possible, such methods and means in the carrying out of the work as will not cause any interruption or interferences with any other contractors and/or District operations.
17. Each bid shall be signed by the person making the bid, along with the firm name, mailing address and telephone number. In case the bid is made by a corporation, the same shall be signed by a legally authorized agent of the corporation. The envelope shall be sealed and plainly marked as a bid for this particular project.
18. The vendor agrees to require the following sections in all contracts:
 - a. A requirement to observe the provisions of the Kansas Act Against Discrimination;
 - b. A requirement that all solicitations or advertisements for employees shall include the phrase "Equal Opportunity Employer";
 - c. A requirement to comply with the proper reporting procedures to the Kansas Commission on Civil Rights, in accordance with the provisions of K.S.A. 1976 Supp. 44-1030;

- d. A requirement that should the vendor be found guilty of a violation of the Kansas Act Against Discrimination; such violation shall deem any contract with USD 266 to have been breached.

General Contractual Requirements

1. Prices quoted shall include all costs for labor, equipment, supplies, shipping and material charges to complete the work and/or deliver the materials at the location indicated and as requested by the Assistant Superintendent.

2. Faxed/emailed bids will not be accepted.

3. Whenever products or materials of any particular producer or manufacturer are mentioned in our specifications, such a product or material mentioned is intended to be descriptive of type or quality and not restrictive to those mentioned except as noted.
4. Maize USD 266, a governmental subdivision, is exempt from payment of Federal Excise Tax and State Sales Tax. Tax exemption information will be furnished upon request.
5. In case of default by the Contractor, the District will procure the services herein specified from other sources and hold the Contractor responsible for any excess cost occasional thereby.
6. Failure to perform as guaranteed, or any other default by the Contractor, may result in disqualification of the Contractor from future bidding.
7. Should bidder take exception to any terms, conditions, or specification; stated therein, such exception must be noted IN WRITING within your bid submittal and an alternate stated. Failure to do so will result in the assumption and requirement of compliance with said terms, conditions, and specifications as stated.
8. Failure to provide any requested information may result in the rejection of your bid.
9. Contractor will provide a one (1) year warranty of workmanship from the date of completion in addition to any manufacturer warranty.

HOLD HARMLESS AGREEMENT

To the fullest extent not prohibited by law, the contractor shall indemnify and hold harmless the District, its Board of Education, officers, agents, and employees from and against all claims, damages, losses and expenses (including but not limited to attorney's fees) arising by reason of any act of failure to act, negligent or otherwise, of Contractor, of any subcontractor (meaning anyone, including but not limited to consultants having a contract with Contractor or a subcontractor for a part of the services), or of anyone directly or indirectly employed by the Contractor or its subcontractor may be liable, in connection with providing these services.

Minimum specifications are as follows:

- Please refer to Schaefer Specifications for additional information
- Please include pricing for alternates 1, 2 and 3 when bidding
- Pre Bid site meeting – Thursday April 2nd, 2026

Thank you for your consideration of this request.

If you have any questions, please contact Gary Holler, Schaefer Architecture
Email: Gary Holler, Schaefer Architecture. 316-684-0171

Sincerely,
Darin Augustine
Executive Director of Operations
Maize USD 266

Maize Unified School District #266

Summary Form

Please list and attach any alternate or differences from your base specifications.

Base Bid Proposal: \$ _____

Alt #1 Low slope extensions: \$ _____

Alt #2 Concrete Paving \$ _____

Alt #3 Thermal Insulation \$ _____

Available for delivery on or before: _____

Please return any bid along with this Bid Summary by 2:00 PM on Thursday April 9th, 2026:

Schaefer Architecture
Attn: Gary Holler
257 N. Broadway
Wichita, KS 67202

Maize USD #266 reserves the right to accept or reject any and all bids.

Company Name: _____

Agent Name: _____

Address: _____

Phone: _____

Fax: _____

Email: _____

Authorized Signature _____

Title: _____

Date: _____

SECTION 01 10 00 - SUMMARY**PART 1 GENERAL****1.01 PROJECT**

- A. Project Name: Maize USD 266 - Bus Storage Building
- B. Owner's Name: Maize Unified School District #266.
- C. The Project consists of the construction of a new metal storage building for buses.

1.02 PROJECT REQUIREMENTS**1.03 WORK BY OWNER**

- A. Items noted NIC (Not in Contract) will be supplied and installed by Owner before Date of Substantial Completion. Some items include:
 - 1. Landscaping and Irrigation.
 - 2. General Contractor shall cooperate fully with separate contractors so work on those Contracts may be carried out smoothly, without interfering with or delaying Work under this Contract or other Contracts. Coordinate the Work of this Contract with Work performed under separate Contracts to the extent of scheduling and making the necessary spaces available.
- B. Owner will supply and install the following:
 - 1. Electrical.

1.04 OWNER OCCUPANCY

- A. Owner intends to continue to occupy adjacent portions of the adjacent site during the entire construction period.
 - 1. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with the day-to-day operations of the Owner. Maintain existing exits unless otherwise indicated
 - 2. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
 - 3. Notify the Owner not less than 72 hours in advance of activities that will affect the operations of the Owner.
- B. Owner intends to occupy the Project upon Substantial Completion.
- C. Owner intends to occupy a certain portion of the Project prior to the completion date for the conduct of normal operations.
- D. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- E. Schedule the Work to accommodate Owner occupancy.

1.05 CONTRACTOR USE OF SITE AND PREMISES

- A. Construction Operations: Limited to areas noted on Drawings.
 - 1. Do not disturb portions of Project site beyond areas in which the Work is indicated.
- B. Arrange use of site and premises to allow:
 - 1. Owner occupancy of the Maintenance Building and surrounding areas.
 - 2. Work by Others.
- C. Provide access to and from site as required by law and by Owner:

1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
 2. Provide temporary exiting pathways where required or as indicated.
 3. Do not obstruct roadways, sidewalks, or other public ways without permit.
- D. Existing building spaces may not be used for storage.
- E. Time Restrictions:
1. None.
- F. Utility Outages and Shutdown:
1. Limit disruption of utility services to hours the building is unoccupied and as coordinated with the Owner.
 2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
 3. Prevent accidental disruption of utility services to other facilities.
 4. Do not disrupt or shut down power to LAN/WAN systems without coordination with the Owner. It is the responsibility of the General Contractor to identify these locations with assistance from the Owner prior to starting any Work.
- G. Controlled Substances: Use of tobacco products and other controlled substances within the new or existing building or the Project site is not permitted.

1.06 PERMANENT UTILITIES

- A. Owner will pay the direct cost from the utility company for the permanent service for the following:
1. Electric.
- B. All other fees and Work shall be included in the cost of Bid.

PART 2 PRODUCTS - NOT USED**PART 3 EXECUTION - NOT USED****END OF SECTION**

SECTION 01 23 00 - ALTERNATES**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Description of Alternates.
- B. Procedures for pricing Alternates.
- C. Bidder's Alternates.

1.02 ALTERNATES - GENERAL

- A. Alternates are units of Work (products, materials, equipment, systems, methods and the like) which may, at the option of the Owner and under terms established in the Instructions to Bidders and Agreement, be selected for the Work in lieu of the corresponding requirements for Base Bid or to complete a unit of work not included in the Base Bid Work.
- B. Selection may be made prior to Contract Date, or may by the Agreement, be deferred for possible selection at a subsequent date.
- C. Refer to the Contract or Owner-Contractor Agreement, and subsequent modifications thereof (if any), for the determination of which Alternates have been accepted and therefore are in effect as though included originally in the Base Bid Work.
- D. Immediately following the award of Contract notify each entity or person involved in the performance of this project work, a notice of the status of each Alternate Bid indicating which Alternates have been: 1) accepted, 2) rejected, 3) deferred for consideration at a later date. Include description of modifications, if any, to the accepted Alternates.
- E. The Alternates herein are abbreviated descriptions but imply that each change must be complete for the scope of the work affected. A reference to this Section is included in specification sections to alert specification users that an alternate will affect that work. The Specifications and Drawings shall be referred to ascertain complete requirements for the Alternate Work. Coordinate related work and modify surrounding work as required to properly integrate or omit the work of the accepted Alternates.

1.03 ACCEPTANCE OF Alternates

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.
- B. Fill in all required prices on the Bid Form.
- C. Alternates will be accepted by the Owner as follows:
 - 1. The Alternates are not listed in order of importance and such listing shall not limit nor dictate the order of acceptance by the Owner.
- D. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

1.04 SCHEDULE OF Alternates

- A. **Alternate No. One - Low Slope Roof Extensions to Both Sides of the Building (Add): Pre-Engineered Metal Building and all associated work to construct low slope roof extensions and columns as shown in drawings and specified in project manual. Roof extensions are between Grids A & B and G & H. Reference Specification Section 13 34 19 - Metal Building Systems.**
 - 1. **Base Bid** to include gutter, downspouts and concrete splashblocks.

- B. **Alternate No. Two - 6" Reinforced Concrete Pavement in lieu of 8" Asphalt Pavement (Add) (Deduct): Provide 6" thick reinforced concrete pavement with sawcut contraction joints in a 12'x12' pattern. Reference Civil Drawings.**
1. **Base bid** to include 8" thick asphalt pavement. Reference Civil Drawings.
 2. Alternate bid to be the cost difference between concrete pavement and asphalt pavement.
- C. **Alternate No. Three - Thermal Insulation in Walls and Roof (Add: Provide thermal insulation at all exterior walls and roof (excluding the roof in Alternate One). Alternate bid to include vapor barrier and all accessories required for insulation and installation. Reference Specification Section 13 34 19 - Metal Building Systems.**
1. **Base bid** to include thermal tape (bridging) between metal panels and structure, so that insulation could be added at a later date.

1.05 BIDDER'S ALTERNATES

- A. Alternates, methods, materials and/or equipment of the Bidder's choice will be considered if submitted with the Bid on Bidder's letterhead, and accompanied by description and technical data necessary to illustrate scope, quality, advantages, and amount of change to the Base Bid price is shown.
- B. Bidder's Alternate(s) may be considered in determination of successful Bidder.
- C. If a Bidder's Alternate is selected, Bidder shall prepare documents for approval and inclusion with Contract Documents.
- D. Additional ARCHITECTURAL / ENGINEERING WORK applies to all Bidder's Alternates evaluated.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 30 00 - ADMINISTRATIVE REQUIREMENTS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. General administrative requirements.
- B. Copyright.
- C. AIA Documents.
- D. Electronic document submittal service.
- E. Preconstruction meeting.
- F. Progress meetings.
- G. Construction progress schedule.
- H. Contractor's daily reports.
- I. Progress photographs.
- J. Submittals for review, information, and project closeout.
- K. Number of copies of submittals.
- L. Requests for Interpretation (RFI) procedures.
- M. Additional Architectural or Engineering Work.
- N. Submittal procedures.

1.02 GENERAL ADMINISTRATIVE REQUIREMENTS

- A. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.
- B. Make the following types of submittals to Schaefer Architecture:
 - 1. Requests for Interpretation (RFI).
 - 2. Requests for substitution.
 - 3. Shop drawings, product data, and samples.
 - 4. Test and inspection reports.
 - 5. Design data.
 - 6. Manufacturer's instructions and field reports.
 - 7. Applications for payment and change order requests.
 - 8. Progress schedules.
 - 9. Coordination drawings.
 - 10. Correction Punch List and Final Correction Punch List for Substantial Completion.
 - 11. Closeout submittals.

1.03 COPYRIGHT

- A. The Drawings and Project Manual of the Project are copyrighted by Schaefer Architecture and consultants. Said drawings, details and specifications shall NOT be reproduced in any manner by any contractor, sub-contractor, supplier, or manufacturer for the purpose of preparing required submittals unless specifically directed to do so by these documents.

1.04 AIA DOCUMENTS

- A. Documents of the American Institute of Architects referred to in the specifications can be purchased by the Contractors from:
 - 1. AIA Kansas, Phone (785) 357-5308 or (800) 444-9853.

- B. **Contractors are cautioned that the AIA documents required under this Contract are copyrighted by the AIA.**

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

- A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF) format, as appropriate to the document, and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.
1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, General Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
 - a. Allows for documents to be uploaded.
 2. General Contractor and Schaefer Architecture are required to use this service.
 3. It is General Contractor's responsibility to submit documents in allowable format.
 4. Subcontractors, suppliers, Owner's Representative and Schaefer Architecture's consultants are to be permitted to use the service at no extra charge.
 5. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
 6. Paper document transmittals will not be reviewed; emailed electronic documents will not be reviewed.
 7. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.
 8. Automatic CD archive once construction is complete.
- B. Cost: The cost of the service is to be paid by General Contractor; include the cost of the service in the Contract Sum.
- C. Submittal Service: Use one of the following:
1. Submittal Exchange (tel: 1-800-714-0024): www.submittalexchange.com/#sle.
 2. Newforma ConstructEx: www.newforma.com/products/constructex/#sle.
 3. Procore (tel: 1-866-477-6267): www.procore.com
- D. Training: One, one-hour, web-based training session will be arranged for all participants, with representatives of Schaefer Architecture and General Contractor participating; further training is the responsibility of the user of the service.
- E. Project Closeout: Schaefer Architecture will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

3.02 PRECONSTRUCTION MEETING

- A. Schaefer Architecture will schedule a meeting after Notice of Award.
- B. Attendance Required:

1. Owner.
 2. Schaefer Architecture.
 3. General Contractor.
- C. Agenda:
1. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
 2. Designation of personnel representing the parties to Contract and Schaefer Architecture.
 3. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 4. Scheduling.
- D. Record minutes and distribute copies within two days after meeting to participants, with an electronic copy in PDF format to Schaefer Architecture, Owner, participants, and those affected by decisions made.

3.03 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the work at maximum bi-monthly intervals.
- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required:
1. General Contractor.
 2. Owner.
 3. Schaefer Architecture.
 4. General Contractor's superintendent.
 5. Major subcontractors.
- D. Agenda:
1. Review minutes of previous meetings.
 2. Review of work progress.
 3. Field observations, problems, and decisions.
 4. Identification of problems that impede, or will impede, planned progress.
 5. Review of submittals schedule and status of submittals.
 6. Review of RFIs log and status of responses.
 7. Review of off-site fabrication and delivery schedules.
 8. Maintenance of progress schedule.
 9. Corrective measures to regain projected schedules.
 10. Planned progress during succeeding work period.
 11. Coordination of projected progress.
 12. Maintenance of quality and work standards.
 13. Effect of proposed changes on progress schedule and coordination.
 14. Other business relating to work.
- E. Record minutes and distribute copies within two days after meeting to participants, with an electronic copy in PDF format to Schaefer Architecture, Owner, participants, and those affected by decisions made.

3.04 CONSTRUCTION PROGRESS SCHEDULE

- A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of work, with a general outline for remainder of work.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
 - 1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- D. Within 10 days after joint review, submit complete schedule.
- E. Submit updated schedule every 30 days to be reviewed during bi-monthly OAC meetings.

3.05 DAILY CONSTRUCTION REPORTS

- A. Include only factual information. Do not include personal remarks or opinions regarding operations and/or personnel.
- B. Prepare a daily construction report recording the following information concerning events at Project site and project progress:
 - 1. Date.
 - 2. High and low temperatures, and general weather conditions.
 - 3. Safety, environmental, or industrial relations incidents.
 - 4. Meetings and significant decisions.
 - 5. Stoppages, delays, shortages, and losses. Include comparison between scheduled work activities (in General Contractor's most recently updated and published schedule) and actual activities. Explain differences, if any. Note days or periods when no work was in progress and explain the reasons why.
 - 6. Testing and/or inspections performed.
 - 7. Signature of General Contractor's authorized representative.

3.06 PROGRESS PHOTOGRAPHS

- A. Photography Type: Digital; electronic files.
- B. Provide photographs of site and construction. Take photographs during construction activities where work will be concealed and throughout progress of Work. Photographs may be used to establish location and arrangement of concealed elements such as plumbing systems. These shall be part of the record documents.
- C. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
 - 1. Delivery Medium: Jump drive.
 - 2. File Naming: Include project identification, date and time of view, and view identification.

3.07 REQUESTS FOR INTERPRETATION (RFI)

- A. Definition: A request seeking one of the following:
 - 1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are

- required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
2. A resolution to an issue which has arisen due to field conditions and affects design intent.
- B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.
- C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
1. Prepare a separate RFI for each specific item.
 - a. Do not forward requests which solely require internal coordination between subcontractors.
 2. Prepare using software provided by the Electronic Document Submittal Service.
 3. Combine RFI and its attachments into a single electronic file. PDF format is preferred.
- D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
1. Include in each request General Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
 2. Unacceptable Uses for RFIs: Do not use RFIs to request the following:
 - a. Approval of submittals (use procedures specified elsewhere in this section).
 - b. Approval of substitutions (see Section - 01 60 00 - Product Requirements)
 - c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
 - d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
 3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response.
 4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, the Contract Documents, with no additional input required to clarify the question. They will be returned without a response.
- E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
- F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.
- G. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
1. Indicate current status of every RFI. Update log promptly and on a regular basis.
 2. Note dates of when each request is made, and when a response is received.
- H. Review Time: Schaefer Architecture will respond and return RFIs to General Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.

1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.
- I. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in General Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
 1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
 2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
 3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.

3.08 ADDITIONAL ARCHITECTURAL OR ENGINEERING WORK

- A. Design has been based upon product and equipment data available at the time the design work was done.
- B. Any costs for modifying construction and design for substitutes shall be the responsibility of the party making or requesting the substitute for the designed product even when the substitute product is specified. Such costs shall be paid to the Owner who shall reimburse the architect and/or consultants. The rate charged by Schaefer Architecture is \$100.00 per hour. Consulting Engineers standard rates apply.

3.09 SUBMITTAL SCHEDULE

- A. Items requiring color selections, including mechanical and electrical devices, will not be made until General Contractor submits all data and samples for selecting colors and finishes. Physical chips/samples are required for all color selections. No paper copies will be accepted.

3.10 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
 1. Product data.
 2. Shop drawings.
 3. Samples for selection.
 4. Samples for verification.
- B. Submit to Schaefer Architecture for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
 1. Physical sample(s) showing the color and other physical properties is required for selection. Electronic images or PDF's will not be reviewed for sample selection. Printed cards or brochures not containing actual physical color and finish sample(s) will not be accepted.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - Closeout Submittals.

3.11 SUBMITTALS FOR INFORMATION

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

3.12 SUBMITTALS FOR PROJECT CLOSEOUT

- A. Submit Final Correction Punch List for Substantial Completion.
- B. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 78 00 - Closeout Submittals:
 - 1. Project record documents.
 - 2. Operation and maintenance data.
 - 3. Warranties.
 - 4. Other types as indicated.
- C. Submit for benefit of the Owner during and after project completion.

3.13 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 Schaefer Architecture.
 - 1. Retained samples will not be returned to General Contractor unless specifically so stated.

3.14 SUBMITTAL PROCEDURES

- A. General Requirements:
 - 1. Use a separate transmittal for each item.
 - 2. Transmit using approved form.
 - a. Use form generated by Electronic Document Submittal Service software.
 - 3. Identify: Project; General Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
 - 4. Apply General Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
 - a. Submittals from sources other than the General Contractor, or without General Contractor's stamp will not be acknowledged, reviewed, or returned.
 - 5. Schedule submittals to expedite the Project, and coordinate submission of related items.

- a. For each submittal for review, allow 15 days time to and from the General Contractor.
 - b. For sequential reviews involving Schaefer Architecture's consultants, Owner, or another affected party, allow an additional 7 days.
6. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
7. Provide space for General Contractor and Schaefer Architecture review stamps.
8. When revised for resubmission, identify all changes made since previous submission.
9. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
10. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
- B. Product Data Procedures:
 1. Submit only information required by individual specification sections.
 2. Collect required information into a single submittal.
 3. Do not submit (Material) Safety Data Sheets for materials or products.
- C. Shop Drawing Procedures:
 1. Digital Data Files: Electronic copies of CAD drawings or Building Information Model of the Contract Drawings will be provided by Schaefer Architecture, Engineers or Consultants for Contractor's use in preparing submittals as follows.
 - a. Cost for each CAD sheet is \$150.00.
 - b. Cost for Navisworks model is \$300.00.
 - c. Contractor to sign Electronic Release Form and pay Schaefer Architecture prior to receiving CAD sheet(s) or Navisworks model.
 - d. Schaefer Architecture makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 2. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
 3. Do not reproduce Contract Documents to create shop drawings.
 4. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

3.15 SUBMITTAL REVIEW

- A. Submittals for Review: Schaefer Architecture will review each submittal, and approve, or take other appropriate action.
- B. Submittals for Information: Schaefer Architecture will acknowledge receipt and review. See below for actions to be taken.
- C. Schaefer Architecture's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
 1. Notations may be made directly on submitted items and/or listed on appended Submittal Review cover sheet.
- D. Schaefer Architecture's and consultants' actions on items submitted for review:
 1. Authorizing purchasing, fabrication, delivery, and installation:
 - a. "No exception taken", or language with same legal meaning.

- b. "Make corrections noted", or language with same legal meaning.
 - 1) At General Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
 - c. "Submit specified item", or language with same legal meaning.
 - 1) Submit correct item, with review notations acknowledged and incorporated.
Submit separately, or as part of project record documents.
- 2. Not Authorizing fabrication, delivery, and installation:
 - a. "Revise and Resubmit".
 - 1) Resubmit revised item, with review notations acknowledged and incorporated.
 - b. "Rejected".
 - 1) Submit item complying with requirements of Contract Documents.
- E. Schaefer Architecture's and consultants' actions on items submitted for information:
 - 1. Items for which no action was taken:
 - a. "Received" - to notify the General Contractor that the submittal has been received for record only.
 - 2. Items for which action was taken:
 - 3. "Reviewed" - no further action is required from General Contractor.
- F. Maintain one complete set of submittals at the Project.

END OF SECTION

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SECTION 01 40 00 - QUALITY REQUIREMENTS**PART 1 GENERAL****1.01 SECTION INCLUDES**

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

1.02 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Test Reports: After each test/inspection, promptly submit two copies of report to Schaefer Architecture and to General Contractor.
 - 1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of inspector.
 - d. Date and time of sampling or inspection.
 - e. Identification of product and specifications section.
 - f. Location in the Project.
 - g. Type of test/inspection.
 - h. Date of test/inspection.
 - i. Results of test/inspection.
 - j. Compliance with Contract Documents.
 - k. When requested by Schaefer Architecture, provide interpretation of results.
 - 2. Test report submittals are for Schaefer Architecture's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
- C. Certificates: When specified in individual specification sections, submit certification by the manufacturer and General Contractor or installation/application subcontractor to Schaefer Architecture, in quantities specified for Product Data.
 - 1. Indicate material or product complies with or exceeds specified requirements.
Submit supporting reference data, affidavits, and certifications as appropriate.
 - 2. Certificates may be recent or previous test results on material or product, but must be acceptable to Schaefer Architecture.
- D. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.03 QUALITY ASSURANCE

- A. Testing Agency Qualifications:

1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
- B. Designer Qualifications: Where professional engineering design services and design data submittals are specifically required of General Contractor by Contract Documents, provide services of a Professional Engineer experienced in design of this type of work and licensed in Kansas.

1.04 REFERENCES AND STANDARDS

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
 1. If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Schaefer Architecture for a decision before proceeding. Refer instances of uncertainty as to which two levels of quantity or quality is more stringent to Schaefer Architecture for decision.
- B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
- C. Should specified reference standards conflict with Contract Documents, request clarification from Schaefer Architecture before proceeding.
 1. Schaefer Architecture may select the more stringent of the two for the application intended.
- D. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Schaefer Architecture shall be altered from Contract Documents by mention or inference otherwise in any reference document.

1.05 TESTING AND INSPECTION AGENCIES AND SERVICES

- A. General Contractor shall employ and pay for services of an independent testing agency to perform specified testing.
- B. Employment of agency in no way relieves General Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- C. General Contractor Employed Agency:
 1. Testing agency: Comply with requirements of ASTM E329, ASTM E543, ASTM C1077, and ASTM D3740.
 2. Inspection agency: Comply with requirements of ASTM D3740 and ASTM E329.
 3. Laboratory: Authorized to operate in Kansas.
 4. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.

- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Schaefer Architecture before proceeding.
- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Where drawings and/or specifications designate a standard of performance (e.g., fire rating, sound transmission class, insulation value, heating output, air velocity, etc.) the completed installation shall perform at least to the designated standard.
- F. Have work performed by persons qualified to produce required and specified quality.
- G. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- H. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Schaefer Architecture before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

3.03 TESTING AND INSPECTION

- A. See individual specification sections and the drawings for testing and inspection required.
- B. Testing Agency Duties:
 - 1. Provide qualified personnel at site. Cooperate with Schaefer Architecture and General Contractor in performance of services.
 - 2. Perform specified sampling and testing of products in accordance with specified standards.
 - 3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 - 4. Promptly notify Schaefer Architecture and General Contractor of observed irregularities or non-compliance of Work or products.
 - 5. Perform additional tests and inspections required by Schaefer Architecture.
 - 6. Submit reports of all tests/inspections specified.
- C. Limits on Testing/Inspection Agency Authority:
 - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 - 2. Agency may not approve or accept any portion of the Work.
 - 3. Agency may not assume any duties of General Contractor.
 - 4. Agency has no authority to stop the Work.
- D. General Contractor Responsibilities:
 - 1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
 - 2. Cooperate with laboratory personnel, and provide access to the Work.
 - 3. Provide incidental labor and facilities:
 - a. To provide access to Work to be tested/inspected.

- b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
 - c. To facilitate tests/inspections.
 - d. To provide storage and curing of test samples.
- 4. Notify Schaefer Architecture and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
- E. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Schaefer Architecture.
- F. Re-testing required because of non-compliance with specified requirements shall be paid for by General Contractor.

3.04 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not complying with specified requirements at Contractors expense.
- B. If, in the opinion of Schaefer Architecture, it is not practical to remove and replace the work, Schaefer Architecture will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 41 00 - REGULATORY REQUIREMENTS**PART 1 GENERAL****1.01 SUMMARY of Reference Standards**

- A. Regulatory requirements applicable to this project are the following:
- B. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- C. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- D. 29 CFR 1910 - Occupational Safety and Health Standards; current edition.
- E. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- F. ICC (IFC) - International Fire Code; 2024.
- G. ICC (IBC) - International Building Code; 2024.
- H. ICC (IMC) - International Mechanical Code; 2024.
- I. NFPA 70 - National Electrical Code; 2023.
- J. Kansas Department of Health and Environment.
- K. Applicable State Statutes Annotated (K.S.A.).
- L. ASHRAE 90.1 - 2004.
- M. National Fire Protection Association, National Fire Codes.
- N. American Welding Society, AWS D1.1-04.
- O. All other federal, state, county, and local requirements applicable and/or referenced.

1.02 QUALITY ASSURANCE

- A. General Contractor's Designer Qualifications: Refer to Section - 01 40 00 - Quality Requirements.

1.03 BUILDING PLAN REVIEW & PERMIT:

- A. The Owner has submitted the Bidding Documents for Code Plan Review and paid the review fee.
- B. The Building Permit(s) and all other construction fees shall be included in the cost of the Work being bid.
 - 1. Development fees charged by the city/county shall be paid for by the Owner.

PART 2 PRODUCTS - NOT USED**PART 3 EXECUTION - NOT USED****END OF SECTION**

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SECTION 01 42 16 - DEFINITIONS**PART 1 GENERAL****1.01 SUMMARY**

- A. This section supplements the definitions contained in the General Conditions.
- B. Other definitions are included in individual specification sections.
- C. Specifications.
- D. Drawings.

1.02 DEFINITIONS

- A. A great amount of the specification language can be recognized as specific definitions for nominal terms found on the drawings and in other contract documents. Certain terms used more generally throughout the Contract Documents are hereby defined as follows:
- B. Directed, Requested, Etc.: Where not otherwise explained, terms such as "directed," "requested," "authorized," "selected," "approved," "required," "accepted" and "permitted" mean "directed by the Architect," "requested by the Architect," etc. However, no such implied meaning will be interpreted to extend the Architect's responsibility into the Contractor's area of construction supervision.
- C. Furnish: To supply, deliver, unload, inspect for damage and ready for unpacking, assembly and installation.
- D. General Requirements: The terms "General Requirement(s)" and "Division 1 Section(s)" are alike in meaning and significance.
- E. Guarantee and Warranty: Defined to be identical in meaning and used interchangeably.
- F. Indicated: The term "indicated" is a cross reference to details, notes, or schedules on the drawings, other paragraphs or schedules in the specifications, and similar means of recording requirements in the contract documents. Where terms such as "shown," "noted," "scheduled" and "specified" are used in lieu of "indicated," it is for the purpose of helping the reader accomplish the cross reference, and no limitation of location is intended except as specifically noted.
- G. Install, Erect, Construct, and Similar Terms: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use as part of the Work.
- H. Installer: The person or entity engaged by the Contractor or his Subcontractor or Sub-subcontractor for the performance of a particular unit of Work at the project site, including installation, erection, application, and similar required operations. It is a general requirement that Installers be recognized experts in the work they are engaged to perform.
- I. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never before used, or re-used materials or equipment.
- J. Project Site: The space available to the Contractor for the performance of the Work, either exclusively or in conjunction with others performing other work as part of the Project.
- K. Provide: To furnish and install, complete and ready for the intended use.
- L. Reviewed: Where used in conjunction with the Architect's or Engineer's response to submittals, requests, applications, inquiries, reports, and claims by the Contractor, the

meaning of the term "reviewed" will be held to the limitations of the Architect's responsibilities and duties as specified in the General and Supplementary Conditions and General Requirements. In no case will "reviewed" by the Architect be interpreted as an assurance to the Contractor that the requirements of the Contract Documents have been fulfilled.

- M. Supply: Same as Furnish.
- N. Testing Laboratory: An independent entity engaged to perform specific inspections or tests of the work, either at the project site or elsewhere; and to report and (if required) interpret the results of those inspections or tests.

1.03 PROJECT MANUAL

- A. The Project Manual is the volume(s) which binds together the Bidding Documents, General Conditions as Modified, and Specifications; identified for this Contract. The several parts of the volume(s) are listed in the Table of Contents of the volume(s).

1.04 SPECIFICATIONS

- A. General: This series of explanations is provided to assist the user of these specifications and associated contract documents to more readily understand the format, language, implied requirements and similar conventions of the content. None of these explanations will be interpreted to modify the substance of the requirements.
- B. Format Explanation: The format of the principal portions of specifications can be described as follows - although other portions may not fully comply and no particular significance will be attached to such compliance or noncompliance.
- C. Sections: Sections have been subdivided into 3 (or less) "parts" for uniformity and convenience (Part 1 -General, Part 2 - Products, and Part 3 - Execution). These do not imply a particular meaning and are not an integral part of the text which specified requirements.
- D. Imperative language is frequently used and, except as otherwise specified, requirements expressed imperatively are to be performed by the Contractor. For clarity of reading, contrasting subjective language is frequently used to describe the responsibilities which must be fulfilled either indirectly by the Contractor or by others.
- E. Streamlined style of the specifications results in abbreviated and incomplete sentences. Omission of words or phrases such as "the Contractor shall," "according to the plans," "a," "the," and "all" are intentional. Omitted words or phrases shall be supplied by inference in the same manner as they are when a note occurs on the drawings.
- F. Section number is for the purposes of abbreviated identification in connection with cross references. The Sections are placed in the binder(s) in sequence; however, this sequence is not complete and the Table of Contents of the Project Manual must be consulted to determine the total listing of Sections.
- G. Pages of each Section are numbered independently for each Section. The Section number is shown with the page number at the bottom of each page. "End of Section" appears on the last page of each Section. Contractor(s) shall verify that all pages of the Specifications are included.
- H. Project identification and date of publication, and revision where applicable, of the Contract Documents are recorded on each page to minimize misuse of the specifications and confusion with other project specifications.

- I. Mechanical and Electrical Provisions: Certain portions of Mechanical Work and Electrical Work of the General Requirements have been specified in their Divisions. This is for the traditional convenience and clarity of using the Contract Documents, and no other meaning will be interpreted from this arrangement of content, except as otherwise specifically indicated. They in turn reference certain other Divisions and Sections to minimize duplication in specifications and to correlate similar work performed by different parties.
- J. Contractors are responsible for their work regardless which Section it is included in.
- K. Contractor's Options: Where more than one set of requirements are specified for a particular unit of work. The option is intended to be the Contractor's.
- L. Specifications and Drawings Complementary: What is included in one is the same as though included in the other or included in both.
- M. Overlapping Requirements and Conflicts: In the event of conflicts between the Contract Documents or between the Contract Documents and applicable standards, codes, resolutions and ordinances, the Contractor shall (1) provide the better quality or greater quantity of Work or (2) comply with the more stringent requirement; or both in accordance with the interpretation of Schaefer Architecture.
- N. Abbreviations: The language of the Specifications and elsewhere in the Contract Documents is of the abbreviated type in certain instances, and implies words and meanings which will be appropriately interpreted. Actual word abbreviations of a self-explanatory nature have been included in the text. Trade associations and general standards are frequently abbreviated. Singular words will be interpreted as plural and plural words will be interpreted as singular wherever applicable and the full context of the requirement so indicated.

1.05 DRAWINGS

- A. Not all conditions have been detailed although such work is a part of the Contract.
- B. In lieu of details, some work may require conformance with written instructions, notes, and/or standards. Such work is a part of the Contract.
- C. Do not scale drawings for dimensions. Accurately layout such work from dimensions indicated unless such be found in error.
- D. Where drawings indicate a portion of the work and the remainder is shown in outline. The parts drawn out apply to other like portions of the work. Where detail is indicated by starting, only, such detail shall continue to apply throughout the courses or parts in which it occurs and apply to similar parts of work unless otherwise indicated.
- E. Details indicate the general application of work at all locations where it logically applies. Provide other related work incident thereto to fully complete the work consistent with the detail, other related details, and actual conditions.
- F. Consult Architect for interpretations concerning locations of equipment.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01 45 33 - CODE-REQUIRED SPECIAL INSPECTIONS AND PROCEDURES**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Code-required special inspections.
- B. Testing services incidental to special inspections.
- C. Submittals.

1.02 RELATED REQUIREMENTS

- A. Section 01 30 00 - Administrative Requirements: Submittal procedures.
- B. Section 01 40 00 - Quality Requirements.
- C. Section 01 60 00 - Product Requirements: Requirements for material and product quality.

1.03 DEFINITIONS

- A. Code or Building Code: International Building Code and, more specifically, Chapter 17 - Structural Tests and Inspections, of same.
- B. Authority Having Jurisdiction (AHJ): Agency or individual officially empowered to enforce the building, fire and life safety code requirements of the permitting jurisdiction in which the Project is located.
- C. Special Inspection:
 - 1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the AHJ that also require special expertise to ensure compliance with the approved Contract Documents and the referenced standards.
 - 2. Special inspections are separate from and independent of tests and inspections conducted by Owner or General Contractor for the purposes of quality assurance and contract administration.

1.04 REFERENCE STANDARDS

- A. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2016).
- B. AISC 360 - Specification for Structural Steel Buildings; 2010.
- C. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- D. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field; 2012.
- E. ASTM C172/C172M - Standard Practice for Sampling Freshly Mixed Concrete; 2010.
- F. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2019.
- G. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2021.
- H. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2021.
- I. ASTM E605/E605M - Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members; 1993 (2015)e1.

- J. ASTM E736/E736M - Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members; 2000 (2015)e1.
- K. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestops; 2014.
- L. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers; 2010a.
- M. AWCI 117 - Technical Manual 12-B; Standard Practice for the Testing and Inspection of Field Applied Thin Film Intumescent Fire-Resistive Materials; an Annotated Guide; 2014.
- N. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020.
- O. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2008.
- P. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; 2011.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Special Inspection Agency Qualifications: Prior to the start of work, the Special Inspection Agency is required to:
 - 1. Submit agency name, address, and telephone number, names of full time registered Engineer and responsible officer.
- C. Special Inspection Reports: After each special inspection, Special Inspector shall promptly submit electronic copies of report; to Schaefer Architecture, to structural engineer, to General Contractor and to the AHJ.
 - 1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of Special Inspector.
 - d. Date and time of special inspection.
 - e. Identification of product and specifications section.
 - f. Location in the Project.
 - g. Type of special inspection.
 - h. Date of special inspection.
 - i. Results of special inspection.
 - j. Compliance with Contract Documents.
 - 2. Final Special Inspection Report: Document special inspections and correction of discrepancies prior to the start of the work.

1.06 SPECIAL INSPECTION AGENCY

- A. Owner will employ and pay for services of a Special Inspection Agency to perform inspections. Refer to 01 40 00 - Quality Requirements for who will employ and pay for material testing and sampling in accordance with ASTM E329 and required by the building code.
- B. Employment of agency in no way relieves General Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.07 QUALITY ASSURANCE

- A. Special Inspection Agency Qualifications:
 - 1. Independent firm specializing in performing testing and inspections of the type specified in this section.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 SPECIAL INSPECTIONS FOR STEEL CONSTRUCTION

- A. Reference Structural Drawings for requirements.

3.02 SPECIAL INSPECTIONS FOR CONCRETE CONSTRUCTION

- A. Reference Structural Drawings and Project Manual for requirements.

3.03 SPECIAL INSPECTIONS FOR SOILS

- A. Reference Structural Drawings and Project Manual for requirements.

3.04 SPECIAL INSPECTION AGENCY DUTIES AND RESPONSIBILITIES

- A. Special Inspection Agency shall:
 - 1. Provide qualified personnel at site. Cooperate with Schaefer Architecture and General Contractor in performance of services.
 - 2. Perform specified sampling and testing of products in accordance with specified reference standards.
 - 3. Ascertain compliance of materials and products with requirements of Contract Documents.
 - 4. Promptly notify Schaefer Architecture and General Contractor of observed irregularities or non-compliance of work or products.
 - 5. Perform additional tests and inspections required by Schaefer Architecture.
 - 6. Submit reports of all tests or inspections specified.
- B. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Schaefer Architecture.
- C. Re-testing required because of non-compliance with specified requirements shall be paid for by General Contractor.

3.05 CONTRACTOR DUTIES AND RESPONSIBILITIES

- A. General Contractor Responsibilities, General:
 - 1. Cooperate with agency and laboratory personnel; provide access to approved documents at project site and to the work.
 - 2. Provide incidental labor and facilities:
 - a. To provide access to work to be tested or inspected.
 - b. To obtain and handle samples at the site or at source of Products to be tested or inspected.
 - c. To facilitate tests or inspections.
 - d. To provide storage and curing of test samples.
 - 3. Notify Schaefer Architecture and laboratory 24 hours prior to expected time for operations requiring testing or inspection services.
 - 4. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by General Contractor beyond specified requirements.

END OF SECTION

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SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Temporary telecommunications services.
- B. Temporary sanitary facilities.
- C. Temporary Controls: Barriers, enclosures, and fencing.
- D. Hoisting Facilities.
- E. Fire Protection.
- F. Security requirements.
- G. Vehicular access and parking.
- H. Waste removal facilities and services.
- I. Project identification sign.
- J. Field offices.
- K. Moisture and Mold Control.

1.02 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2021a.

1.03 TEMPORARY UTILITIES - See Section 01 51 00**1.04 TELECOMMUNICATIONS SERVICES**

- A. General Contractor shall provide, maintain, and pay for telecommunications services to field office at time of project mobilization.
- B. Telecommunications services shall include:
 - 1. Windows-based personal computer dedicated to project telecommunications, with necessary software.
 - 2. Telephone Land Lines: One line, minimum; one handset per line.
 - 3. Internet Connections: Minimum of one; DSL modem or faster.
- C. Superintendent for General Contractor shall be available by cell phone or other means throughout the day.
- D. Long distance calls shall be paid for by party making call.

1.05 TEMPORARY SANITARY FACILITIES

- A. General Contractor to provide and maintain required temporary facilities and enclosures. Provide at time of project mobilization.
 - 1. Temporary toilet facilities shall meet the requirements of the state and local departments of public health.
- B. Use of existing facilities is not permitted.
- C. New permanent facilities may not be used during construction operations.
- D. Maintain daily in clean and sanitary condition.

1.06 BARRIERS

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

- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
- C. Provide protection for plants designated to remain. Replace damaged plants.
 - 1. Care, pruning and maintenance of trees which are to remain shall be done under the direction of and in accordance with recommendations of a qualified and approved arborist or tree trimming specialist.
- D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.07 FENCING

- A. Construction: Commercial grade chain link fence. A panelized system may be utilized.
- B. Provide 6 foot (1.8 m) high fence around construction site; equip with vehicular and pedestrian gates with locks.
 - 1. Extent of Fence: As required to enclose portion determined sufficient to accommodate construction operations.

1.08 EXTERIOR ENCLOSURES

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

1.09 HOISTING FACILITIES

- A. For two stories (including roof) or less above grade; each contractor and subcontractor shall be responsible for providing their own hoisting of their own materials and debris.

1.10 FIRE PROTECTION

- A. General Contractor shall provide temporary fire protection. Portable fire extinguishers shall be provided with class and extinguishing agent as required by locations and classes of fire exposures. Subcontractors will be responsible for their own specialty requirements. Permanent fire protection equipment used for fire protection during construction shall be the responsibility of the installing contractor.

1.11 SECURITY

- A. Provide security and facilities to protect Work, and Owner's operations from unauthorized entry, vandalism, or theft.
- B. General Contractor may provide a "watchman" at their own cost.

1.12 VEHICULAR ACCESS AND PARKING

- A. General Contractor shall provide adequate access including roads into the site of the structure, if required, for the prosecution of the work. Also provide and maintain at least one temporary or permanent access to each working elevation which is to be permanently occupied
- B. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.
- C. Coordinate access and haul routes with governing authorities and Owner.
- D. Provide and maintain access to fire hydrants, free of obstructions.
- E. Provide means of removing mud from vehicle wheels before entering streets.
 - 1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

- F. Existing on-site roads may be used for construction traffic.
- G. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

1.13 WASTE REMOVAL

- A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- B. Provide containers with lids. Remove trash from site periodically.
- C. Each Contractor or Subcontractor shall be responsible to collect and deposit their debris in such collection facilities. The General Contractor shall be responsible for the removal of all debris from the job site.
- D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
- E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.
- F. Trash that blows onto adjacent property shall be removed by the responsible party or parties under the direct supervision of the General Contractor.
- G. Subcontractors shall collect and remove their own liquid waste and properly dispose of off-site.

1.14 PROJECT IDENTIFICATION

- A. Provide project identification sign of design and construction indicated on drawings.
- B. Erect on site at location indicated.
- C. No other signs or advertising are allowed without Owner permission except those required by law.
 - 1. Signs customarily located on trailers, field offices and vehicles will be permitted.

1.15 FIELD OFFICES

- A. Office: Not required.

1.16 MOISTURE AND MOLD CONTROL

- A. Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
 - 1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 - 2. Keep interior spaces reasonably clean and protected from water damage.
 - 3. Periodically collect and remove waste containing cellulose or other organic matter.
 - 4. Discard or replace water-damaged material.
 - 5. Do not install material that is wet.
 - 6. Discard, replace or clean stored or installed material that begins to grow mold.
 - 7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

- C. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 2. Use permanent HVAC system when they come available to control humidity.
 3. Comply with manufacturer's written instructions on products for temperature, relative humidity, and exposure to water limits.

1.17 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.
- B. Remove underground installations to a minimum depth of 2 feet (600 mm). Grade site as indicated.
- C. Clean and repair damage caused by installation or use of temporary work.
- D. Restore existing facilities used during construction to original condition.
- E. Restore new permanent facilities used during construction to specified condition.

PART 2 PRODUCTS - NOT USED**PART 3 EXECUTION - NOT USED****END OF SECTION**

SECTION 01 51 00 - TEMPORARY UTILITIES**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Temporary Utilities: Provision of electricity and water.

1.02 TEMPORARY ELECTRICITY

- A. Cost: By General Contractor.
- B. Provide power service required from utility source. Make arrangements with electric utility for service.
 - 1. For sites with no electric service, General Contractor shall provide portable generator(s) as required to maintain construction operations until electric service is installed by utility company.
- C. Power Service Characteristics: 120/208 or 120/240 volt, required ampere, three phase, four wire.
 - 1. Each Contractor shall be responsible for power they require exceeding systems specified.
- D. Electrical Contractor shall provide power outlets for construction operations, with branch wiring and distribution boxes located as required so that an extension no longer than 100 feet (30 m) will reach any work station. Each Contractor shall provide their own flexible power cords as required.
 - 1. Provide sufficient capacity for construction tools, equipment, temporary ventilation and lighting.
 - 2. Modify, maintain and upon completion of project remove temporary power system.
- E. Electrical Contractor shall provide 30 Amp service to maximum of 4 construction offices.
- F. Employ permanent systems as they are completed and available.
- G. Permanent convenience receptacles may be utilized during construction.

1.03 TEMPORARY WATER SERVICE

- A. Cost of Water Used: By General Contractor.
- B. General Contractor shall provide potable drinking water in convenient and accessible locations, for all persons engaged upon the work, so long as they have personnel on the job.

PART 2 PRODUCTS - NOT USED**PART 3 EXECUTION - NOT USED****END OF SECTION**

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SECTION 01 57 13 - TEMPORARY EROSION AND SEDIMENT CONTROL**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Prevention of erosion due to construction activities.
- B. Prevention of sedimentation of waterways, open drainage ways, and storm and sanitary sewers due to construction activities.
- C. Restoration of areas eroded due to insufficient preventive measures.
- D. Compensation of Owner for fines levied by authorities having jurisdiction due to non-compliance by General Contractor.

1.02 REFERENCE STANDARDS

- A. ASTM D4355/D4355M - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus; 2014.
- B. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.; 1999a (Reapproved 2014).
- C. ASTM D4533/D4533M - Standard Test Method for Trapezoid Tearing Strength of Geotextiles; 2015 (Reapproved 2023).
- D. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles; 2015a.
- E. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile; 2012.
- F. ASTM D4873/D4873M - Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples; 2017 (Reapproved 2021).
- G. EPA (NPDES) - National Pollutant Discharge Elimination System (NPDES), Construction General Permit; Current Edition.
- H. FHWA FLP-94-005 - Best Management Practices for Erosion and Sediment Control; 1995.
- I. USDA TR-55 - Urban Hydrology for Small Watersheds; USDA Natural Resources Conservation Service; 2009.

1.03 PERFORMANCE REQUIREMENTS

- A. Comply with requirements of EPA (NPDES) for erosion and sedimentation control, as specified by the NPDES, for Phases I and II, and in compliance with requirements of Construction General Permit (CGP).
- B. Comply with all requirements of the city and county for which the project is located for erosion and sedimentation control .
- C. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained; furnish all documentation required to obtain applicable permits.
 - 1. Owner will submit a Notice of Intent (NOI) obtain permits and pay yearly fee required to the Department of Health and Environment (KDHE).
 - 2. Owner will withhold payment to General Contractor equivalent to all fines resulting from non-compliance with applicable regulations.
- D. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.
- E. Storm Water Runoff: Control increased storm water runoff due to disturbance of surface cover due to construction activities for this project.

1. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less.
 2. Anticipate runoff volume due to the most extreme short term and 24-hour rainfall events that might occur in 25 years.
- F. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
1. Control movement of sediment and soil from temporary stockpiles of soil.
 2. Prevent development of ruts due to equipment and vehicular traffic.
 3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.
- G. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.
1. Prevent windblown soil from leaving the project site.
 2. Prevent tracking of mud onto public roads outside site.
 3. Prevent mud and sediment from flowing onto sidewalks and pavements.
 4. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.
- H. Sedimentation of Waterways On Site: Prevent sedimentation of waterways on the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
 2. If sediment basins are used as temporary preventive measures, pump dry and remove deposited sediment after each storm.
- I. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
- J. Open Water: Prevent standing water that could become stagnant.
- K. Maintenance: General Contractor shall maintain temporary preventive measures until permanent measures have been established.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Mulch: Use one of the following:
1. Straw or hay.
 2. Wood waste, chips, or bark.
 3. Erosion control matting or netting.
- B. Grass Seed For Temporary Cover: Select a species appropriate to climate, planting season, and intended purpose. If same area will later be planted with permanent vegetation, do not use species known to be excessively competitive or prone to volunteer in subsequent seasons.

- C. Bales: Air dry, rectangular straw bales.
 - 1. Cross Section: 14 by 18 inches (350 by 450 mm), minimum.
 - 2. Bindings: Wire or string, around long dimension.
- D. Bale Stakes: One of the following, minimum 3 feet (1 m) long:
 - 1. Steel U- or T-section, with minimum mass of 1.33 pound per linear foot (1.98 kg per linear m).
 - 2. Wood, 2 by 2 inches (50 by 50 mm) in cross section.
- E. Silt Fence Fabric: Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; fabric including seams with the following minimum average roll lengths:
 - 1. Average Opening Size: 30 U.S. Std. Sieve (0.600 mm), maximum, when tested in accordance with ASTM D4751.
 - 2. Permittivity: 0.05 sec^{-1} , minimum, when tested in accordance with ASTM D4491.
 - 3. Ultraviolet Resistance: Retaining at least 70 percent of tensile strength, when tested in accordance with ASTM D4355/D4355M after 500 hours exposure.
 - 4. Tensile Strength: 100 pounds-force (450 N), minimum, in cross-machine direction; 124 pounds-force (550 N), minimum, in machine direction; when tested in accordance with ASTM D4632/D4632M.
 - 5. Elongation: 15 to 30 percent, when tested in accordance with ASTM D4632/D4632M.
 - 6. Tear Strength: 55 pounds-force (245 N), minimum, when tested in accordance with ASTM D4533/D4533M.
 - 7. Color: Manufacturer's standard.
 - 8. Manufacturers:
 - a. TenCate: www.tencate.com/#sle.
 - b. North American Green: www.nagreen.com/#sle.
 - c. Propex Geosynthetics: www.geotextile.com/#sle.
- F. Silt Fence Posts: One of the following, minimum 5 feet (1500 mm) long:
 - 1. Steel U- or T-section, with minimum mass of 1.33 pound per linear foot (1.98 kg per linear m).
 - 2. Softwood, 4 by 4 inches (100 by 100 mm) in cross section.
 - 3. Hardwood, 2 by 2 inches (50 by 50 mm) in cross section.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible.

3.02 PREPARATION

- A. Schedule work so that soil surfaces are left exposed for the minimum amount of time.

3.03 SCOPE OF PREVENTIVE MEASURES

- A. In all cases, if permanent erosion resistant measures have been installed temporary preventive measures are not required.
- B. Construction Entrances: Traffic-bearing aggregate surface.
 - 1. Width: As required; 20 feet (7 m), minimum or as indicated on the drawings.
 - 2. Length: 50 feet (16 m), minimum or as indicated on the drawings.

3. Provide at each construction entrance from public right-of-way.
4. Where necessary to prevent tracking of mud onto right-of-way, provide wheel washing area out of direct traffic lane, with drain into sediment trap or basin.
- C. Linear Sediment Barriers: Made of silt fences or straw bales.
 1. Provide linear sediment barriers:
 - a. Where indicated on the drawings.
- D. Storm Drain Curb Inlet Sediment Trap: Protect each curb inlet using one of the following measures:
 1. Filter fabric wrapped around hollow concrete blocks blocking entire inlet face area; use one piece of fabric wrapped at least 1-1/2 times around concrete blocks and secured to prevent dislodging; orient cores of blocks so runoff passes into inlet.
 2. Straw bale row blocking entire inlet face area; anchor into pavement.
- E. Storm Drain Drop Inlet Sediment Traps: As detailed on drawings.
- F. Temporary Splash Pads: Stone aggregate over filter fabric; size to suit application; provide at downspout outlets and storm water outlets.
- G. Soil Stockpiles: Protect using one of the following measures:
 1. Cover with polyethylene film, secured by placing soil on outer edges.
 2. Cover with mulch at least 4 inches (100 mm) thickness of pine needles, sawdust, bark, wood chips, or shredded leaves, or 6 inches (150 mm) of straw or hay.
- H. Mulching: Use only for areas that may be subjected to erosion for less than 6 months.
 1. Wood Waste: Use only on slopes 3:1 or flatter; no anchoring required.
- I. Temporary Seeding: Use where temporary vegetated cover is required.

3.04 INSTALLATION

- A. Traffic-Bearing Aggregate Surface:
 1. Excavate minimum of 6 inches (150 mm).
 2. Place geotextile fabric full width and length, with minimum 12 inch (300 mm) overlap at joints.
 3. Place and compact at least 6 inches (150 mm) of 1 1/2 to 3 1/2 inch (40 to 90 mm) diameter stone.
- B. Silt Fences:
 1. Store and handle fabric in accordance with ASTM D4873/D4873M.
 2. Where slope gradient is less than 3:1 or barriers will be in place less than 6 months, use nominal 16 inch (405 mm) high barriers with minimum 36 inch (905 mm) long posts spaced at 6 feet (1830 mm) maximum, with fabric embedded at least 4 inches (100 mm) in ground.
 3. Where slope gradient is steeper than 3:1 or barriers will be in place over 6 months, use nominal 28 inch (710 mm) high barriers, minimum 48 inch (1220 mm) long posts spaced at 6 feet (1830 mm) maximum, with fabric embedded at least 6 inches (150 mm) in ground.
 4. Where slope gradient is steeper than 3:1 and vertical height of slope between barriers is more than 20 feet (6 m), use nominal 32 inch (810 mm) high barriers with woven wire reinforcement and steel posts spaced at 4 feet (1220 mm) maximum, with fabric embedded at least 6 inches (150 mm) in ground.
 5. Install with top of fabric at nominal height and embedment as specified.

6. Do not splice fabric width; minimize splices in fabric length; splice at post only, overlapping at least 18 inches (460 mm), with extra post.
 7. Fasten fabric to wood posts using one of the following:
 - a. Four nails per post with 3/4 inch (19 mm) diameter flat or button head, 1 inch (25 mm) long, and 14 gage, 0.083 inch (2.11 mm) shank diameter.
 - b. Five staples per post with at least 17 gage, 0.0453 inch (1.150 mm) wire, 3/4 inch (19 mm) crown width and 1/2 inch (12 mm) long legs.
 8. Fasten fabric to steel posts using wire, nylon cord, or integral pockets.
 9. Wherever runoff will flow around end of barrier or over the top, provide temporary splash pad or other outlet protection; at such outlets in the run of the barrier, make barrier not more than 12 inches (300 mm) high with post spacing not more than 4 feet (1220 mm).
- C. Straw Bale Rows:
1. Install bales in continuous rows with ends butting tightly, with one bale at each end of row turned uphill.
 2. Install bales so that bindings are not in contact with the ground.
 3. Embed bales at least 4 inches (100 mm) in the ground.
 4. Anchor bales with at least two stakes per bale, driven at least 18 inches (450 mm) into the ground; drive first stake in each bale toward the previously placed bale to force bales together.
 5. Fill gaps between ends of bales with loose straw wedged tightly.
 6. Place soil excavated for trench against bales on the upslope side of the row, compacted.
- D. Mulching Over Large Areas:
1. Dry Straw and Hay: Apply 2-1/2 tons per acre (6350 kg per hectare); anchor using dull disc harrow or emulsified asphalt applied using same spraying machine at 100 gallons of water per ton of mulch.
 2. Wood Waste: Apply 6 to 9 tons per acre (15,200 to 20,800 kg per hectare).
 3. Erosion Control Matting: Comply with manufacturer's instructions.
- E. Mulching Over Small and Medium Areas:
1. Dry Straw and Hay: Apply 4 to 6 inches (100 to 150 mm) depth.
 2. Wood Waste: Apply 2 to 3 inches (50 to 75 mm) depth.
 3. Erosion Control Matting: Comply with manufacturer's instructions.
- F. Temporary Seeding:
1. When hydraulic seeder is used, seedbed preparation is not required.
 2. When surface soil has been sealed by rainfall or consists of smooth undisturbed cut slopes, and conventional or manual seeding is to be used, prepare seedbed by scarifying sufficiently to allow seed to lodge and germinate.
 3. If temporary mulching was used on planting area but not removed, apply nitrogen fertilizer at 1 pound per 1000 sq ft (0.5 kg per 100 sq m).
 4. On soils of very low fertility, apply 10-10-10 fertilizer at rate of 12 to 16 pounds per 1000 sq ft (6 to 8 kg per 100 sq m).
 5. Incorporate fertilizer into soil before seeding.
 6. Apply seed uniformly; if using drill or cultipacker seeders place seed 1/2 to 1 inch (12 to 25 mm) deep.

7. Irrigate as required to thoroughly wet soil to depth that will ensure germination, without causing runoff or erosion.
8. Repeat irrigation as required until grass is established.

3.05 MAINTENANCE

- A. Inspect preventive measures weekly, within 24 hours after the end of any storm that produces 0.5 inches (13 mm) or more rainfall at the project site, and daily during prolonged rainfall.
- B. Repair deficiencies immediately.
- C. Silt Fences:
 1. Promptly replace fabric that deteriorates unless need for fence has passed.
 2. Remove silt deposits that exceed one-third of the height of the fence.
 3. Repair fences that are undercut by runoff or otherwise damaged, whether by runoff or other causes.
- D. Straw Bale Rows:
 1. Promptly replace bales that fall apart or otherwise deteriorate unless need has passed.
 2. Remove silt deposits that exceed one-half of the height of the bales.
 3. Repair bale rows that are undercut by runoff or otherwise damaged, whether by runoff or other causes.
- E. Clean out temporary sediment control structures weekly and relocate soil on site.
- F. Place sediment in appropriate locations on site; do not remove from site.

3.06 CLEAN UP

- A. Remove temporary measures after permanent measures have been installed, unless permitted to remain by Schaefer Architecture.
- B. Clean out temporary sediment control structures that are to remain as permanent measures.
- C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.

END OF SECTION

SECTION 01 60 00 - PRODUCT REQUIREMENTS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. General product requirements.
- B. Re-use of existing products.
- C. Transportation, handling, storage and protection.
- D. Product option requirements.
- E. Substitution limitations.
- F. Maintenance materials, including extra materials, spare parts, tools, and software.

PART 2 PRODUCTS**2.01 EXISTING PRODUCTS**

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.
- B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.
- C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the General Contractor; remove from site.
 - 1. The Owner has first salvage rights on materials and equipment whether identified to remain as property of the Owner or not.

2.02 NEW PRODUCTS

- A. Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
- B. Use of products having any of the following characteristics is not permitted:
 - 1. Containing lead, cadmium, or asbestos.

2.03 PRODUCT OPTIONS

- A. General: The specifying of particular products, materials and systems is done to establish a minimum standard of performance, quality, type and physical characteristics.
- B. Prebid approval is required for proposed materials, equipment or systems for manufacturers not specified or listed in the Contract Documents when other manufacturers and/or products are specified and there is listed a Provision for Substitutions.
- C. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- D. Products where it is specified by name, model number or series to establish quality with a Provision for Substitutions: Use product indicated. Submit a request for substitution for any product not named.
- E. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- F. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

- G. Where Contractor proposes products or systems as a "Bidders Alternate", a request for substitution is not required. Follow requirements under section 01 23 00 - Alternates.

2.04 PRODUCT OPTIONS AFTER BID

- A. After execution of contract, substitutions of materials, equipment or systems other than those specified and approved by addendum will be approved by the Schaefer Architecture only if the following are met:
1. Materials specified and ordered in a timely manner cannot be delivered to the job in time to complete the work in proper sequence.
 2. An equal or superior material is proposed.
 3. The Project cost will lower or remain unchanged.

2.05 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver and place in location as directed; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 TRANSPORTATION AND HANDLING

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.02 STORAGE AND PROTECTION

- A. Provide protection of stored materials and products against theft, casualty, or deterioration.
- B. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
1. Structural Loading Limitations: Handle and store products and materials so as not to exceed static and dynamic load-bearing capacities of project floor and roof areas.
- C. Store and protect products in accordance with manufacturers' instructions.
- D. Store with seals and labels intact and legible.
- E. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- F. For exterior storage of fabricated products, place on sloped supports above ground.

- G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- H. Comply with manufacturer's warranty conditions, if any.
- I. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- J. Prevent contact with material that may cause corrosion, discoloration, or staining.
- K. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- L. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

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SECTION 01 70 00 - EXECUTION AND CLOSEOUT REQUIREMENTS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.
- C. Pre-installation meetings.
- D. Cutting and patching.
- E. Surveying for laying out the work.
- F. Cleaning and protection.
- G. Starting of systems and equipment.
- H. Demonstration and instruction of Owner personnel.
- I. Closeout procedures, including General Contractor's Correction Punch List, except payment procedures.
- J. General requirements for maintenance service.

1.02 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
 - 1. Structural integrity of any element of Project.
 - 2. Efficiency, maintenance, or safety of any operational element.
 - 3. Visual qualities of sight exposed elements.
 - 4. Work of Owner or separate Contractor.
 - 5. Include in request:
 - a. Location and description of affected work.
 - b. Necessity for cutting or alteration.
 - c. Description of proposed work and products to be used.
 - d. Date and time work will be executed.
- C. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.03 QUALIFICATIONS

- A. For demolition work, employ a firm specializing in the type of work required.
- B. For surveying work, employ a land surveyor registered in Kansas and acceptable to Schaefer Architecture. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

1.04 PROJECT CONDITIONS

- A. Use of explosives is not permitted.
- B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- C. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

- D. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- E. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
 - 1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.
 - 2. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.
- F. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
 - 1. Minimize amount of bare soil exposed at one time.
 - 2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
 - 3. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
 - 4. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.
- G. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.
- H. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.
- I. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.05 COORDINATION

- A. See Section 01 10 00 for occupancy-related requirements.
- B. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- C. Notify affected utility companies and comply with their requirements.
- D. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- E. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- G. Coordinate completion and clean-up of work of separate sections.

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

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

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

3.03 PREINSTALLATION MEETINGS

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Schaefer Architecture four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 - 1. Review conditions of examination, preparation and installation procedures.
 - 2. Review coordination with related work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Schaefer Architecture, Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Schaefer Architecture of any discrepancies discovered.
- C. General Contractor shall locate and protect survey control and reference points.
- D. Control datum for survey is that indicated on drawings.
- E. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- F. Promptly report to Schaefer Architecture the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- G. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Schaefer Architecture.
- H. Utilize recognized engineering survey practices.
- I. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
 - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
 - 2. Grid or axis for structures.
 - 3. Building foundation, column locations, ground floor elevations.
- J. Periodically verify layouts by same means.
- K. Maintain a complete and accurate log of control and survey work as it progresses.

3.05 ORDERING, RECEIVING, AND STORING MATERIALS

- A. Order materials in timely manner to assure delivery in ample time for orderly incorporation into the Work.
- B. On receipt of materials, check for in-transit damage in ample time to replace any damaged materials prior to installation time.
- C. Wherever possible deliver materials and equipment to project site in manufacturer's original packages, keeping labels intact until final cleaning. Where items are to be job-assembled, label, tag, mark or otherwise properly identify each component part until incorporated in the Work.
- D. Store materials in a manner to prevent deterioration, staining, soiling and intrusion of foreign materials. Provide waterproof well-ventilated enclosures for materials subject to deterioration by dampness. Adequately protect those materials subject to damage by freezing and frost.
- E. Remove from premises and replace with new, any materials showing deterioration or damage.

3.06 MANUFACTURER'S REQUIREMENT:

- A. All materials and equipment supplied for this building shall be installed, applied or erected in strict accordance with the manufacturer's recommendations or with manufacturer's trade association requirements unless the specifications bound herewith exceed those requirements.
 - 1. Exception: Methods or procedures, set forth in the manufacturer's recommendations which the Contractor finds unacceptable shall be submitted to Schaefer Architecture in writing for clarification.

3.07 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.
- F. Prepare all work to receive subsequent work or finish as needed and described in specifications for both substrate and subsequent products.
- G. Furnish, apply, install, connect, erect, clean and condition manufactured articles, materials, and equipment per manufacturer's printed directions. If otherwise indicated or specified, notify Schaefer Architecture well in advance of installation and prerequisite construction.
- H. Manufacturer's printed directions must be on job prior to and during installation of materials and equipment.
- I. Provide all attachment devices and materials necessary to secure materials together or to other materials and to secure work of other trades.
- J. Make allowance for ample expansion and contraction for all building components subject to same.
- K. Each trade shall build in openings required for their own work and sleeves furnished by another trade for their work and prepare openings when another trade requires and furnishes the information in a timely manner. Each trade shall be responsible for cutting into construction when they have not acted in timely manner; all in accordance with CUTTING AND PATCHING in this section. Each trade shall be responsible for filling around their work, within blockouts, sleeves, and holes for their work, to maintain the integrity (acoustic, fire, smoke, appearance, etc.) of the construction.
- L. Where proper fit of work depends upon close tolerances of manufactured products, furnish manufacturer with necessary templates to insure proper fit of all components.
- M. Install materials only when conditions of adjacent building components are conducive to achieving best installation results.
- N. Construct job assemblies accurately and as necessary for other trades having adjunct work. Correct errors in cutting, shop fabrication and installation. Where necessary to cut into other building components, do so only in a manner not to damage building structurally nor aesthetically, then repair adjoining parts and materials thoroughly and neatly.
- O. Erect, install and secure building components in a structurally sound and appropriate manner. Where necessary, temporarily brace, shore, or otherwise support members until final connection or installation. Brace walls and other structural elements to prevent damage by wind and construction operations. Leave temporary bracing, shoring, or other structural supports in place as long as necessary for safety and until structure is strong enough to withstand all loads involved.

- P. Where construction consists of a series of courses or units, assemble units in best acceptable manner to provide structurally sound installation, waterproof where exposed to exterior. Accurately plumb and level all courses and verify levels of frequent courses with instrument.
- Q. Handle materials in manner to prevent scratching, abrading, distortion, chipping, breaking or other disfigurement to those materials as well as to materials and construction already existing.
- R. Unless indicated, fabricate and install materials true to line, plumb and level. Leave finished surfaces smooth and flat or of smooth contour where indicated, free from wrinkles, warps, scratches, dents, and other imperfections
- S. Provide quality of workmanship not less than the commercially accepted standards of that trade.
- T. Where obviously of best practice, furnish materials in longest practical lengths and largest practical sizes to avoid unnecessary jointing. Make all joints secure.
- U. Consult Schaefer Architecture for mounting height or position of any unit not specifically located.
- V. Mix no more materials than can be used before materials begin to "set". Mix no partially "set" batch with another. Clean tools and appliances prior to mixing materials that can be contaminated.
- W. Conduct work in a manner to avoid injury to previously placed work.
- X. Do not disturb materials requiring curing time until appropriate curing time has transpired.
- Y. Install, connect, service, and operate permanent systems at earliest practical dates, except as may be modified by specification section 01 51 00.

3.08 ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 - 1. Verify that construction and utility arrangements are as indicated.
 - 2. Report discrepancies to Schaefer Architecture before disturbing existing installation.
 - 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
 - 1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 50 00 in locations indicated on drawings.
- C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
 - 1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
 - 2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.
- D. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove items indicated on drawings.
 - 2. Relocate items indicated on drawings.

3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- E. Protect existing work to remain.
 1. Prevent movement of structure; provide shoring and bracing if necessary.
 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 3. Repair adjacent construction and finishes damaged during removal work.
- F. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
 1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Schaefer Architecture.
 2. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
 3. Where a change of plane of 1/4 inch (6 mm) or more occurs in existing work, submit recommendation for providing a smooth transition for Schaefer Architecture review and request instructions.
 4. Trim existing wood doors as necessary to clear new floor finish. Refinish trim as required.
- G. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- H. Refinish existing surfaces as indicated:
 1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
 2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
- I. Clean existing systems and equipment.
- J. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- K. Do not begin new construction in alterations areas before demolition is complete.
- L. Comply with all other applicable requirements of this section.

3.09 CUTTING AND PATCHING

- A. **Prior approval for cutting and patching is required unless waived by the Schaefer Architecture.**
- B. **Approval of Schaefer Architecture to proceed with proposed cutting-and-patching does not waive right to later require complete removal and replacement of work found to be cut-and-patched in an unsatisfactory manner.**
- C. General:
 1. "Cutting-and-patching" is hereby defined to include, but is not necessarily limited to; the cutting and patching of nominally completed and existing work, in order to

accommodate the coordination of work, or the installation of other work, or to uncover other work for access or inspection, or to obtain samples for testing, or for repair or correction, or for similar purposes.

2. Patching also is defined as repair to new or existing landscaping or other features.
3. Existing work shall be prepared, cleaned, and patched as required for new work by appropriate trades, ready for the subsequent finishes.
4. Excavating and the associated operations of boulder removal, dewatering, bracing, removal of underground debris, penetration of rock and other barriers, backfilling, and similar work as specified in Division 31 and in other contract documents, may be required as a special form of cutting-and-patching, but is recognized primarily as an example of a related-but-separate category of work.
5. Restoring or removing and replacing non-complying work may require cutting-and-patching operations as specified herein.
6. Refer to other sections of these specifications and all drawings for ramifications regarding work necessary to accomplish installation of items shown.
7. Each trade shall be responsible for the sizing, location, timing, coordinating and cost for cutting and patching necessary to accommodate their work. Cutting and patching shall be done by individuals skilled in working the tools and materials involved.

D. Quality Assurance:

1. Requirements for Structural Work: Do not cut-and-patch structural work in a manner resulting in a reduction of load-carrying capacity or load/deflection ratio.
2. Operational and Safety Limitations: Do not cut-and-patch operational elements and safety-related components in a manner resulting in a reduction of capacities to perform in the manner intended or resulting in decreased operational life, increased maintenance, or decreased safety. Operational elements include but are not limited to the following:
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire-suppression systems.
 - e. Mechanical systems piping and ducts.
 - f. Control systems.
 - g. Fire alarm and Communication systems.
 - h. Conveying systems.
 - i. Electrical wiring systems.
 - j. Operating systems of special construction.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
 - a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Exterior curtain-wall construction.
 - d. Equipment supports.

- e. Piping, ductwork, vessels, and equipment.
- f. Noise- and vibration-control elements and systems.
- 4. Visual Requirements: Do not cut-and-patch work which is exposed on the exterior or exposed in occupied spaces of the building, in a manner resulting in a reduction of visual qualities or resulting in substantial evidence of the cut-and-patch work, both as judged solely by the Architect. Remove and replace work judged by the Architect to be cut-and-patched in a visually unsatisfactory manner. Trade requiring cutting may use small escutcheons or similar trim at piping, ducts and the like, if permitted for new work, and not as a device to cover work which should be patched.
- 5. Engage the original Installer/Fabricator to perform cutting-and-patching in new construction. Engage capable personnel to perform cut-and-patch work.
- E. Submittals:
 - 1. Unless waived by Schaefer Architecture, submit proposal well in advance of time work will be performed and request approval to proceed. Include description of why cutting-and-patching cannot (reasonably) be avoided, how it will be performed, products to be used, firms and tradesmen to perform the work, approximate dates of the work, and anticipated results in terms of variations from the work as originally completed.
 - 2. Schaefer Architecture may require that the Contractor provide structural engineering services through the project structural engineer at the Contractor's expense.
 - 3. Where applicable, include cost proposal, suggested alternatives to the cutting-and-patching procedure proposed
- F. Materials: Provide materials for cutting-and-patching which will result in equal-or-better work than the work being cut-and-patched, in terms of performance characteristics and including visual effect where applicable. Comply with the requirements, and use materials identical with the original materials where feasible and where recognized that satisfactory results can be produced thereby.
- G. Whenever possible, execute the work by methods that avoid cutting or patching.
- H. See Alterations article above for additional requirements.
- I. Perform whatever cutting and patching is necessary to:
 - 1. Complete the work.
 - 2. Fit products together to integrate with other work.
 - 3. Provide openings for penetration of mechanical, electrical, and other services.
 - 4. Match work that has been cut to adjacent work.
 - 5. Repair areas adjacent to cuts to required condition.
 - 6. Repair new work damaged by subsequent work.
 - 7. Remove samples of installed work for testing when requested.
 - 8. Remove and replace defective and non-complying work.
- J. Protection: Construct barriers to separate work areas from occupied areas and to protect building occupants from danger of uncontrolled temperature and pollution. Seal openings as needed to provide such protection.
 - 1. Ventilate areas where dust and odors are produced to the outside.
 - 2. Provide and maintain filters over building ventilating and return air outlets enveloped by dust enclosures when system ties into occupied areas.
- K. 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.

- L. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
 - 1. Minimize the use of hammering and chopping tools.
- M. Restore work with new products in accordance with requirements of Contract Documents.
- N. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- O. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 84 00, to full thickness of the penetrated element.
- P. Patching:
 - 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
 - 2. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance unless otherwise indicated.
 - 3. Ceilings: Patch, repair, or rehang in-place ceilings as necessary or as indicated to provide an even-plane surface of uniform appearance.
 - 4. Match color, texture, and appearance.
 - 5. 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.
 - 6. Restore exposed finishes of patched areas, and where necessary, extend finish restoration and new finish onto adjoining retained work, in a manner which will eliminate evidence of patching. As an example; where patch occurs in or adjacent to a painted surface, extend final paint coat over the entire unbroken surface containing the patch after patched area has received prime and base coats and whole surface prepared for painting.

3.10 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
 - 1. Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.11 PROTECTION OF INSTALLED WORK

- A. Protect existing construction, property and installed work from damage by construction operations, weather and its elements.

- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Prohibit traffic from landscaped areas.
- H. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.
- I. Remove ice and snow as necessary for safety and proper execution of Work.
- J. Brace all construction to prevent damage from wind and construction loading.
- K. Transport, handle, store and erect materials in a manner to keep them free from injury.
- L. Repair damaged materials, systems, equipment and the like. If satisfactory repair cannot be attained, replace damaged products with equally aesthetic and serviceable products, systems and equipment.
- M. Clean off any foreign materials accidentally deposited on finish surfaces and, where such would stain, corrode or otherwise disfigure, clean same immediately with material that will not damage finished work.

3.12 SYSTEM STARTUP

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Schaefer Architecture and Owner seven days prior to start-up of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify that wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable General Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.13 DEMONSTRATION AND INSTRUCTION

- A. See Section 01 79 00 - Demonstration and Training.

3.14 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.
- B. Adjust doors, hardware, motors, valves, controls, and other equipment for proper operation.

- C. Seal exterior joints between materials to form a weathertight enclosure.
- D. Touch up imperfections in surfaces, paint, and other finishes after all Contractors and tradesmen have completed their work.
- E. Completed work shall be thoroughly clean and free from foreign materials and stains.
- F. Clean surfaces using appropriate materials and methods that will thoroughly clean but not damage materials and their finishes, not damage or adversely affect other materials in the project.

3.15 FINAL CLEANING

- A. Execute final cleaning prior to Substantial Completion.
 - 1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.
 - 2. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
- B. Use cleaning materials that are nonhazardous.
- C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- F. Clean debris from roofs, gutters, and downspouts.
- G. Clean site; sweep paved areas, rake clean landscaped surfaces.
- H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.16 CLOSEOUT PROCEDURES

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following:
 - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 2. Advise Owner of pending insurance changeover requirements.
 - 3. Advise Owner of pending utility changeover requirements if applicable.
 - 4. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 - 5. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
 - 6. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 - 7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
 - 8. Complete final cleaning requirements, including touchup painting.
 - 9. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- B. Make submittals that are required by governing or other authorities.

1. Provide copies to Schaefer Architecture.
- C. Notify Schaefer Architecture when work is considered ready for Schaefer Architecture's Substantial Completion inspection.
- D. Submit written certification containing General Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete (by General Contractor and Subcontractors) in accordance with Contract Documents and ready for Schaefer Architecture's Substantial Completion inspection.
 1. Separate inspections for mechanical, electrical and general construction work and equipment shall be arranged in the same basic time period by Schaefer Architecture, engineers and consultants.
 2. Schaefer Architecture may decline to perform the inspection if the building (or designated portion) can not be used for the intended purpose.
 3. Schaefer Architecture may also terminate the inspection at any time if the amount and/or type of incomplete work demonstrates that the building can not be used for the intended purpose without generating an inspection report.
- E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Schaefer Architecture's and General Contractor's comprehensive list of items identified to be completed or corrected and submit to Schaefer Architecture.
- F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- G. Notify Schaefer Architecture when work is considered finally complete and ready for Schaefer Architecture's Substantial Completion final inspection.
- H. Complete items of work determined by Schaefer Architecture listed in executed Certificate of Substantial Completion.
- I. All additional inspections incurred by Schaefer Architecture and/or consultants because of incomplete or unsatisfactory work will be charged to the General Contractor. Time will be billed through the Owner at \$100.00 per worker hour for time chargeable to the Project whether on site, traveling, or in office. Payments to be deducted from amounts owed to the General Contractor by the Owner without any additional action required by the Owner, Schaefer Architecture, or General Contractor.

3.17 MAINTENANCE

- A. Provide service and maintenance of components indicated in specification sections.

END OF SECTION

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SECTION 01 78 00 - CLOSEOUT SUBMITTALS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Project Record Documents.
- B. Operation and Maintenance Data.
- C. Warranties.

1.02 SUBMITTALS

- A. Project Record Documents: Submit documents to Schaefer Architecture with claim for final Application for Payment.
- B. Operation and Maintenance Data:
 - 1. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance. Submit two copies.
- C. Warranties:
 - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
 - 2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
 - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.
- D. Consent of Surety to Final Payment, on AIA Form G707. Submit three copies.
- E. Contractor's Affidavit of Payment of Debts and Claims, AIA Document G706. Submit three copies.
- F. Contractor's Affidavit of Release of Liens, AIA Document G706A. Submit three copies.
- G. Contractor's Release or Waiver of Liens, conditional upon receipt of payment, on the Contractor's letterhead. Submit three copies.
 - 1. The Owner reserves the right to require any other data necessary to establish satisfactory payment of all contractual obligations.
- H. Sales Tax Exemption Certificate. Submit two copies.
- I. If required by Owner or Schaefer Architecture, one copy each of all invoices properly identified with the Sales Tax Exemption number as required by the State of Kansas. The Contractor shall retain such invoices for a period of not less than five years.
- J. For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the work.

PART 2 PRODUCTS - NOT USED**PART 3 EXECUTION****3.01 PROJECT RECORD DOCUMENTS**

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:

1. Drawings.
 2. Specifications.
 3. Addenda.
 4. Change Orders and other modifications to the Contract.
 5. Reviewed shop drawings, product data, and samples.
 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
1. Manufacturer's name and product model and number.
 2. Product substitutions or alternates utilized.
 3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 2. Field changes of dimension and detail.
 3. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

- A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

- A. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- B. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
- C. Additional information as specified in individual product specification sections.
- D. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

- A. For Each Item of Equipment and Each System:
1. Description of unit or system, and component parts.

2. Identify function, normal operating characteristics, and limiting conditions.
3. Include performance curves, with engineering data and tests.
4. Complete nomenclature and model number of replaceable parts.
- B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.
- C. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- D. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- E. Provide servicing and lubrication schedule, and list of lubricants required.
- F. Include manufacturer's printed operation and maintenance instructions.
- G. Include sequence of operation by controls manufacturer.
- H. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- I. Include test and balancing reports.
- J. Additional Requirements: As specified in individual product specification sections.

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

- A. Assemble operation and maintenance data for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
- B. Where systems involve more than one specification section, provide separate tabs dividing each system.
- C. Submit operations and maintenance manuals in a PDF electronic file.
- D. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Schaefer Architecture, Consultants, General Contractor and subcontractors, with names of responsible parties.
- E. Tables of Contents: List every item by a bookmark that allows for easy access of content.
- F. Arrangement of Contents: Organize as follows:
 1. Project Directory.
 2. Table of Contents.
 3. Operation and Maintenance Data: Arranged by system, then by product category.
 - a. Source data.
 - b. Product data, shop drawings, and other submittals.
 - c. Operation and maintenance data.
 - d. Field quality control data.
 - e. Photocopies of warranties and bonds.
 4. Design Data: To allow for addition of design data furnished by Schaefer Architecture or others, provide a bookmark "Design Data".

3.06 WARRANTIES

- A. For all pieces of operating equipment and system provided by any trade for this Project and when warranties or guarantees are otherwise specified, submit written guarantee or warranty documents which shall include the following information:

1. Name and address of Project and Owner.
 2. Article, material or system covered.
 3. Name and address of Installing contractor.
 4. Name and address of Prime Contractor.
 5. Signature of individual authorized to sign contracts for the company issuing the guarantee.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
1. Scan warranties and assemble complete warranty submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide table of contents at beginning of document.
- D. The following terms (minimum) shall be incorporated:
1. Duration, one year or as specified, dated from "Date of Substantial Completion."
This shall be in addition to and not a limitation of other rights the Owner may have under the Contract Documents.
 2. The article, material or system is free from defective materials and workmanship.
 3. Costs of repair or replacement shall not accrue to the Owner including repair or replacement of other work disturbed by repair or replacement.
- E. Guarantees which are standard guarantees provided by a manufacturer for his product shall be received by the Contractor, filled out and filed with the company for the Owner. Certificates or registration stubs shall be included with the shop drawings submitted for the Owner upon completion of the work. The Contractor's responsibility stipulated in the paragraph before this one, terminates as stipulated therein. The Owner shall administrate manufacturer's warranties/guarantees thereafter.
- F. Co-execute submittals when required.

END OF SECTION

SECTION 03 01 00 - MAINTENANCE OF CONCRETE**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Cleaning of existing concrete surfaces.
- B. Repair of exposed structural, shrinkage, and settlement cracks.
- C. Resurfacing of concrete surfaces having spalled areas and other damage.
- D. Repair of deteriorated concrete.
- E. Scope of Work: As indicated on drawings.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Finishing of concrete surface to tolerance; floating, troweling, and similar operations; curing.

1.03 REFERENCE STANDARDS

- A. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2018a.
- B. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2018.
- C. ASTM C150/C150M - Standard Specification for Portland Cement; 2021.
- D. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.
- E. ASTM C928/C928M - Standard Specification for Packaged, Dry, Rapid-Hardening Cementitious Material for Concrete Repairs; 2013.
- F. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete; 2013.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate product standards, physical and chemical characteristics, technical specifications, limitations, maintenance instructions, and general recommendations regarding each material.
- C. Project Record Documents: Accurately record actual locations of structural reinforcement repairs and type of repair.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of experience.
- B. Cleaner Qualifications: Company specializing in, and with minimum of 3 years of experience in, the type of cleaning specified.
- C. Installer Qualifications: Company specializing in performing work of the type specified and with minimum of 3 years of experience.

1.06 MOCK-UP(S)

- A. Test each type of maintenance procedure required on each type of existing construction, to determine the most appropriate procedures to use and as a record of expected results.
- B. Crack Injection: Prepare one sample of each type of injection.
- C. Horizontal Surface Repair: Total of 10 foot (3 m) square area, demonstrating each type of repair.

- D. Vertical Surface Repair: Total of 10 foot (3 m) square area, demonstrating each type of repair.
- E. Re-work mock-up(s) until satisfactory to Schaefer Architecture.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturers' instructions for storage, shelf life limitations, and handling of products.

PART 2 PRODUCTS

2.01 CLEANING MATERIALS

- A. Degreaser:
 - 1. Manufacturers:
 - a. L&M Construction Chemicals, Inc, a subsidiary of Laticrete International, Inc; CITREX: www.lmcc.com/#sle.
 - b. SpecChem, LLC; Orange Peel-Citrus Cleaner: www.specchemllc.com/#sle.
 - c. W. R. Meadows, Inc; Ultrite Degreaser: www.wrmeadows.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Detergent: Non-ionic detergent.

2.02 CEMENTITIOUS PATCHING AND REPAIR MATERIALS

- A. Bonding Slurry: Water-based latex admixture complying with ASTM C1059/C1059M, combined with Portland cement and sand in accordance with admixture manufacturer's instructions.
 - 1. Admixture Manufacturers (Interior):
 - a. Dayton Superior Corporation; PVA Bonding Agent J41: www.daytonsuperior.com.
 - b. Euclid Chemical Company; Euco Weld: www.euclidchemical.com/#sle.
 - c. SpecChem, LLC; SpecWeld: www.specchemllc.com/#sle.
 - d. W.R. Meadows, Inc.; Intralok: www.wrmeadows.com/sle.
 - e. Larsen Products Corp.; Weld-Crete: www.larsenproducts.com.
 - f. L&M Construction Chemicals, Inc.; Everweld: www.lmcc.com.
 - g. Metalcrete Industries; Herculux: www.metalcreteindustries.com.
 - h. Symons Corporation; Ready Bond: www.symons.com.
 - i. Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. Admixture Manufacturers (Interior/Exterior):
 - a. W.R. Meadows, Inc.; Acry-lok: www.wrmeadows.com/sle.
 - b. W.R. Meadows, Inc.; Intralok: www.wrmeadows.com/sle.
 - c. Dayton Superior Corporation; Acrylic Bonding Agent J40: www.daytonsuperior.com.
 - d. Edoco; Acrylic Bondcrete: www.daytonsuperior.com.
 - e. Conspec; Strongbond: www.daytonsuperior.com.
 - f. Euclid Chemical Corporation; SBR Latex: www.euclidchemical.com.
 - g. W.R. Grace & Company; Daraweld C: www.grace.com.
 - h. L&M Construction Chemicals, Inc.; Everbond: www.lmcc.com.
 - i. Symons Corporation; Strong Bond: www.symons.com.
 - j. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 ACCESSORIES

- A. Bonding Agent Interior: Polyvinyl acetate emulsion, dispersed in water while mixing, non-coagulant in mix, water resistant when cured.
- B. Bonding Agent Interior/Exterior: Acrylic or Styrene Butadiene
- C. Portland Cement: ASTM C150/C150M, Type I, grey.
- D. Sand: ASTM C33/C33M or ASTM C404; uniformly graded, clean.
- E. Water: Clean and potable.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that surfaces are ready to receive work.
- B. Beginning of installation means acceptance of substrate.

3.02 CLEANING EXISTING CONCRETE

- A. Provide enclosures, barricades, and other temporary construction as required to protect adjacent work from damage.
- B. Clean concrete surfaces of dirt or other contamination using the gentlest method that is effective.
 - 1. Try the gentlest method first, then, if not clean enough, use a less gentle method taking care to watch for impending damage.
 - 2. Clean out cracks and voids using same methods.
- C. The following are acceptable cleaning methods, in order from gentlest to less gentle:
 - 1. Water washing using low-pressure, maximum of 100 psi, and, if necessary, brushes with natural or synthetic bristles.
 - 2. Increasing the water washing pressure to maximum of 400 psi.
 - 3. Adding detergent to washing water; with final water rinse to remove residual detergent.
 - 4. Steam-generated low-pressure hot-water washing.
- D. Do not use any of the following cleaning methods, unless otherwise indicated:
 - 1. Brushes with wire bristles, grinding with abrasives, solvents, hydrochloric or muriatic acid, sodium hydroxide, caustic soda, or lye.
 - 2. Soap or detergent that is not non-ionic.

3.03 CONCRETE SURFACE REPAIR USING CEMENTITIOUS MATERIALS

- A. Clean concrete surfaces, cracks, and joints of dirt, laitance, corrosion, and other contamination using method(s) specified above and allow to dry.
- B. Apply coating of bonding agent to entire concrete surface to be repaired.
- C. Trowel finish to match adjacent concrete surfaces.

END OF SECTION

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SECTION 03 10 00 - 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 RELATED REQUIREMENTS

- A. Section 03 20 00 - Concrete Reinforcing.
- B. Section 03 30 00 - Cast-in-Place Concrete.
- C. Section 13 34 19 - Metal Building Systems: Placement of embedded steel anchors and plates in cast-in-place concrete.

1.03 REFERENCE STANDARDS

- A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; 2010.
- B. ACI 301 - Specifications for Structural Concrete; 2016.
- C. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2016).
- D. ACI 347R - Guide to Formwork for Concrete; 2014.
- E. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2015a.
- F. PS 1 - Structural Plywood; 2009.

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 301, ACI 318, ACI 347R, ACI 301, ACI 318, ACI 347R, ACI 301, ACI 318, and ACI 347R.

2.02 WOOD FORM MATERIALS

- A. Softwood Plywood: PS 1, B-B High Density Concrete Form Overlay, Class I.
- B. Plywood: PS 1, B-B Concrete Form Panels, Class 1, Exterior Grade, mill-applied release agent and edge sealed.

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 or snap-off type, galvanized metal, fixed length, cone type, with waterproofing washer, 1 1/2 inch back break dimension, (38 mm back break dimension,) 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. Products:
 - a. SpecChem, LLC; Bio Strip WB (water-based): www.specchemllc.com/#sle.
 - b. W. R. Meadows, Inc; Duogard: www.wrmeadows.com/sle.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Filler Strips for Chamfered Corners: Rigid plastic type; 3/4 x 3/4 inch (19 x 19 mm) size; maximum possible lengths.
- 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: As specified in Section 05 12 00.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 EARTH FORMS

- A. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

3.03 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. Arrange form-facing material in an orderly and symmetrical manner with a minimum of seams.
- E. Align joints and make watertight. Keep form joints to a minimum.

- F. Obtain approval before framing openings in structural members that are not indicated on drawings.
- 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 Schaefer Architecture before proceeding.

3.04 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations. Use low-VOC compound.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Coat steel forms with a nonstaining, rust preventative material. Rust-stained steel formwork is not acceptable.
- D. 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.

3.05 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.

3.06 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.
 - 2. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.07 FORMWORK TOLERANCES

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

3.08 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.
- B. 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.
- C. Do not reuse wood formwork more than two times for concrete surfaces to be exposed to view. Do not patch formwork.
- D. Split, frayed, delaminated or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.

3.09 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
- B. Formwork not supporting weight of concrete, such as sides of beams, walls, columns and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations and providing curing and protection operations are maintained.
- C. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- D. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged forms.

END OF SECTION

SECTION 03 20 00 - 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 RELATED REQUIREMENTS

- A. Section 03 10 00 - Concrete Forming and Accessories.
- B. Section 03 30 00 - Cast-in-Place Concrete.

1.03 REFERENCE STANDARDS

- A. ACI 301 - Specifications for Structural Concrete; 2016.
- B. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2016).
- C. ACI SP-66 - ACI Detailing Manual; 2004.
- D. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2020.
- E. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement; 2014.
- F. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2018a.
- G. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; 2011.
- H. CRSI (DA4) - Manual of Standard Practice; 2009.
- I. CRSI (P1) - Placing Reinforcing Bars; 2011.

1.04 SUBMITTALS

- A. See Section 01 30 00 - 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. Include special reinforcing required for openings through concrete structures.
 - 1. Prepare shop drawings under the supervision of a Professional Structural Engineer experienced in design of work of this type and licensed in Kansas.
- C. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.

1.05 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.
 - 2. Unfinished.
- B. Reinforcing Steel: ASTM A706/A706M, deformed low-alloy steel bars.
 - 1. Unfinished.
 - 2. Provide where specifically defined on the drawings.
- C. Steel Welded Wire Reinforcement (WWR): Plain type; ASTM A1064/A1064M.

1. Form: Flat Sheets.
2. WWR Style: As indicated on drawings.
- D. 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 reinforcing bars, dowels and welded wire reinforcement during concrete placement.
 3. For slabs-on-grade and footings, use supports with sand plates or horizontal runners where base material will not support chair legs.
 4. Slabs-on-grade Joint Dowel Bars: ASTM A615/A615M Grade 60 (420) smooth steel bars, cut true to length with ends square and free of burrs.

2.02 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.
- B. Welding of reinforcement is not permitted, except where specifically defined on the drawings. Weld reinforcing bars according to AWS D1.4/D1.4M where specifically required.
- C. Locate reinforcing splices not indicated on drawings at point of minimum stress.
 1. Review locations of splices with Schaefer Architecture.
 2. Clearly define all splice locations on the shop drawing submittal.

PART 3 EXECUTION

3.01 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position. Do not tack weld crossing reinforcing bars.
- B. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports and as specified.
- C. Do not displace or damage vapor barrier.
- D. Clean reinforcement of loose rust and mill scale, earth, ice and other materials that reduce or destroy bond with concrete.
- E. Accommodate placement of formed openings.
- F. Conform to applicable code for concrete cover over reinforcement.
- G. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

3.02 FIELD QUALITY CONTROL

- A. An independent testing agency, as specified in Section 01 40 00, will inspect installed reinforcement for conformance to contract documents before concrete placement.

END OF SECTION

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Floors and slabs on grade.
- B. Concrete footings.
- C. Concrete foundations and anchor bolts for pre-engineered building.
- D. Concrete curing.

1.02 RELATED REQUIREMENTS

- A. Section 03 10 00 - Concrete Forming and Accessories: Forms and accessories for formwork.
- B. Section 03 20 00 - Concrete Reinforcing.
- C. Section 07 92 00 - Joint Sealants: Products and installation for sealants for saw cut joints and isolation joints in slabs.

1.03 REFERENCE STANDARDS

- A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; 2010.
- B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).
- C. ACI 301 - Specifications for Structural Concrete; 2016.
- D. ACI 302.1R - Guide to Concrete Floor and Slab Construction; 2015.
- E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000 (Reapproved 2009).
- F. ACI 305R - Guide to Hot Weather Concreting; 2010.
- G. ACI 306R - Guide to Cold Weather Concreting; 2016.
- H. ACI 308R - Guide to Curing Concrete; 2001 (Reapproved 2008).
- I. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2016).
- J. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2018.
- K. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2021.
- L. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2021a.
- M. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2013.
- N. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.
- O. ASTM C150/C150M - Standard Specification for Portland Cement; 2021.
- P. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete; 2007.
- Q. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2016.
- R. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a (Reapproved 2016).
- S. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2019.
- T. ASTM C595/C595M - Standard Specification for Blended Hydraulic Cements; 2017.

- U. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2019.
- V. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete; 2014.
- W. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2014.
- X. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2018.
- Y. ASTM D2103 - Standard Specification for Polyethylene Film and Sheeting; 2015.
- Z. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- AA. ASTM E1155/E1155M - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers; 2023.
- BB. ASTM E1155M - Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers (Metric); 1996 (Reapproved 2008).
- CC. ASTM E1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2018a.
- DD. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2017.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
 - 1. For curing compounds, provide data on method of removal in the event of incompatibility with floor covering adhesives.
- C. Mix Design: Submit proposed concrete mix design(s).
 - 1. Submit reports for each concrete material and each mix design test. Reference Structural Notes for mix design requirements.
- D. Samples: Submit samples of underslab vapor barrier to be used.
- E. Test Reports: Submit report for each test or series of tests specified.
- F. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.
- G. Construction and contraction joint layout drawings: Submit proposed layout of construction and contraction joints in foundations, concrete structural elements and systems, and slabs on grade showing compliance with the structure requirements and the specified criteria.

1.05 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301 and ACI 318.
- B. Follow recommendations of ACI 305R when concreting during hot weather.
- C. Follow recommendations of ACI 306R when concreting during cold weather.

PART 2 PRODUCTS**2.01 FORMWORK**

- A. Comply with requirements of Section 03 10 00.

2.02 REINFORCEMENT

- A. Comply with requirements of Section 03 20 00.

2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I and I/II Normal, Portland type or ASTM C595/C595M Portland-Limestone blended hydraulic cement, type IL.
1. Acquire cement for entire project from same source.
- B. Fine and Coarse Aggregates: ASTM C 33.
1. Acquire aggregates for entire project from same source.
 2. For exposed exterior surfaces, do not use fine or coarse aggregates that contain substances that cause spalling.
 3. Local aggregates not complying with ASTM C33/C33M that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to Schaefer Architecture.
 4. Fine Aggregates: Clean, sharp, natural sand free from loam, clay, lumps or other deleterious substances.
 5. Coarse Aggregates: Clean, uncoated, processed from natural rock or stone containing no clay, loam or foreign matter. Unless otherwise noted or mass concrete, use aggregate meeting #57 or #67 grading requirements.
- C. Fly Ash: ASTM C618, Class C.
1. Do not use fly ash in exposed, finished concrete.
- D. Water: Clean, potable and not detrimental to concrete.

2.04 ADMIXTURES

- A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.
1. Do not use calcium chloride or admixtures containing calcium chloride.
- B. Air Entrainment Admixture: ASTM C260/C260M.
- C. High Range Water Reducing and Retarding Admixture: ASTM C494/C494M Type G.
- D. High Range Water Reducing Admixture: ASTM C494/C494M Type F.
- E. Water Reducing and Accelerating Admixture: ASTM C494/C494M Type E.
- F. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.
- G. Accelerating Admixture: ASTM C494/C494M Type C.
- H. Retarding Admixture: ASTM C494/C494M Type B.
- I. Water Reducing Admixture: ASTM C494/C494M Type A.

2.05 ACCESSORY MATERIALS

- A. Underslab Vapor Retarder: Multi-layer, fabric-, cord-, grid-, or aluminum-reinforced polyethylene or equivalent, complying with ASTM E1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. The use of single ply polyethylene is prohibited.
1. **Permeance of less than 0.010 Perms (grains/(ft²*hr*inHg)** per ASTM E1745, Section 7.1.
 2. Thickness: 15 mils minimum.

3. Strength: ASTM E1745 Class A.
4. Accessory Products: Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations in vapor retarder for a complete system.
5. Manufacturers:
 - a. Stego Industries, LLC; Stego Wrap Vapor Barrier - 15 mil: www.stegoindustries.com.
 - b. W. R. Meadows, Inc; PERMINATOR Class A - 15 mils (0.38 mm): www.wrmeadows.com/#sle.
 - c. Reef Industries, Vaporguard 15 mil, www.reefindustries.com.
 - d. Fortifiber, Moistop Ultra 15 (15 mil); www.fortifiber.com.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
 1. Minimum Compressive Strength at 48 Hours: 2,000 pounds per square inch (13.7 MPa).
 2. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch (48 MPa).

2.06 BONDING AND JOINTING PRODUCTS

- A. See Section 03 01 00 - Maintenance of Concrete and 03 10 00 - Concrete Forming and Accessories.
- B. Reglets: Formed steel sheet, galvanized, with temporary filler to prevent concrete intrusion during placement.
 1. Size: As indicated on drawings.
 2. Size: 1/2 inch (12 mm) throat, 1/2 inch (12 mm) deep.
- C. Slab Isolation Joint Filler: 1/2 inch (13 mm) thick, height equal to slab thickness, with removable top section that will form 1/2 inch (13 mm) deep sealant pocket after removal.
 1. Material: ASTM D1751, cellulose fiber.

2.07 CURING MATERIALS

- A. Evaporation Reducer: Liquid thin-film-forming compound that reduces rapid moisture loss caused by high temperature, low humidity, and high winds; intended for application immediately after concrete placement.
 1. Manufacturers:
 - a. Dayton Superior Corporation; AquaFilm Concentrate J74: www.daytonsuperior.com/#sle.
 - b. Euclid Chemical Company ; EUCOBAR: www.euclidchemical.com/#sle.
 - c. SpecChem, LLC; SpecFilm Concentrate or SpecFilm RTU: www.specchemllc.com/#sle.
 - d. W. R. Meadows, Inc; Evapre or Evapre-RTU: www.wrmeadows.com/#sle.
 - e. Metalcrete Industries; Waterhold: www.metalcreteindustries.com.
 - f. L & M Construction Chemicals, Inc.; E-Con: www.lmcc.com.
 - g. Substitutions: See Section 01 60 00 - Product Requirements.

- B. High Performance Concrete Flooring Treatment: Water-based lithium-fortified material that cures quickly to form a clear, extremely hard, micro-coating that protects the substrate.
1. Products:
 - a. Dayton Superior Corporation; Pentra-Hard Densifier and Durable Floor System: www.daytonsuperior.com
 - b. Substitutions: See Section 01 60 00 - Product Requirements
 - c. Applications: Use at shop floor as scheduled.
- C. Curing and Sealing Compound: Liquid, membrane-forming, clear, non-yellowing acrylic; complying with ASTM C309 Type I Class B.
1. Application: Use at interior and exterior concrete and at applications approved by manufacturer.
 2. Vehicle: Water-based.
 3. Solids by Mass: 18 percent, minimum.
 4. VOC Content: OTC compliant.
 5. Manufacturers:
 - a. Dayton Superior Corporation; Cure & Seal 309 EF: www.daytonsuperior.com/#sle.
 - b. L&M Construction Chemicals, Inc, a subsidiary of Laticrete International, Inc; Dress & Seal WB: www.lmcc.com/#sle.
 - c. SpecChem, LLC; Cure and Seal WB: www.specchemllc.com/#sle.
 - d. Metalcrete Industries; Metcure 0800: www.metalcreteindustries.com.
 - e. Euclid Chemical Company; Aqua-Cure VOX: www.euclidchemical.com.
 - f. W.R. Meadows, Inc.; VOCOMP-20: www.wrmeadows.com.
 - g. BASF Construction Chemicals; MasterKure CC 180 WB: www.buildingsystems.basf.com.
- D. Curing and Sealing Compound, Low Gloss: Liquid, membrane-forming, clear, non-yellowing acrylic; complying with ASTM C1315 Type 1 Class A.
1. Application: Use at interior and exterior concrete and at applications approved by manufacturer.
 2. Vehicle: Solvent-based.
 3. Solids by Mass: 25 percent, minimum.
 4. VOC Content: OTC compliant.
 5. Manufacturers:
 - a. Dayton Superior Corporation; Cure & Seal 1315 J22WB: www.daytonsuperior.com/#sle.
 - b. Dayton Superior Corporation; Cure & Seal 1315 EF: www.daytonsuperior.com/#sle.
 - c. BASF Construction Chemicals; Kure 1315: www.buildingsystems.basf.com.
 - d. L & M Construction Chemicals; Dress & Seal WB 25: www.lmcc.com.
 - e. Metalcrete Industries; Metcure 30: www.metalcreteindustries.com.
 - f. SpecChem, LLC; Cure and Seal WB 25: www.specchemllc.com.
 - g. W. R. Meadows, Inc; VOCOMP-25: www.wrmeadows.com/#sle.
 - h. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Moisture-Retaining Sheet: ASTM C171.
1. Curing paper, regular.

2. Polyethylene film, clear, minimum nominal thickness of 0.0040 inch (0.10 mm).
 3. White-burlap-polyethylene sheet, weighing not less than 10 ounces per linear yard, 40 inches wide (305 g/sq m).
- F. Polyethylene Film: ASTM D2103, 4 mil (0.1 mm) thick, clear.
- G. Water: Potable, not detrimental to concrete.

2.08 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.
- C. Normal Weight Concrete:
1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days:
As indicated on drawings.
 2. Fly Ash Content: Maximum 20 percent of cementitious materials by weight. In no case shall the amount of the fly ash per cubic yard of concrete exceed 100 pounds (45 kg).
 3. Water-Cement Ratio: Locations for each mix are scheduled on Structural Drawings.
 - a. Maximum 45 percent by weight for 4000 and 4500 psi (27.6 MPa) concrete.
 - b. Maximum 50 percent by weight for 3500 psi (24.2 MPa) concrete.
 - c. Maximum 55 percent by weight for non-air-entrained 3000 psi (20.7 MPa) concrete.
 - d. Maximum 50 percent by weight for air-entrained 3000 psi (20.7 MPa) concrete.
 4. Total Air Content: 4 - 7 percent, determined in accordance with ASTM C173/C173M.
 - a. For exterior exposed concrete.
 5. Maximum Slump:
 - a. Ramps and sloping slab surfaces: not more than 3 inch (76 mm).
 - b. Reinforced foundation systems: not less than 3 inch (76 mm) and not more than 5 inch (127 mm).
 - c. Concrete containing high-range water-reducing admixture (superplasticizers): not more than 8 inch (203 mm) after adding admixture to site-verified 2 -3 inch (51 - 76 mm) slump concrete.
 - d. Other concrete: not less than 3 inch (76 mm) and not more than 5 inch (127 mm).
 6. Aggregates: Proportion aggregates to provide a minimum of 50% coarse aggregate ratio to total aggregate.
 7. Maximum Aggregate Size: 3/4 inch (19 mm), unless noted or approved otherwise.
 8. Admixtures:
 - a. Use water-reducing admixture or high-range water-reducing admixture (superplasticizers) in concrete, as required, for placement and workability.
 - b. Use accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg F (10 deg C).
 - c. Use mid-range or high-range water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs, architectural concrete, parking structure slabs, concrete required to be watertight, and concrete with water-cement ratios below 0.50.

- d. Use air-entraining admixture in exterior exposed concrete unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content of 5 1/2 percent with a tolerance of plus or minus 1 1/2 percent.
- e. Other concrete not exposed to freezing, thawing, or hydraulic pressure, or to receive a surface hardener: 2 to 4 percent air.
- f. Use admixtures for water reduction and set accelerating or retarding in strict compliance with manufacturer's directions.

2.09 MIXING

- A. Transit Mixers: Comply with ASTM C 94/C 94M.
 - 1. The addition of water to a batch at the job site will only be allowed when the Owner, Schaefer Architecture, Structural Engineer and the General Contractor agree to the following defined criteria at the preconstruction meeting. This criteria must be strictly met when water is added to a batch at the job site.
 - a. Water shall only be allowed to be added to a batch at the site if the measured concrete slump is less than 3 inch (76.2 mm).
 - b. When allowed, water should only be added once to the batch on-site and the addition of the water must be completed within 15 minutes from the start of the water addition.
 - c. The on-site added water must be properly mixed to ensure that a homogenous mixture is attained.
 - d. The maximum amount of water which may be added to the batch on-site is 1 gallon (3.78 liter) of water per 1 cu. yd. (0.76 cu. m) of concrete.
 - e. After the on-site added water has been added to the batch and the batch has been properly mixed, the concrete shall have a measured slump within the defined slump range of 3 inches (76.2 mm) to 5 inches (127 mm)
 - f. Concrete shall be rejected if the slump, after the addition of on-site water, does not occur with the slump range of 3 inches (76.2 mm) to 5 inches (127 mm) or is deemed unacceptable for placement.
 - g. The field testing and inspection agency or an approved Representative of the Owner shall monitor the implementation of the slump measurements and the water addition procedures.
 - 2. When air temperature is between 85 deg F (29 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1 1/2 hours to 75 minutes, and when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

- A. Verify that forms are clean and free of rust before applying release agent.
- B. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

- C. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in accordance to bonding agent manufacturer's instructions.
 - 1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.
- D. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels in holes filled with an approved epoxy or adhesive.
- E. Install Vapor Barrier in accordance with Manufacturer's printed instructions and ASTM E1643 directly on top of sand or granular course.
 - 1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
 - 2. **Extend vapor barrier to the perimeter of the slab.** If practicable, terminate it at the top of the slab, otherwise (a) at a point acceptable to the structural engineer or (b) where obstructed by impediments, such as dowels, water stops, or any other site condition requiring early termination of the vapor barrier. At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself.
 - 3. **Continue vapor barrier past end of slab pour where it will abut an additional slab pour. Allow for the minimum lap for a complete continuation of the vapor barrier under the building's slab.**
 - 4. Lap joints 6 inch (152 mm) minimum and seal with Manufacturer's seam tape. Apply seam tape to clean and dry vapor barrier.
 - 5. No penetration of the vapor barrier permitted except at reinforcing and permanent utilities. Install pipe boots at permitted locations.
 - 6. Avoid the use of stakes driven through vapor barrier by utilizing screed and forming systems that will not leave punctures in the vapor barrier.
 - 7. Inspect membrane after reinforcing has been placed and immediately prior to placing concrete.
 - 8. Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile.

3.03 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. Place concrete for floor slabs in accordance with ACI 302.1R.
- C. Notify Schaefer Architecture not less than 24 hours prior to commencement of placement operations.
- D. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- E. Ensure reinforcement, inserts, waterstops, and embedded parts will not be disturbed during concrete placement.
 - 1. Set and build into formwork anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.
- F. 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.

- G. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.
- H. Repair underslab vapor barrier damaged during placement of concrete reinforcing. Repair with vapor barrier material; lap over damaged areas minimum 6 inches (150 mm) and seal watertight.
- I. Cold-Weather Placement: Comply with ACI 306R and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- J. Hot-Weather Placement: Comply with ACI 305R and as follows:
 - 1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.04 SLAB JOINTING

- A. Anchor joint fillers and devices to prevent movement during concrete placement.
- B. Construction Joints
 - 1. Locate and install construction joints so they do not impair strength or appearance of the structure, as acceptable to Schaefer Architecture.
 - 2. Do not locate construction joints across rooms where any type of flooring will be applied except in inconspicuous places such as end of corridors, edge of walls, at doorways, etc.
 - 3. Provide keyways at least 1 1/2 inch (38 mm) deep in construction joints between slabs and where detailed. Bulkheads designed and accepted for this purpose may be used for slabs.
 - 4. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as indicated otherwise.
 - 5. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.
- C. Isolation Joints in Slabs-on-Grade
 - 1. Construct isolation joints in slabs-on-grade at points of contact between slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
- D. Contraction (Control) Joints in Slabs-on-Grade
 - 1. General: Construct contraction joints in slabs-on-grade to form panels of patterns as noted or shown. Use tool cuts 1/8 inch (3 mm) wide by one-fourth of slab depth

- or inserts 1/4 inch (6 mm) wide by one-fourth of slab depth or saw cutting to a depth not less than 10 percent of slab thickness with a 1 inch (25 mm) minimum depth.
2. Tooled Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate grooved tool marks on concrete surfaces. Tool edges in exposed slabs.
 3. Saw cutting of floor slabs, curbs and vehicle paving:
 - a. Slabs may be sawed if cut immediately and within 2 hours following final troweling using a "Soff-cut" saw or early entry dry-cutting saw system. Install cuts as soon as concrete will support weight of saw and operator without disturbing final finish.
 4. Inserts: Form contraction joints by inserting premolded plastic, hardboard, or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.
 5. If joint pattern is not shown, provide joints not exceeding 15 feet (4.5 m) in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third bays).
- E. Placing Concrete in Forms
1. Deposit concrete in forms in horizontal layers no deeper than 24 inch (600 mm) and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
 2. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309.
 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate placed layer and at least 6 inch (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix to segregate.
- F. Placing Concrete Slabs
1. Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until completing placement of a panel or section.
 2. Consolidate concrete during placement operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.
 3. Maintain reinforcing in proper position on chairs during concrete placement.
 4. Bring slab surfaces to correct level with a straightedge and strike off. Use bull floats or darbies to smooth surface free of lumps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.

3.05 FLOOR FLATNESS AND LEVELNESS TOLERANCES

- A. Minimum F(F) Floor Flatness and F(L) Floor Levelness Values:
1. All Floors: F(F) of 25; F(L) of 20.

- B. Measure F(F) Floor Flatness and F(L) Floor Levelness in accordance with ASTM E1155/E1155M (ASTM E1155M), within 48 hours after slab installation; report both composite overall values and local values for each measured section.
- C. Correct the slab surface if composite overall value is less than specified and if local value is less than two-thirds of specified value or less than F(F) 13/F(L) 10.
- D. 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.

3.06 CONCRETE FINISHING

- A. Repair surface defects, including tie holes, immediately after removing formwork.
- B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch (6 mm) or more in height.
- C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch (6 mm) or more in height. For surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or another similar system. 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.
 - 2. Grout Cleaned Finish: Wet areas to be cleaned and apply grout mixture by brush or spray; scrub immediately to remove excess grout. After drying, rub vigorously with clean burlap, and keep moist for 36 hours.
 - a. Combine one part portland cement to one and one-half parts fine sand by volume, and a 50:50 mixture of acrylic or styrene butadiene-based bonding admixture and water to form the consistency of thick paint. Blend standard portland cement and white portland cement in amounts determined by trial patches so that final color of dry grout will match adjacent surfaces.
 - 3. Cork Floated Finish: Immediately after form removal, apply grout with trowel or firm rubber float; compress grout with low-speed grinder, and apply final texture with cork float.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.
- E. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
 - 1. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI 302.1R; thin floor coverings include carpeting, resilient flooring, seamless flooring, resinous matrix terrazzo, thin set quarry tile, and thin set ceramic tile.
 - 2. Other Surfaces to Be Left Exposed: Trowel as described in ACI 302.1R, minimizing burnish marks and other appearance defects.
 - a. Sealer: After slab has cured and at the time of substantial completion, thoroughly clean and buff exposed concrete floor surfaces and recoat with Curing and Sealing Compound per manufacturer's instructions.
 - 3. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply a trowel finish as specified, then immediately follow by slightly scarifying the surface with a fine broom.

4. Non-Slip Broom Finish: Apply a nonslip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
 - a. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Schaefer Architecture before application.

3.07 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

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. Evaporation Retarder: In hot, dry, and windy weather apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq ft x h (1 kg/sq m x h) before and during finishing operations. Apply according to manufacturer's instructions after screeding and bull floating, but before power floating and troweling.
- D. Formed Surfaces: Cure by moist curing with forms in place for full curing period.
 1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
- E. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- F. Cure concrete according to ACI 308R, by one or a combination of the following methods:
 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12 inch (300 mm) lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inch (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.

- c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
- 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
- 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.09 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.
- B. Provide free access to concrete operations at project site and cooperate with appointed firm.
 - 1. Contractor may perform field tests and cast compression test specimens if specimens are prepared and handled by person(s) trained and CERTIFIED for sampling concrete.
- C. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.
- D. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure four concrete test cylinders. Obtain test samples for every 50 cubic yards (38 cu m) or less of each class of concrete placed.
 - 1. One specimen tested at 7 days, two specimens tested at 28 days and one specimen retained in reserve for later testing if required.
- E. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
- F. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.
- G. Air Content Test: ASTM C173/C173M, volumetric method for lightweight or normal weight concrete; ASTM C231, pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
- H. Concrete Temperature: ASTM C1064/C1064M; one test hourly when air temperature is 40 deg F (4 deg C) and below, when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.
- I. Test Results: The testing agency shall report test results in writing to Schaefer Architecture and General Contractor within 24 hours of test.
 - 1. Reports of compressive strength tests shall contain the following:
 - a. Project identification name and number
 - b. Date of concrete placement

- c. Name of concrete testing service
- d. Concrete type and class
- e. Location of concrete batch in structure
- f. Design compressive strength at 28 days
- g. Concrete mix proportions and materials
- h. Compressive breaking strength
- i. Type of break for both 7-day tests and 28-day tests
- j. Site measured slump, temperature and air-content

3.10 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
 - 1. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi (3.4 MPa).
- B. Repair or replacement of defective concrete will be determined by Schaefer Architecture. The cost of additional testing shall be borne by General Contractor when defective concrete is identified.
 - 1. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
 - 2. Additional Tests: The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Schaefer Architecture. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M, or by other methods as directed.
- C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Schaefer Architecture for each individual area.

3.11 PROTECTION

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

END OF SECTION

SECTION 05 50 00 - METAL FABRICATIONS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Shop fabricated steel items.
- B. Includes metal items required under other divisions such as anchors, bolts, sleeves, lintels, brackets except where specification states that item(s) are to be furnished to the General Contractor for installation.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.
- B. Section 09 91 13 - Exterior Painting: Paint finish.
- C. Section 13 34 19 - Metal Building Systems: Gutter and Downspouts.

1.03 REFERENCE STANDARDS

- A. SSPC-SP 3 - Power Tool Cleaning; 2018.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2020.
- D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- E. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- F. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2021.
- G. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- H. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- I. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2019, with Editorial Revision (2020).
- J. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
- K. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

1.05 QUALITY ASSURANCE

- A. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.2/D1.2M and dated no more than 12 months before start of scheduled welding work.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Angles, Plates, Channels and Shapes: ASTM A36/A36M.
- B. Steel Sections: ASTM A 36/A 36M, u.n.o.
- C. Steel Tubing: ASTM A500/A500M Grade C cold-formed structural tubing.
- D. Pipe: ASTM A 53/A 53M Grade B Schedule 40, black finish.
- E. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, galvanized to ASTM A153/A153M where connecting galvanized components.
- F. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- H. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 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. Cut, drill, and punch metals cleanly and accurately. Remove burrs, sharp edges or rough areas on exposed surfaces.
- D. Continuously seal joined members by continuous welds.
- E. 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.
- F. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- I. 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 FABRICATED ITEMS

- A. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.
 - 1. Cap: Provide pre-formed cap.
 - a. Topgard; Pipe Bollard Cap: www.topgardcap.com .
- B. Door Frames for Overhead Door Openings: Flat plate or channel or angle sections; galvanized finish.
- C. Door Sill Frames for Overhead Door Openings: Angle sections; galvanized finish.
- D. Foot Scrapers: As detailed; steel, galvanized finish.
- E. Anchor Devices: Inserts and anchoring devices for all metal work this section. Anchors, tie bolts, inserts, hangers etc. to anchor and support other construction to concrete, masonry or steel.

2.04 FINISHES - STEEL

- A. Prime paint steel items.
 - 1. Exceptions: Galvanize items to be embedded in concrete, items to be embedded in masonry, and items specified for galvanize finish.
 - 2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.
- B. Prepare surfaces to be primed in accordance with SSPC-SP 3.
- C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- D. Prime Painting: One coat.
- E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements.
- F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.05 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.
- B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components as indicated on drawings.
- D. Perform field welding in accordance with AWS D1.1/D1.1M.
- E. Obtain approval prior to site cutting or making adjustments not scheduled.
- F. After erection, prime welds, abrasions and surfaces not shop primed or galvanized , 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

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SECTION 07 21 00 - THERMAL INSULATION**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Board insulation at perimeter foundation wall.
- B. Alternate Bid: Batt insulation for filling crevices in exterior wall and roof, other areas where indicated on the plans, and perimeter door shim spaces.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Field-applied termiticide for concrete slabs and foundations.
- B. Section 13 34 19 - Metal Building Systems: Wall and Roof insulation.

1.03 REFERENCE STANDARDS

- A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2015a.
- B. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014.
- C. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- D. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2016.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2021a.
- F. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- G. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2016.
- H. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2012.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics and performance criteria.
- C. Manufacturer's Installation Instructions: Include information on installation techniques.

1.05 FIELD CONDITIONS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

1.06 DELIVERY, STORAGE AND PROTECTION

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 PRODUCTS**2.01 APPLICATIONS**

- A. Insulation at perimeter of trenched foundation walls: 2 inch (50 mm) extruded polystyrene board or 2 inch (50 mm) expanded polystyrene board.

2.02 FOAM BOARD INSULATION MATERIALS

Reference Applications above this section for location and thickness of each type of insulation board.

- A. Expanded Polystyrene (EPS) Board Insulation: ASTM C578, Type IX; with the following characteristics:
1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 2. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 3. Board Edges: Square.
 4. Water Absorption: 2 percent by volume, maximum.
 5. Compressive Resistance: 25 psi (173 kPa).
 6. Manufacturers:
 - a. AFM Corp: www.r-control.com.
 - b. Diversifoam Products: www.diversifoam.com.
 - c. Insulfoam LLC: www.insulfoam.com/#sle.
 - d. ACH Foam Technologies: www.achfoam.com.
 7. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Extruded Polystyrene Board Insulation: Extruded polystyrene board; ASTM C578; with either natural skin or cut cell surfaces, and the following characteristics:
1. Type: ASTM C578, Type IV.
 2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 4. R-value (RSI-value); 1 inch (25 mm) of material at 72 degrees F (22 C): 5 (0.88), minimum.
 5. Board Edges: Square.
 6. Water Absorption, Maximum: 0.3 percent, by volume.
 7. Manufacturers:
 - a. Dow Chemical Company; STYROFOAM CAVITYMATE Ultra: www.dow.com/#sle.
 - b. Kingspan Insulation LLC; GreenGuard XPS TYPE IV 25 PSI: www.trustgreenguard.com/#sle.
 - c. Owens Corning Corporation; FOAMULAR Extruded Polystyrene (XPS) Insulation: www.ocbuildingspec.com/#sle.
 8. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Polyisocyanurate (ISO) Board Insulation with Facers Both Sides: Rigid cellular foam, complying with ASTM C1289.
1. Classifications:
 - a. Type I: Faced with aluminum foil on both major surfaces of core foam.
 - 1) Class 1 - Non-reinforced core foam.

- 2) Compressive Strength: 16 psi (110 kPa), minimum.
- 3) Thermal Resistance: R-value (RSI-value) of 6.5 (1.14) per 1 inch (25 mm) determined in accordance with ASTM C518 using stabilized R-Values @ 75 degrees F (23.8 degreeec C) mean temperature.
2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
4. Board Edges: Square.
5. Manufacturers:
 - a. Hunter Panels; Xci Foil: www.hunterpanels.com/#sle.
 - b. Johns Manville; AP Foil-Faced: www.jm.com/#sle.
 - c. Rmax Inc; ECOMAXci: www.rmax.com/#sle.
6. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 BATT INSULATION MATERIALS

Reference Applications above this section for location and thickness of each type of batt insulation.

- A. Reference Specification Section 13 34 19 - Metal Building Systems for insulation in the walls and roof.

2.04 ACCESSORIES

- A. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inch (50 mm) wide, as recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
- B. Tape joints of rigid insulation in accordance with roofing and insulation manufacturers' instructions.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Verify substrate surfaces are flat, free of honeycomb, fins, or irregularities.

3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER

- A. Apply manufacturer's recommended adhesive to back of boards:
 1. Three continuous beads per board length.
 2. Full bed 1/8 inch (3 mm) thick.
- B. Install boards horizontally on foundation perimeter.
 1. Butt edges and ends tightly to adjacent boards and to protrusions.
- C. Extend boards over expansion joints, unbonded to foundation on one side of joint.
- D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.03 BATT INSTALLATION

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
- B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.

- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

3.04 PROTECTION

- A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Fabricated sheet metal items, including flashings and counterflashings.
- B. Sealants for joints within sheet metal fabrications.

1.02 RELATED REQUIREMENTS

- A. Section 13 34 19 - Metal Building Systems: Gutters and downspouts.

1.03 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- D. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2012).
- E. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, roof details, roof edge trim, glazing trim and installation details.
 - 1. Include sheet gauge, texture and color selections.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) requirements and standard details, except as otherwise indicated.
- B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with three years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.

1.07 WARRANTY

- A. Sheet Metal Flashing and Trim Guarantee: Include metal roof flashing work with roofing guarantee.

PART 2 PRODUCTS**2.01 SHEET MATERIALS**

- A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage, (0.0239 inch) (0.61 mm) thick base metal.
- B. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage, (0.0239) inch (0.61 mm) thick base metal, shop pre-coated with PVDF coating.

1. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
2. Color: As selected by Schaefer Architecture from manufacturer's standard colors.
3. Gauges required, flat sheet, smooth for fabrication.
4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat.

2.02 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated.
- D. Hem exposed edges on underside 1/2 inch (13 mm); miter and seam corners.
- E. Fabricate corners from one piece with minimum 18 inch (450 mm) long legs; seam for rigidity, seal with sealant.
- F. Fabricate vertical faces with bottom edge formed outward 1/4 inch (6 mm) and hemmed to form drip.
- G. Holes, dents, creases or wrinkles shall be cause for rejection.

2.03 GUTTER AND DOWNSPOUT FABRICATION

- A. Reference Section 13 34 19 - Metal Building Systems for gutters and downspouts.

2.04 ACCESSORIES

- A. Fasteners: Galvanized steel, with soft neoprene washers.
- B. Primer: Zinc chromate type.
- C. Concealed Sealants: Non-curing butyl sealant.
- D. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.
- E. Plastic Cement: ASTM D4586/D4586M, Type I.

PART 3 EXECUTION

3.01 GENERAL

- A. Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

3.02 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.03 INSTALLATION

- A. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..
- B. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

- C. Seams: Joints butted with 6 inch (152 mm) long concealed splice plate. Apply bond breaker tape on splice plate minimum 1/2 inch (12.7 mm) wide. Space facing metal at least 3/8 inch (9.5 mm) apart over the tape. Apply sealant over joint.
- D. Seal metal joints watertight.
- E. Secure gutters and downspouts in place with fasteners.
- F. Slope gutters 1/4 inch per 10 feet (2.1 mm per m), minimum.
- G. Counter Flashing: Lap cap (counter) flashing joints 4 inch (102 mm), seal.
 - 1. Install cap (counter) flashing to spring tight against roofing, secure cap (counter) flashing in reglet. Stagger joints at least 12 inch (305 mm) from reglet joints.
- H. Reglets: Install formed metal in reglets where flashing is shown. Lap and seal joints.

END OF SECTION

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SECTION 07 92 00 - 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.
- D. Owner-provided field quality control.

1.02 RELATED REQUIREMENTS

- A. Section 08 71 00 - Door Hardware: Setting exterior door thresholds in sealant.
- B. Section 13 34 19 - Metal Building Systems: Sealants required in conjunction with air barriers and vapor retarders.

1.03 REFERENCE STANDARDS

- A. ASTM C834 - Standard Specification for Latex Sealants; 2014.
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
- D. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2008 (Reapproved 2012).
- E. ASTM C1311 - Standard Specification for Solvent Release Sealants; 2014.
- F. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2002 (Reapproved 2013).
- G. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints; 2013.
- H. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates the product should not be used on.
 - 5. Substrates for which use of primer is required.
 - 6. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
- C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- D. Installation Plan: Submit at least four weeks prior to start of installation.

1.05 QUALITY ASSURANCE

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

- B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of experience.
- C. Installation Plan: Include schedule of sealed joints, including the following.
 - 1. Joint width indicated in contract documents.
 - 2. Joint depth indicated in contract documents; to face of backing material at centerline of joint.
 - 3. Method to be used to protect adjacent surfaces from sealant droppings and smears, with acknowledgement that some surfaces cannot be cleaned to like-new condition and therefore prevention is imperative.
- D. Owner will employ an independent testing agency to perform the field quality control inspection and testing as referenced in PART 3 of this section and as follows, to prepare and submit the field quality control plan and log, and to provide recommendations of remedies in the case of failure.
 - 1. Contractor shall cooperate with testing agency and repair failures discovered and destructive test location damage.
- E. Field Quality Control Plan - Discretionary Testing by Owner:
 - 1. Visual inspection of entire length of sealant joints.
 - 2. Non-destructive field adhesion testing of sealant joints, except interior acrylic latex sealants.
 - a. For each different sealant and substrate combination, allow for one test every 12 inches (305 mm) in the first 10 linear feet (3 linear meters) of joint and one test every 24 inches (610 mm) thereafter.
 - b. If any failures occur in the first 10 linear feet (3 linear meters), continue testing at 12 inch (305 mm) intervals at no extra cost to Owner.
 - 3. Field Quality Control Log Form: Show same data fields as on Preinstallation Field Adhesion Test Log, with known information filled out and lines for multiple tests per sealant/substrate combinations; include visual inspection and specified field testing; allow for possibility that more tests than minimum specified may be necessary.
- F. Field Adhesion Test Procedures:
 - 1. Allow sealants to fully cure as recommended by manufacturer before testing.
 - 2. Have a copy of the test method document available during tests.
 - 3. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.
 - 4. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Schaefer Architecture.
- G. Non-Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Nondestructive Spot Method.
 - 1. Record results on Field Quality Control Log.
 - 2. Repair failed portions of joints.

1.06 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
 - 2. When joint substrates are wet.

3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.07 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a two year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
 1. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 2. Bostik Inc: www.bostik-us.com.
 3. Dow Corning Corporation: www.dowcorning.com/construction/sle.
 4. Hilti, Inc: www.us.hilti.com/#sle.
 5. Momentive Performance Materials, Inc (formerly GE Silicones): www.momentive.com/sle.
 6. Pecora Corporation: www.pecora.com.
 7. Tremco Global Sealants: www.tremcosealants.com.
 8. Sika Corporation: www.usa-sika.com.
 9. W.R. Meadows, Inc: www.wrmeadows.com/sle.
 10. Substitutions: See Section 01 60 00 - 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. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 2. Bostik Inc: www.bostik-us.com.
 3. Dayton Superior Corporation: www.daytonsuperior.com.
 4. Dow Corning Corporation: www.dowcorning.com/construction/sle.
 5. Pecora Corporation: www.pecora.com.
 6. Tremco Global Sealants: www.tremcosealants.com.
 7. Sika Corporation: www.usa-sika.com.
 8. W.R. Meadows, Inc: www.wrmeadows.com/sle.
 9. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 JOINT SEALANT APPLICATIONS

- A. Scope:
 1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
 - a. Joints between door and other frames and adjacent construction.
 - b. Joints between different exposed materials.
 - c. Other joints indicated below.

2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
 - a. Joints between door and other frames and adjacent construction.
 - b. Joints between dissimilar materials; such as between tile and hollow metal or aluminum frames.
 - c. Other joints indicated below.
 3. Do not seal the following types of joints.
 - a. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
 - b. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - c. Joints where installation of sealant is specified in another section.
- B. Type of Joint
1. Designations: The number Type refer to the product to be used, listed in Sealants below.
 2. Exterior Joints:
 - a. Perimeters of exterior opening frames at adjoining materials:
Type: 2, 4, 5.
 - b. Expansion and control joints in exterior surfaces of poured-in-place concrete:
Type: 2, 4, 5.
 - c. Coping joints and coping-to-facade joints.
Type: 2, 4, 5.
 - d. Metal flashing trim joints.
Type: 2, 4, 5.
 - e. Exterior joints in horizontal wearing surfaces - vehicle, pedestrian paving and paving to building joints.
Type: 8.
 3. Interior Joints:
 - a. Seal interior perimeters of exterior opening frames.
Type: 2, 4, 5, 7.
 - b. Interior control and expansion joints in floor surfaces.
Type: 8, 9.

2.03 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.
- B. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177-2600.
- C. As selected by Architect from manufacturer's standard colors. In general, colors will be selected to match or be slightly darker than the adjacent material(s).

2.04 NONSAG JOINT SEALANTS

- A. Designations: The number Type refer to the work to be caulked in Joint Sealant Applications above.
- B. Type 2 - Non-Staining Silicone Sealant (Low Modulus): 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. Manufacturers:
 - a. Dow Corning Corporation; 790 Silicone Building Sealant: www.dowcorning.com/construction/#sle.
 - b. Pecora Corporation; Pecora 890 NST (Non-Staining Technology): www.pecora.com/#sle.
 - c. Pecora Corporation; 864NST Low Modulus Architectural Silicone Sealant: www.pecora.com.
 - d. Momentive Performance Materials, Inc (GE Silicones products); SCS2700 Silpruf LM: www.momentive.com.
 - e. Tremco Global Sealants; Spectrem 3: www.tremcosealants.com.
 - f. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Type 3 - Silicone Sealant (Glazing): ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
 1. Movement Capability: Plus and minus 25 percent, minimum.
 2. Manufacturers:
 - a. Dow Corning Corporation; 791: www.dowcorning.com/construction/sle.
 - b. Pecora Corporation; 860: www.pecora.com.
 - c. Momentive Performance Materials, Inc (GE Silicones products); SCS2800 Silglaze II: www.momentive.com.
 - d. Tremco Global Sealants; Spectrem 2: www.tremcosealants.com.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Type 4 - Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
 1. Movement Capability: Plus and minus 25 percent, minimum.
 2. Color: To be selected by Schaefer Architecture from manufacturer's standard range.
 3. Manufacturers:
 - a. Pecora Corporation; DynaTrol II General Purpose Two Part Polyurethane Sealant: www.pecora.com.
 - b. Sika Corporation; Sikaflex-2c NS: www.usa-sika.com/#sle.
 - c. W. R. Meadows, Inc; POURTHANE NS: www.wrmeadows.com/#sle.
 - d. Tremco Building Solutions; Dymeric 240FC: www.tremcosealants.com.
 - e. MasterSeal; NP2: www.master-builders-solutions.basf.com.
 - f. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Type 5 - Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single component; not expected to withstand continuous water immersion or traffic.
 1. Movement Capability: Plus and minus 25 percent.
 2. Color: To be selected by Schaefer Architecture from manufacturer's standard range.
 3. Products:
 - a. Pecora Corporation; DynaTrol I-XL General Purpose One Part Polyurethane Sealant: www.pecora.com.
 - b. MasterSeal; NP1: www.master-builders-solutions.basf.com.
 - c. Tremco Building Solutions; Dymonic FC: www.tremcosealants.com.
 - d. Sika Corp.; Sikaflex 1A: www.sikacorp.com.

- e. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Type 7 - Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
 - 1. Color: To be selected by Schaefer Architecture from manufacturer's standard range.
 - 2. Manufacturers:
 - a. Pecora Corporation; AC-20 + Silicone Acrylic Latex Caulking Compound: www.pecora.com.
 - b. Tremco Global Sealants; Tremflex 834: www.tremcosealants.com.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

2.05 SELF-LEVELING SEALANTS

- A. Type 8 - Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; multi-component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
 - 1. Movement Capability: Plus and minus 25 percent, minimum.
 - 2. Manufacturers:
 - a. Pecora Corporation; NR-200 Self-Leveling Traffic-Grade Polyurethane Sealant: www.pecora.com.
 - b. Sherwin-Williams Company; Stampede 2SL Polyurethane Sealant: www.sherwin-williams.com/#sle.
 - c. Sika Corporation; Sikaflex-2c SL: www.usa-sika.com/#sle.
 - d. MasterSeal; SL2: www.master-builders-solutions.basf.com.
 - e. Tremco Global Sealants; THC-900: www.tremcosealants.com.
 - f. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Type 9 - Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion.
 - 1. Movement Capability: Plus and minus 25 percent.
 - 2. Manufacturers:
 - a. Sherwin-Williams Company; Stampede 2SL Polyurethane Sealant: www.sherwin-williams.com.
 - b. Pecora Corporation; Unexpan NR-201: www.pecora.com.
 - c. MasterSeal; SL1: www.master-builders-solutions.basf.com.
 - d. Sika Corp.; Sikaflex 1CSL: www.sikacorp.com.
 - e. Tremco Global Sealants; Vulkem 45 SSL: www.tremcosealants.com.
 - f. Substitutions: See Section 01 60 00 - 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. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type C - Closed Cell Polyethylene.
 - 2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type C - Closed Cell Polyethylene.
 - 3. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.

- 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. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- D. 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. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer.
- D. Install bond breaker backing tape where backer rod cannot be used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- F. 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.
- G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
- H. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

3.04 FIELD QUALITY CONTROL

- A. Owner may employ an independent testing agency to perform field quality control inspection and testing as specified in PART 1 under QUALITY ASSURANCE article.
 - 1. Independent testing may be employed by Owner if Owner has concerns over the quality of installation of exterior joints.
- B. Non-Destructive Adhesion Testing: If there are any failures in first 100 linear feet (30 linear m), notify Schaefer Architecture immediately.
- C. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

3.05 POST-OCCUPANCY

- A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width; i.e. at the low temperature in the thermal cycle. Report failures immediately and repair.

END OF SECTION

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Thermally insulated hollow metal doors with frames.

1.02 RELATED REQUIREMENTS

- A. Section 08 71 00 - Door Hardware.
- B. Section 09 91 13 - Exterior Painting: Field painting.
- C. Section 13 34 19 - Metal Building Systems: Door/Frame Installation.

1.03 ABBREVIATIONS AND ACRONYMS

- A. ANSI: American National Standards Institute.
- B. ASCE: American Society of Civil Engineers.
- C. HMMA: Hollow Metal Manufacturers Association.
- D. NAAMM: National Association of Architectural Metal Manufacturers.
- E. NFPA: National Fire Protection Association.
- F. SCIF: Sensitive Compartmented Information Facility.
- G. SDI: Steel Door Institute.
- H. UL: Underwriters Laboratories.

1.04 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.
- C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2017.
- D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
- F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2020.
- G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2018a.
- H. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- I. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2016.
- J. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- K. ITS (DIR) - Directory of Listed Products; current edition.
- L. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.
- M. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.
- N. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2007.

- O. NAAMM HMMA 850 - Fire-Protection and Smoke Control Rated Hollow Metal Door and Frame Products; 2014.
- P. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2014.
- Q. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2019.
- R. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2019.
- S. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2017.
- T. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2013.
- U. UL (DIR) - Online Certifications Directory; Current Edition.
- V. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes.
 - 1. Finish hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.
- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.
 - 1. Provide a schedule of hollow metal work using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule. Include fire rating locations.

1.06 QUALITY ASSURANCE

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

1.07 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.
- C. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- D. Store hollow metal work under cover at Project site.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Hollow Metal Doors and Frames:
 - 1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com/#sle.
 - 2. Curries, an Assa Abloy Group company: www.assaabloydss.com/#sle.
 - 3. Republic Doors: www.republicdoor.com.
 - 4. Steelcraft, an Allegion brand: www.allegion.com/#sle.
 - 5. Amweld Building Products, LLC: www.amweld.com.
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

A. Requirements for Hollow Metal Doors and Frames:

1. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
 3. Edge and Face Sheet Joining: Mechanically interlocked vertical edges, continuous weld, welds are to be ground and filled to make them invisible and provide a smooth flush surface.
 4. Door Top and Bottom Closures: Flush with top/bottom of faces and edges.
 - a. Continuous steel channel not less than 16 gage, extending the full width of the door and welded to the face sheet.
 5. Door Edge Profile: Beveled on latch edge.
 - a. Edge shall be beveled 1/8 inch in 2 inches (3.175 mm in 50.8 mm).
 6. Typical Door Face Sheets: Flush.
 7. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
 - a. Doors shall be mortised for hinges. Hinge reinforcements shall be 7 gage steel, drilled and tapped.
 - b. Frames shall be mortised for hinges. Hinge reinforcement shall be 7 gage steel, drilled and tapped. Where surface mounted hardware is to be applied, frames shall have 12 gage reinforcing plates only. Lock jambs shall be mortised for a universal lock strike. Plaster guards shall be provided.
 8. Zinc Coating for Exterior Locations as indicated below: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvanized) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
 - a. Based on SDI Standards: Provide at least A60/ZF180 (galvanized) for corrosive, wet (locker rooms and showers) and exterior door locations.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

- A. Door Finish: Factory primed and field finished.
- B. Exterior Doors: Thermally insulated.
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 3 - Extra Heavy-duty.
 - b. Physical Performance Level A 1 000 000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 2 - Seamless.

- d. Door Face Metal Thickness: 16 gauge, 0.053 inch (1.3 mm), minimum.
- e. Zinc Coating: A60/ZF180 galvanized coating; ASTM A653/A653M.
- 2. Core Material: Polyurethane, 1.8 lbs/cu ft minimum density.
- 3. Door Thermal Resistance: R-Value of 8.7, minimum, for installed thickness of polyurethane.
- 4. Door Thickness: 1-3/4 inches (44.5 mm), nominal.
- 5. Top Closures: Flush with top of faces and edges.
- 6. Weatherstripping: Refer to Section 08 71 00.

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 and field finished.
- C. Corners: Head and jamb members shall have diecut mitered corners that interlock rigidly prior to welding. All welds ground smooth and primed.
- D. Exterior Door Frames: Face welded type.
 - 1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvanized) in accordance with ASTM A653/A653M, with A60/ZF180 coating.
 - 2. Frame Metal Thickness: 16 gage, 0.053 inch (1.3 mm), minimum.
 - 3. Weatherstripping: Separate, see Section 08 71 00.
- E. Jamb anchors: Install 24 inch (609 mm) o.c. maximum, 3 per jamb minimum. Use type required for construction.

2.05 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
 - 1. Prime finishes on all doors and frames shall meet the ASTM humidity, salt spray, impact and film adhesion test as required by ANSI A224.1. Shop applied red oxide primers are not acceptable.

2.06 ACCESSORIES

- A. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.
- B. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
- C. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

3.03 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Coordinate frame anchor placement with wall construction.

- C. Erect frames so that the following door clearances will occur.
 - 1. 1/8 inch (3.2 mm) at head, jambs, abutting door leaves.
 - 2. 3/8 inch (9.5 mm) to hard surface flooring where no threshold is used.
 - 3. 1/4 inch (6.3 mm) plus threshold height at fire rated doors.
- D. Install door hardware as specified in Section 08 71 00.
- E. Comply with glazing installation requirements of Section 08 80 00.
- F. Coordinate installation of electrical connections to electrical hardware items.

3.04 TOLERANCES

- A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.
- B. Maximum Diagonal Distortion: 1/16 inch (1.6 mm) measured with straight edge, corner to corner.

3.05 ADJUSTING

- A. Adjust for smooth and balanced door movement.

3.06 SCHEDULE

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

END OF SECTION

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SECTION 08 36 13 - SECTIONAL DOORS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Overhead sectional doors, electrically operated.
- B. Electrical controls.

1.02 RELATED REQUIREMENTS

- A. Section 05 50 00 - Metal Fabrications: Steel channel opening frame.

1.03 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test; 2010.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
- D. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2018a.
- E. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
- F. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
- G. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- H. DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors; 2011.
- I. NEMA MG 00001 - Motors and Generators; 2024.
- J. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
- K. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- C. Product Data: Show component construction, anchorage method, and hardware.
- D. Samples: Submit two panel finish samples, 2x2 inch (____x____ mm) in size, illustrating color and finish.
- E. Operation Data: Include normal operation, troubleshooting, and adjusting.
- F. Maintenance Data: Include data for motor and transmission, shaft and gearing, lubrication frequency, spare part sources.
- G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

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

1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for warranty requirements.
- B. Correct defective Work within a five 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:
 - 1. **Basis of Design:** Wayne-Dalton, a Division of Overhead Door Corporation:
www.wayne-dalton.com/#sle; Model 200-20.

2.02 STEEL DOOR COMPONENTS

- A. Steel Doors: Stile and rail steel with solid and glazed panels; high 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. Thermal Transmittance: U-factor (Usi-factor) of 0.12 Btu/hr sq ft degrees F (____ W/sq m K), maximum, in accordance with DASMA 102.
 - 4. Thermal Resistance (Base Bid): R-value of 17.5, minimum, for overall thickness indicated.
 - 5. Air Leakage Rate: Less than 0.40 cfm/sf (2.0 L/sec/sq m) when tested in accordance with ASTM E283 at test pressure difference of 1.57 psf (75 Pa).
 - 6. Exterior Finish: Factory finished with acrylic baked enamel; color as selected by Architect.
 - 7. Interior Finish: Factory finished with acrylic baked enamel; color as selected by Architect.
 - 8. Glazed Lights: Three glazed lights per panel, one row, approx. 34"w x 16"h ea; set in place with security glazing stops.
 - 9. Operation: Electric.
- 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 26 gage, .016 inch (.405 mm) minimum thickness, flat profile; core reinforcement ____ inch (____ mm) 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: Annealed float glass; insulated; clear; 1/4 inch (6.4 mm) thick.

2.03 DOOR COMPONENTS

- A. Track: Rolled galvanized steel, 0.090 inch (2.3 mm) minimum thickness; 2 inch (50 mm) wide, 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 ELECTRICAL OPERATION

- A. Motor: NEMA MG 1, Type 1.
- B. Disconnect Switch: Factory mount disconnect switch in control panel.
- C. Electric Operator: Center 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.
- D. 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.

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.

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. Electrical hook-up by Owner's Contractor.

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.

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 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:
 - 1. Swinging doors.
 - 2. Other doors to the extent indicated.
- B. Door hardware includes, but is not necessarily limited to, the following:
 - 1. Mechanical door hardware.
 - 2. Cylinders specified for doors in other sections.
- C. Related Sections:
 - 1. Division 08 Section “Hollow Metal Doors and Frames”.
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
 - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 - 2. ICC/IBC - International Building Code.
 - 3. NFPA 70 - National Electrical Code.
 - 4. NFPA 80 - Fire Doors and Windows.
 - 5. NFPA 101 - Life Safety Code.
 - 6. NFPA 105 - Installation of Smoke Door Assemblies.
 - 7. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
 - 1. ANSI/BHMA Certified Product Standards - A156 Series.
 - 2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
 - 3. ANSI/UL 294 - Access Control System Units.
 - 4. UL 305 - Panic Hardware.
 - 5. ANSI/UL 437- Key Locks.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - 1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 - 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 - 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
 - h. Warranty information for each product.
 - 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.
- D. Informational Submittals:
 - 1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

1.4 CLOSEOUT SUBMITTALS

- A. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.
- B. Project Record Documents: Provide record documentation of as-built door hardware sets in digital format (.pdf, .docx, .xlsx, .csv) and as required in Division 01, Project Record Documents.

1.5 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).
- C. Installer Qualifications: A minimum 5 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
- E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
 - 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
- F. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.
- G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
 - 1. Function of building, purpose of each area and degree of security required.
 - 2. Plans for existing and future key system expansion.
 - 3. Requirements for key control storage and software.

4. Installation of permanent keys, cylinder cores and software.
 5. Address and requirements for delivery of keys.
- H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
 2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
 3. Review sequence of operation narratives for each unique access controlled opening.
 4. Review and finalize construction schedule and verify availability of materials.
 5. Review the required inspecting, testing, commissioning, and demonstration procedures
- I. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.7 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.8 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
 - 1. Structural failures including excessive deflection, cracking, or breakage.
 - 2. Faulty operation of the hardware.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 4. Electrical component defects and failures within the systems operation.
- C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 BUTT HINGES

- A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
 - 1. Quantity: Provide the following hinge quantity:
 - a. Two Hinges: For doors with heights up to 60 inches.
 - b. Three Hinges: For doors with heights 61 to 90 inches.
 - c. Four Hinges: For doors with heights 91 to 120 inches.
 - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
 - 2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
 - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
 - 3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
 - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
 - 4. Hinge Options: Comply with the following:

- a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for all out-swinging lockable doors.
5. Manufacturers:
 - a. Hager Companies (HA) - BB Series, 5-knuckle.
 - b. McKinney (MK) - TA/T4A Series, 5-knuckle.
 - c. dormakaba BEST (ST) - F/FBB Series, 5-knuckle.

2.2 CONTINUOUS HINGES

- A. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 continuous geared hinge. with minimum 0.120-inch thick extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.
 1. Where specified, provide modular continuous geared hinges that ship in two or three pieces and form a single continuous hinge upon installation.
 2. Manufacturers:
 - a. Hager Companies (HA).
 - b. Pemko (PE).
 - c. dormakaba BEST (ST).

2.3 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
 1. Manufacturers:
 - a. ASSA ABLOY ACCENTRA, formerly known as Yale (YA).
 - b. No Substitution.
- B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
 1. Threaded mortise cylinders with rings and cams to suit hardware application.
 2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
 3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
 4. Tubular deadlocks and other auxiliary locks.
 5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
 6. Keyway: Match Facility Standard.

- C. Large Format Interchangeable Cores: Provide removable cores (LFIC) as specified, core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware.
- D. Keying System: Each type of lock and cylinders to be factory keyed.
 - 1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
 - 2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
 - 3. Existing System: Field verify and key cylinders to match Owner's existing system.
- E. Key Quantity: Provide the following minimum number of keys:
 - 1. Change Keys per Cylinder: Two (2)
 - 2. Master Keys (per Master Key Level/Group): Five (5).
 - 3. Construction Keys (where required): Ten (10).
 - 4. Construction Control Keys (where required): Two (2).
 - 5. Permanent Control Keys (where required): Two (2).
- F. Construction Keying: Provide construction master keyed cylinders.
- G. Construction Keying: Provide temporary keyed construction cores.
- H. Key Registration List (Bitting List):
 - 1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
 - 2. Provide transcript list in writing or electronic file as directed by the Owner.

2.4 MORTISE LOCKS AND LATCHING DEVICES

- A. Mortise Locksets, Grade 1 (Heavy Duty): Provide ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed mortise locksets. Listed manufacturers shall meet all functions and features as specified herein.
 - 1. Provide locksets with functions and features as follows:
 - a. Heavy duty 12-gauge wrought steel case.
 - b. Stainless steel 3/4" one-piece anti-friction reversible latchbolt with a one-piece hardened stainless steel 1" projection deadbolt.
 - c. Where required by code, provide knurling or abrasive coating on all levers leading to hazardous areas.
 - d. Meets UL and CUL Standard 10C Positive Pressure, Fire Test of Door Assemblies with levers that meet A117.1 Accessibility Code.
 - e. Meets UL Certification Directory ZHLL.R21744 for products used in windstorm rated assemblies.
 - f. Extended cycle test: Locks to have been cycle tested in ordinance with ANSI/BHMA 156.13 requirements to 12.3 million cycles or greater.

- g. Status indicators inside, outside, or on both sides of doors as specified; available with wording for “locked/unlocked”, “vacant/occupied” or custom wording options. Indicator to be located above the cylinder with the inside thumb-turn not blocking the visibility of the indicator status.
 - h. Ten-year limited warranty for mechanical functions.
2. Manufacturers:
- a. ASSA ABLOY ACCENTRA, formerly known as Yale (YA) - 8800FL Series.
 - b. No Substitution.

2.5 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
- 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 - 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 - 3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
 - 4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.
- B. Standards: Comply with the following:
- 1. Strikes for Mortise Locks and Latches: BHMA A156.13.
 - 2. Strikes for Bored Locks and Latches: BHMA A156.2.
 - 3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
 - 4. Dustproof Strikes: BHMA A156.16.

2.6 SURFACE DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
- 1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
 - 2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
 - 3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
 - 4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
 - 5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.

6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.
- B. Door Closers, Surface Mounted (Unitrol): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted closers with door stop mechanism to absorb dead stop shock on arm and top hinge. Hold-open arms to have a spring loaded mechanism in addition to shock absorber assembly. Arms to be provided with rigid steel main arm and secondary arm lengths proportional to the door width.
1. Manufacturers:
 - a. ASSA ABLOY ACCENTRA, formerly known as Yale (YA) - Unitrol Series.
 - b. Corbin Russwin Hardware (RU) - Unitrol Series.
 - c. Norton Rixson (NO) - Unitrol Series.
 - d. No Substitution.

2.7 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:
 - a. Stainless Steel: 300 grade, .050-inch thick.
5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:
 - a. Burns Manufacturing (BU).
 - b. Hager Companies (HA).
 - c. Hiawatha, Inc. (HI).
 - d. Rockwood (RO).

2.8 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:

- a. Burns Manufacturing (BU).
- b. Hager Companies (HA).
- c. Hiawatha, Inc. (HI).
- d. Rockwood (RO).

2.9 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.

- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:

1. National Guard Products (NG).
2. Pemko (PE).
3. Reese Enterprises, Inc. (RE).

2.10 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.11 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
 - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Push Plates and Door Pulls: When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.
- E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
 - 1. Quantities listed are for each pair of doors, or for each single door.
 - 2. The supplier is responsible for handing and sizing all products.
 - 3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
- B. Manufacturer's Abbreviations:
 - 1. MK - McKinney
 - 2. PE - Pemko
 - 3. YA - ASSA ABLOY ACCENTRA
 - 4. NO - Norton
 - 5. RO - Rockwood

Hardware Sets**Set: 1.0**

Doors: S100F, S100M

Description: Exterior

1 Continuous Hinge	CFMHD1 x Door Height		PE
1 Storeroom or Closet Lock	AUCN 8805FL 2196	626	YA
1 Surface Closer	UNI7500 SN-134	689	NO
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO
1 Door Stop	462	US2C	RO
1 Gasketing	S773BL (Head & Jambs)		PE
1 Rain Guard	346C x Overall Frame Width		PE
1 Sweep	345ANB x Door Width		PE
1 Threshold	279x292AFGPK x Opening Width		PE

Set: 2.0

Doors: S100A, S100B, S100C, S100D, S100E, S100G, S100H, S100J, S100K, S100L

Description: Exterior

Notes: All hardware furnished by Overhead Door Supplier.

END OF SECTION 08 71 00

SECTION 09 91 13 - EXTERIOR PAINTING**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
 - 1. General: Paint all exposed surfaces, except as otherwise indicated, whether or not colors are designated. If not designated, match adjacent painted surface; if not in a painted surface, in general match trim color.
 - 2. Exposed surfaces of steel lintels and ledge angles.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Unless otherwise indicated, shop priming of ferrous metal items and fabricated components are included under their respective trades.
 - 3. Items indicated to receive other finishes.
 - 4. Items indicated to remain unfinished.
 - 5. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 - 6. Non-metallic roofing and flashing.

1.02 RELATED REQUIREMENTS

- A. Section 05 50 00 - Metal Fabrications: Shop-primed items.

1.03 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating; 2005 (Reapproved 2012).
- C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2020.
- D. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.
- E. SSPC V1 (PM1) - Good Painting Practice: Painting Manual, Volume 1; Fourth Edition.
- F. SSPC V2 (PM2) - Systems and Specifications: Steel Structures Painting Manual, Volume 2; Fourth Edition.
- G. SSPC-SP 1 - Solvent Cleaning; 2015.
- H. SSPC-SP 2 - Hand Tool Cleaning; 2018.
- I. SSPC-SP 3 - Power Tool Cleaning; 2018.
- J. SSPC-SP 13 - Surface Preparation of Concrete; (Reaffirmed 2015).; 2003.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:

1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 2. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
- C. Samples for Initial Selection: For each type of topcoat product indicated.
1. Color schedules will be furnished to General Contractor, by Schaefer Architecture, before application of prime coats.
- D. Manufacturer's Instructions: Indicate special surface preparation procedures and substrate conditions requiring special attention.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum three years experience.

1.06 MOCK-UP

- A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.
- B. Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
- C. Apply benchmark samples after permanent lighting and HVAC services have been activated.
- D. Locate where directed by Architect.
- E. Final approval of color selections will be based on benchmark samples.
1. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Schaefer Architecture at no added cost to Owner.
- F. Mock-up may remain as part of the work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. 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.

1.08 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 50 degrees F (10 degrees C) for exterior; unless required otherwise by manufacturer's instructions.

- E. 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 from the same manufacturer to the greatest extent possible, for interior/exterior paints.
1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Schaefer Architecture is obtained using the specified procedures for substitutions.
- B. Paint "Series" are intended to specify type and quality of a paint line which includes white and tint bases. Contractor shall use proper base for color(s) selected including accent colors.
- C. Paints:
1. Base Manufacturer: Sherwin-Williams Company: www.sherwin-williams.com/#sle.
 2. Other acceptable manufacturers equal first line products may be submitted after bidding and shall be subject to Schaefer Architecture approval:
 3. PPG Paints: www.ppgpaints.com/#sle.
 4. Glidden Professional: www.glidden.com.
 5. Tnemec Inc.: www.tnemec.com.
 6. Benjamin Moore & Co.: www.benjaminmoore.com.
 7. Coronado Paint: www.coronadopaint.com.
- D. Primer Sealers: Same manufacturer as top coats.
- E. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.
1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 3. Supply each paint material in quantity required to complete entire project's work from a single production run.
 4. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content:
1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- C. Colors: To be selected from manufacturer's full range of available colors.
1. Selection to be made by Schaefer Architecture after award of contract.

2.03 PAINT SYSTEMS - EXTERIOR

- A. Structural Steel Exposed to Weather
 - 1. To be shop primed and prepared. Refer to 05 12 00 - Structural Steel Framing for shop primer procedures and products.
- B. Ferrous Metal
 - 1. Refer to 09 96 00 - High-Performance Coatings.
- C. Galvanized Metal
 - 1. Refer to 09 96 00 - High-Performance Coatings.

2.04 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. Loose dirt, foreign matter, brushed or scraped off, leaving surface clean and dry before painting.
- C. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- D. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- E. If substrate preparation is the responsibility of another installer, notify Schaefer Architecture of unsatisfactory preparation before proceeding.
- F. Test shop-applied primer for compatibility with subsequent cover materials.
- G. 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. Concrete Floors and Traffic Surfaces: 8 percent.

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. Preparation of previously painted surfaces:
 - 1. Loose surface materials - scrape and brush well. Sand surface feathering edges.
 - 2. Oily films, clean with thinner and/or as specified for mildew.
 - 3. Dull high gloss surfaces.
 - 4. Remove wax with commercial stripping product.
 - 5. Rust and corrosion - sand or brush to clean metal.
 - 6. Apply primer to repaired or bare areas and finish as specified in paint systems. Apply only finish coat on solid painted surfaces.
 - 7. Paint entire surface from interior corner to interior corner where remodeling work causes patching or revision in the painted surfaces.

- E. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
- F. Seal surfaces that might cause bleed through or staining of topcoat.
- G. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- H. Concrete:
 - 1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
 - 2. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.
 - 3. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- I. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.
- J. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.
- K. Galvanized Surfaces:
 - 1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
 - 2. Prepare surface according to SSPC-SP 2.
- L. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.
 - 1. Paint top and bottom of doors same as face and edges. Paint exterior doors same inside and out with exterior paint system.

3.03 APPLICATION

- A. Unless specified otherwise, apply paint with brush, spray, or roller as recommended by manufacturer to recommended thickness minimum. **Use a spray or roller application on hollow metal doors and frames for a brushless finish.**
- B. Apply products in accordance with manufacturer's written instructions.
- C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- E. Apply each coat to uniform appearance.
 - 1. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- F. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply additional coats until complete hide is achieved.
- G. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance at no cost to Owner.
- H. Sand metal surfaces lightly between coats to achieve required finish.
- I. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

3.04 CLEANING

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

- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces

3.05 PROTECTION

- A. Protect finishes until completion of project.
- B. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Schaefer Architecture, and leave in an undamaged condition.
- C. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

SECTION 10 44 00 - FIRE PROTECTION SPECIALTIES**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Fire extinguishers.
- B. Accessories.

1.02 REFERENCE STANDARDS

- A. NFPA 10 - Standard for Portable Fire Extinguishers; 2013.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate wall bracket mounted measurements.
 - 1. Provide schedule of types of extinguishers and locations.
- C. Product Data: Provide color and finish, anchorage details, and lettering if any.
- D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
- E. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.04 FIELD CONDITIONS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS**2.01 MANUFACTURERS****2.02 FIRE EXTINGUISHERS**

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
 - 1. Provide extinguishers labeled by UL for the purpose specified and indicated.
- B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
 - 1. Size and classification as scheduled.
 - 2. Finish: Baked polyester powder coat color as selected.

2.03 ACCESSORIES

- A. Extinguisher Brackets: Formed steel, galvanized and enamel finished.
 - 1. Designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with black or red baked-enamel finish.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as scheduled.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Examine fire extinguishers for proper charging and tagging.
 - 1. Remove and replace damaged, defective, or undercharged fire extinguishers.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Secure rigidly in place.
- C. Seal through penetrations with firestopping sealant.

3.03 SCHEDULES

- A. Fire Extinguishers:
 - 1. Vehicle areas: Multipurpose Dry-Chemical Type in Steel Container: UL-rated 4-A:60-B:C, 20 lb (9 kg) nominal capacity, with monoammonium phosphate-based dry chemical. Equal to J.L. Industries, Inc. Product Cosmic 20E:
www.jlindustries.com.

END OF SECTION

SECTION 13 34 19 - METAL BUILDING SYSTEMS**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Manufacturer-engineered, shop-fabricated structural steel building frame.
- B. Metal wall and roof panels including gutters and downspouts.
- C. Alternate Bid for the low slope roofs on both sides (north/south) of the main building.
- D. Alternate Bid for thermal insulation at walls and roof.

1.02 RELATED REQUIREMENTS

- A. Section 05 50 00 - Metal Fabrications.
- B. Section 07 92 00 - Joint Sealants: Sealing joints between accessory components and wall system.
- C. Section 08 11 13 - Hollow Metal Doors and Frames.
- D. Section 08 36 13 - Sectional Doors.

1.03 REFERENCE STANDARDS

- A. AISC 360 - Specification for Structural Steel Buildings; 2010.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- D. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014, with Editorial Revision (2017).
- E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2021.
- F. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.
- G. ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality; 2014.
- H. ASTM A992/A992M - Standard Specification for Structural Steel Shapes; 2020.
- I. ASTM C991 - Standard Specification for Flexible Glass Fiber Insulation for Metal Buildings; 2015.
- J. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2014.
- K. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2021a.
- L. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- M. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength; 2007a.
- N. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2019, with Editorial Revision (2020).
- O. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020.
- P. IAS AC472 - Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems; 2012.

- Q. MBMA (MBSM) - Metal Building Systems Manual; Metal Building Manufacturers Association; 2012.
- R. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).
- S. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on profiles, component dimensions, fasteners.
- C. Shop Drawings: Indicate components by others. Include full building plan, elevations, sections, details and the following:
 - 1. Anchor-Rod Plans: Submit anchor-rod plans and templates before foundation work begins. Include location, diameter, and minimum required projection of anchor rods required to attach metal building to foundation. Indicate column reactions at each location.
 - 2. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.
 - 3. Metal Roof and Wall Panel Layout Drawings: Show layouts of panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, clip spacing, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work; show locations of exposed fasteners.
 - a. Show wall-mounted items including personnel doors, vehicular doors, windows, louvers, and lighting fixtures.
- D. Samples for the following products:
 - 1. Panels: Nominal 12 inches long by actual panel width. Include fasteners, closures, and other exposed panel accessories.
 - 2. Flashing and Trim: Nominal 12 inches long. Include fasteners and other exposed accessories.
 - 3. Vapor-Retarder Facings: Nominal 6-inch- square Samples.
 - 4. Accessories: Nominal 12-inch- long Samples for each type of accessory.
- E. Delegated Design Submittal: For metal building systems. Include analysis data indicating compliance with performance requirements and design data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Include analysis data indicating compliance with performance requirements and design data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 2. Letter of Design Certification: Signed and sealed by a qualified professional engineer. Include the following:
 - a. Name and location of Project.
 - b. Order number.

- c. Name of manufacturer.
 - d. Name of Contractor.
 - e. Building dimensions including width, length, height, and roof slope.
 - f. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
 - g. Governing building code and year of edition.
 - h. . Design Loads: Include dead load, roof live load, collateral loads, roof snow load, deflection, wind loads/speeds and exposure, seismic design category or effective peak velocity-related acceleration/peak acceleration, and auxiliary loads.
 - i. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.
 - j. Building-Use Category: Indicate category of building use and its effect on load importance factors.
- F. Erection Drawings: Indicate members by label, assembly sequence, and temporary erection bracing.
- G. Manufacturer Qualification Statement: Provide documentation showing metal building manufacturer is accredited under IAS AC472.
- 1. Source quality-control reports.
 - 2. Field quality-control reports.
- H. Project Record Documents: Record actual locations of concealed components and utilities.

1.06 QUALITY ASSURANCE

- A. Design structural components, develop shop drawings, and perform shop and site work under direct supervision of a Professional Structural Engineer experienced in design of this Work.
- 1. Design Engineer Qualifications: Licensed in Kansas.
 - 2. Conform to applicable code for submission of design calculations as required for acquiring permits.
 - 3. Cooperate with regulatory agency or authority and provide data as requested.
- B. Perform work in accordance with AISC 360 and MBMA (MBSM).
- 1. Maintain one copy on site.
- C. Perform welding in accordance with AWS D1.1/D1.1M.
- D. Manufacturer Qualifications: Company specializing in the manufacture of products similar to those required for this project.
- 1. Not less than three years of documented experience
 - 2. Accredited by IAS in accordance with IAS AC472.
- E. Erector Qualifications: Company specializing in performing the work of this section with minimum three years experience.

1.07 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide manufacturer's written single source no dollar limit weathertightness warranty for a minimum of twenty (20) years against leaks in roof panels arising out of or caused by ordinary wear and tear under normal weather and atmospheric conditions. Warranty shall be signed by both the metal roofing system manufacturer and the metal roofing

system contractor who shall be a certified Contractor of the installed product by the manufacturer.

- C. Provide manufacturer's standard single source written warranty for twenty (20) years against perforation of metal roof panels due to corrosion under normal weather and atmospheric conditions. Warranty shall be signed by metal roofing system manufacturer.
- D. Provide manufacturer's standard written paint film warranty for twenty (20) years on finish film integrity and color retention. The finish will not crack, check, peel, flake, or blister, or chalk in excess of ASTM D659, number 8 rating, or fade in excess of 5 units per ASTM D 2244, under normal atmospheric conditions. Warranty shall be signed by metal roof system manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Buildings:
 - 1. Ceco Building Systems; ____: www.cecobuildings.com/#sle.
 - 2. Metallic Building Company; ____: www.metallic.com/#sle.
 - 3. Alliance Steel, PBR.
 - 4. Pinnacle Structures, Inc.
 - 5. Lucas Metal Works.
 - 6. Red Dot Buildings.
 - 7. Whirlwind Steel Buildings & Components.
 - 8. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 METAL BUILDING

- A. Primary-Frame Type: 1. Rigid Clear Span: Solid-member, structural-framing system without interior columns. 2. Lean-to: Solid-member, structural-framing system, designed to be partially supported by another structure..
- B. End-Wall Framing: Engineer end walls to be expandable. Provide primary frame, capable of supporting full-bay design loads, and end-wall columns.
- C. Secondary Framing: Manufacturer's standard purlins and girts. Provide partially inset-framed girts at end walls and exterior-framed (bypass) girts at side walls.
- D. Wall System: Preformed metal panels of vertical profile, with sub-girt framing/anchorage assembly, and accessory components.
- E. Roof System: Preformed metal panels oriented parallel to slope, with sub-girt framing/anchorage assembly, and accessory components.
- F. Roof Slope: As detailed in drawings.

2.03 PERFORMANCE REQUIREMENTS

- A. Design structural members to withstand dead load, applicable snow load, and design loads due to pressure and suction of wind calculated in accordance with applicable code and as indicated on drawings.
- B. Design structural members to withstand Class 90 wind uplift in accordance with UL 580.
- C. Design metal building system assemblies to withstand serviceability design loads without exceeding deflections and drift limits as indicated on structural drawings.
- D. Provide drainage to exterior for water entering or condensation occurring within wall or roof system.

- E. Size and fabricate wall and roof systems free of distortion or defects detrimental to appearance or performance.

2.04 MATERIALS - STRUCTURAL STEEL FRAMING

- A. Bolted Connections: Comply with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
- B. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.
- C. Primary Framing: Manufacturer's standard primary-framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse frames; rafter beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.
 - 1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.
 - 2. Rigid Modular Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes.
- D. End-Wall Framing: Manufacturer's standard primary end-wall framing fabricated for field-bolted assembly to comply with the following:
 - 1. End-Wall and Corner Columns: I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates; or C-shaped, cold-formed, structural-steel sheet.
- E. Secondary Framing: Manufacturer's standard secondary framing, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Unless otherwise indicated, fabricate framing from either cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet, prepainted with coil coating, to comply with the following:
 - 1. Purlins: C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes. Depth as needed to comply with system performance requirements.
 - 2. Girts: C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes. Form ends of Z-sections with stiffening lips angled 40 to 50 degrees from flange. Depth as indicated on drawings.
 - 3. Eave Struts: Unequal-flange, C-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; to provide adequate backup for metal panels.
 - 4. Framing for Openings: Channel shapes; fabricated from cold-formed, structural-steel sheet or structural-steel shapes. Frame head and jamb of door openings and head, jamb, and sill of other openings.
 - 5. Miscellaneous Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural-steel sheet; built-up steel plates; or zinc-coated (galvanized) steel sheet; designed to withstand required loads.
- F. Bracing: Provide wind bracing types at locations indicated and as follows:
 - 1. X-Bracing Rods: minimum 1/2-inch diameter steel rods; threaded a minimum of 6 inches at each end.

2. Rigid Portal Frames: Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
- G. Materials:
1. W-Shapes: ASTM A992.
 2. Channels, Angles, M-Shapes, Plate and Bar: ASTM A36; ASTM A572, Grade 50 or 55; or ASTM A529, Grade 50 or 55.
 3. Cold-Formed Hollow Structural Sections: ASTM A500, Grade B or C, structural tubing.
 4. Structural-Steel Sheet: Hot-rolled, ASTM A1011, Structural Steel (SS), Grades 30 through 55.
 5. Metallic-Coated Steel Sheet: ASTM A653, SS, Grades 33 through 80 with G60 (Z180) coating designation.
 6. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A755.
 7. Bolts: Provide plain-finish bolts for structural-framing components that are primed or finish painted. Provide zinc-plated bolts for structural-framing components that are galvanized.
 - a. Non-High-Strength Bolts, Nuts, and Washers: ASTM A307, Grade A, carbon-steel, hex-head bolts; ASTM A563 carbon-steel hex nuts; and ASTM F844 plain (flat) steel washers.
 - b. High-Strength Bolts, Nuts, and Washers: ASTM F3125, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers.
 8. Headed Anchor Rods: ASTM F1554, Grade 36 or ASTM A307, Grade A, straight anchor rods, plain finish; ASTM A563 heavy-hex carbon steel nuts; ASTM F436 hardened carbon steel washers; and ASTM A36 carbon steel plate washers.
- H. Finish: Factory primed. Apply specified primer immediately after cleaning and pretreating.
1. Clean and prepare in accordance with SSPC-SP2.
 2. Coat with manufacturer's standard primer. Apply primer to primary and secondary framing to a minimum dry film thickness of 1 mil (0.025 mm).

2.05 MATERIALS - WALLS

- A. Exposed Fastener Metal Wall Panels (MP1)
1. Basis of Design; BR9-36 Profile B manufactured by Morin: www.kingspanpanels.us
 2. Color: As selected by Architect from Manufacturer's standard colors. Two colors per exterior side.

2.06 MATERIALS - ROOF

- A. Metal Roof Panels:
1. Basis of Design: Ceko, PBR Roof Panel.
 2. Nominal Thickness: 24 ga. coated thickness.
 3. Panel Surface: Smooth with minor ribs in pan.
 4. Exterior Finish: Fluoropolymer two-coat system (PVDF)
 5. Color: As selected by Architect from manufacturer's full range of colors

6. Panel Width: 36 inches nominal.
7. Panel Seam Height: 1 1/2 inch nominal.

B. Steel Sheet: ASTM A 792/A 792M aluminum-zinc alloy coated to AZ50/AZM150.

2.07 THERMAL INSULATION (Alternate Bid)

A. Roof

1. Vapor Barrier and Fall Protection

a. Manufacturers:

- 1) Thermal Design; Product Simple Saver
- 2) Guardian Building Products; Product Energy Saver FP
- 3) Substitutions: See section 01 60 00 - Product requirements.

b. Vapor barrier liner fabric, thermal breaks, straps and other devices.

- 1) Vapor barrier liner fabric: Woven, reinforced, high-density polyethylene yarns coated on both sides with a continuous white polyethylene coating, as follows:
 - (a) ASTM C1136, Types I through Type VI.
 - (b) Perm rating: 0.02 for fabric and for seams in accordance with ASTM E96.
 - (c) Flame/Smoke Properties: 25/50 in accordance with ASTM E84.
 - (d) Thermal Breaks: 3/16 inch by 3 inch wide, closed-cell polyethylene foam with pre-applied adhesive film.
 - (e) Straps: Galvanized, primed and painted to match fabric.
 - (f) Fasteners and Accessories: As recommended by manufacturer.

2. Roof Insulation

- a. Unfaced Metal Building Insulation: ASTM C 991, Type I, or NAIMA 202, glass-fiber-blanket insulation; 0.5-lb/cu. ft. (8-kg/cu. m) density; continuous, vapor-tight edge tabs; with a flame-spread index of 25 or less.
- b. R-Value - Minimum R30.
- c. Batt insulation shall fill area between bottom of metal panel and top of vapor barrier liner fabric completely.

B. Wall Insulation

1. Faced Metal Building Insulation: ASTM C 991, Type II, glass-fiber-blanket insulation; 0.5-lb/cu. ft. (8-kg/cu. m) density; vapor-tight edge tabs; with a flame-spread index of 25 or less.
2. Vapor-Retarder Facing: ASTM C 1136, with permeance not greater than 0.10 perm (5.75 ng/Pa x s x sq. m) when tested according to ASTM E 96/E 96M, Desiccant Method.
3. R-Value - Minimum R19.

2.08 ACCESSORIES

- ### **A. General:** Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.

1. Form exposed sheet metal accessories that are without excessive oil-canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

- B. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fascia, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.
 - 1. Closures: Provide closures at eaves and ridges, fabricated of same material as metal roof panels.
- C. Trim, Closure Pieces, Expansion Joints, Caps, Flashings, Fascias, and Infills: Same material, thickness and finish as exterior sheets; factory-fabricated to required profiles; fabricated in longest practicable lengths.
- D. Gutters: Formed from 0.022 inch (0.56 mm) nominal-thickness, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match roof fascia and rake trim. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- (2438-mm-) long sections, sized according to SMACNA's "Architectural Sheet Metal Manual."
- E. Downspouts: Formed from 0.022 inch (0.56 mm) nominal-thickness, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match metal wall panels. Fabricate in minimum 10-foot- (3-m-) long sections, complete with formed elbows and offsets.
- F. Sealant: ASTM C920, elastomeric sealant with movement capability of at least plus/minus 50 percent; 100 percent silicone; for exposed applications, match adjacent colors as closely as possible.

2.09 ACCESSORY COMPONENTS

- A. Doors and Frames: Specified in Section 08 11 13.
- B. Sectional Doors: Specified in Section 08 36 13
- C. Provide all jamb/sill trim, door/window jamb trim, angle trim, window end dams, base angle, eave strut, base trim, corner trim, door/window head trim, offset sill trim, and offset jamb trim. Coordinate installation between metal building manufacturer, insulated panel manufacturer and door/window installer.

2.10 FABRICATION - FRAMING

- A. Fabricate members in accordance with AISC 360. Comply with MBMA's "Metal Building Systems Manual" for fabrication and erection tolerances.
- B. Shop fabricate framing components to indicated size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
- C. Source Quality Control: After fabrication, submit copy of certificate of compliance to authorities having jurisdiction, certifying that Work was performed according to Contract requirements.

2.11 FABRICATION - GUTTERS AND DOWNSPOUTS

- A. Fabricate of same material and finish as roofing metal.
- B. Form gutters and downspouts of square profile and size indicated to collect and remove water. Fabricate with connection pieces.
- C. Form sections in maximum possible lengths. Hem exposed edges. Allow for expansion at joints.
- D. Fabricate support straps of same material and finish as roofing metal, color as selected.

2.12 FINISHES

- A. Framing Members: Clean, prepare, and shop prime. Do not prime surfaces to be field welded.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Examine substrates, areas, and conditions, with erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify that foundation, floor slab, mechanical and electrical utilities, and placed anchors are in correct position
- C. Proceed with erection only after unsatisfactory conditions have been corrected.

3.02 ERECTION - FRAMING

- A. Erect framing in accordance with AISC 360.
- B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing. Locate braced bays as indicated.
- C. Set column base plates with non-shrink grout to achieve full plate bearing.
- D. Do not field cut or alter structural members without approval.
- E. After erection, prime welds, abrasions, and surfaces not shop primed.

3.03 ERECTION - WALL AND ROOF PANELS

- A. Install in accordance with manufacturer's instructions.
- B. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.
- C. Fasten cladding system to structural supports, aligned level and plumb.
- D. Locate end laps over supports. End laps minimum 2 inches (50 mm). Place side laps over bearing.
- E. Provide expansion joints where indicated.
- F. Use concealed fasteners at roof and Base Bid wall panels.
- G. Install insulation and vapor retarder utilizing _____ for attachment. Place wire mesh under vapor retarder for support between framing members.
- H. Install sealant and gaskets, providing weather tight installation.

3.04 ERECTION - GUTTERS AND DOWNSPOUTS

- A. Rigidly support and secure components. Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts.
- B. Slope gutters 1/4 inch per 10 feet (2.1 mm per m), minimum to the nearest downspout.
- C. Install splash blocks under each downspout.

3.05 INSTALLATION - ACCESSORY COMPONENTS IN WALL SYSTEM

- A. Install door frames, doors, and overhead doors in accordance with manufacturer's instructions.

3.06 INSTALLATION - THERMAL INSULATION

- A. Follow manufacturer's instructions for system.
- B. Install batt insulation in exterior wall and roof spaces without gaps or voids. Do not compress insulation. Trim insulation neatly to fit spaces.

- C. Insulate miscellaneous gaps and voids.

3.07 TOLERANCES

- A. Framing Members: 1/4 inch (6 mm) from level; 1/8 inch (3 mm) from plumb.
- B. Siding and Roofing: 1/8 inch (3 mm) from true position.

END OF SECTION

SECTION 31 20 00 - EARTH MOVING**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Removal and stockpiling of topsoil.
- B. Rough grading, site preparation, excavation, fill and backfill for the site for site structures, building pads, and paving.
- C. Replacement of topsoil and finish grading .
- D. Work of all trades shall comply with this section.
- E. Work includes a final blading and shaping of the grades on the site. To be completed near the end of the project. Site to be free of weeds, ruts, trash, debris.

1.02 RELATED REQUIREMENTS

- A. Geotechnical Study - Geotechnical Engineering Report.
- B. Section 01 57 13 - Temporary Erosion and Sediment Control.

1.03 DEFINITIONS

- A. Backfill: Soil material placed back in an excavated area up to the original soil level or grade.
- B. Excavation: Cutting and removing soil materials to provide for construction of utilities, building elements, paving, site improvements, etc.
- C. Fill: Soil material placed above an original soil level or grade.
- D. Finish Grading: Grading, spreading, adjusting and raking soil to fine accuracy within 1 inch (25 mm) of indicated grade, level or plane. Allow 1 inch (25 mm) for sod where indicated.
- E. Rough Grading: Spreading and adjusting soil levels and planes to uniform slopes, within 3 inch (76 mm) of indicated grade, level and plane.
- F. Site: Land area where work for this project is indicated.
- G. Soil Engineer: Soil testing agency responsible for field quality control of earthwork.
- H. Utilities: Underground piping and services for buildings and site improvements.
- I. Waste: Debris, removed and demolished materials, unsatisfactory and excess soils materials resulting from site preparation, demolition work, utility work and construction operations.

1.04 REFERENCE STANDARDS

- A. ASTM D4254: Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density; 2016
- B. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2018.
- C. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method; 2015, with Editorial Revision (2016).
- D. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)); 2012 (Reapproved 2021).
- E. ASTM D448 - Standard Classification for Sizes of Aggregate for Road and Bridge Construction; 2012 (Reapproved 2017).
- F. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth); 2017a, with Editorial Revision.

- G. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)); 2012 (Reapproved 2021).

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Test Reports: Secure and submit to Soil Engineer proposed off-site borrow soil samples as needed for evaluation and determination of acceptability for project use.
 - 1. On-site material samples required by Soil Engineer will be obtained by the Soil Engineer.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum five years of experience.
- B. Geotechnical Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.
 - 1. Schaefer Architecture shall approve laboratory for soil compaction testing.

1.07 DELIVERY, STORAGE, AND HANDLING

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

1.08 FIELD CONDITIONS

- A. Site Survey: The Owner has a survey of the project site and surrounding areas. A copy of this survey is included in the drawings for information. Background copies of the survey serve as a base for other sitework drawings.
- B. Subgrade Soil Survey: The Owner has a report of the subgrade soils investigation conducted at numerous locations within the building site. A copy of this report is bound with these specifications for convenience and information. The data is representative of the test locations. Conditions do vary between test locations and will vary seasonally. The general character of soils and conditions have been used to establish these specifications.
 - 1. Additional exploratory work may be done by Bidders and Contractors at their own expense. Correlate such work with the Owner.
- C. Existing Utilities: Survey shows utility locations as accurately as records permit.
 - 1. Maintain utility services active during construction. Schedule any necessary shut-downs with Owner well in advance of interrupting service.
 - 2. Utility Locator Service: Notify Kansas One-Call System at 1-800-DIG SAFE (1-800-344-7233) before beginning earth moving operations. A notice of two full working days is required.
 - a. Stake and mark additional indicated locations of underground lines before excavating in the area they are indicated. Excavate carefully and when located verify location.
 - b. RECORD on project record site plan all locations; show corrections where discrepancies occur.

3. Repair damage to utilities due to earthwork operations at no added cost to the Owner.
- D. Do not commence earth moving operations until temporary erosion- and sedimentation-control measures, specified in 01 57 13 - Temporary Erosion and Sediment Control are in place.
- E. Explosives: Use of explosives not permitted.
- F. Protection of Persons and Property:
 1. Barricade open excavations occurring as part of this work and post with warning devices.
 2. Operate warning lights as recommended by authorities having jurisdiction.
 3. Protect structures, utilities, landscape materials, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards occurring during earthwork operations.
 4. Perform excavation within drip-line of "trees to remain" by hand, and protect the root systems, of landscape materials which remain, from damage or dry out to the greatest extent possible. Maintain moist condition for root system and cover exposed roots with burlap. Paint root cuts of 1 inch (25 mm) diameter and larger with emulsified asphalt tree paint.

PART 2 PRODUCTS

2.01 SOIL MATERIALS

- A. Satisfactory material for fill and backfill: Clean excavated approved material or approved borrow material. Material to be free from organic material and debris. For fill and backfill: outside building area, within building below the low volume change zone, adjacent to foundations and retaining walls only where soil contact both faces, and within the paving areas.
 1. Cohesive soils with a liquid limit (LL) of 45 or less and a plasticity index (PI) of 45 or less.
- B. Clean low volume change (LVC) material: Soil shall be approved; free of organic material and debris. For fill, backfill and for low volume change zone below slabs on grade:
 1. Cohesive materials with a plasticity index (PI) of between 5 and 15.
 2. Silty gravel (e.g. AB-3 KDOT).
 3. Excavated soil treated to provide equivalent characteristics as materials above.
- C. For granular leveling bed below slab on grade areas: Clean granular material free from organic material and debris.
 1. Clean, medium to coarse grained sand, or clean gravel/rock with less than 5 percent fines.
- D. For fill and backfill adjacent to foundation and retaining walls where soil contacts only one surface: Clean granular material free from organic material and debris.
 1. Clean, well-graded granular material meeting ASTM C33/C33M #57 or #67 gradation.
- E. Topsoil:
 1. From topsoil stockpile on site.
 2. Clean stripped top soil with organic materials.

3. Clean sandy loam which is currently supporting vegetation but little if any weeds or sandy loam which is treated to control weed growth.

2.02 ACCESSORIES

- A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inch (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inch (750 mm) deep; colored as follows:
 1. Red: Electric.
 2. Yellow: Gas, oil, steam, and dangerous materials.
 3. Orange: Telephone and other communications.
 4. Blue: Water systems.
 5. Green: Sewer systems.

PART 3 EXECUTION

3.01 SITE PREPARATION

- A. Remove paving, curbs, walks, steps, trees, shrubbery, and other site improvements indicated and necessary for removal to permit construction of the new work shown.
- B. Remove above ground surface vegetation from areas to be stripped.
- C. Protect and maintain erosion and sedimentation controls during earth moving operations.
- D. Notify utility company to remove and relocate utilities.

3.02 EXCAVATION

- A. General:
 1. Excavation is unclassified, and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered.
 2. Unauthorized excavation consists of removal of material beyond indicated subgrade elevations or dimensions without specific direction of Schaefer Architecture.
Unauthorized excavation, as well as remedial work directed by Schaefer Architecture shall be at the expense of the General Contractor.
 3. Under footings, foundation bases, or retaining walls, fill unauthorized excavation with concrete by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation.
 - a. Lean concrete fill, with 28-day compressive strength of 2500 psi (17.2 MPa), may be used when approved by Schaefer Architecture.
 4. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Schaefer Architecture.
- B. Additional Excavation:
 1. When excavation has reached required subgrade elevations, notify Schaefer Architecture and Soil Engineer who will make an inspection of conditions.
 2. If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by Schaefer Architecture.

3. Removal of existing fill and other unsuitable material and its replacement as directed will be paid on basis of contract conditions relative to changes in work.
- C. Stability of Excavations:
1. Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.
 2. Maintain sides and slopes of excavations in safe condition until completion of backfilling.
- D. Shoring and Bracing:
1. Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition and to comply with local codes and authorities having jurisdiction.
 2. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses. Remove as backfill progresses.
- E. Dewatering:
1. Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.
 2. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation soils, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations and into storm sewer.
 3. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water to collecting areas. Do not use trench excavations as temporary drainage ditches.
- F. Material Storage:
1. Stockpile satisfactory excavated materials within site area until required for backfill, fill or dressing. Place, grade and shape stockpiles for proper drainage.
 2. Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.
 3. Stockpiles: Use areas designated on site; pile depth not to exceed 8 feet (2.5 m); protect from erosion.
- G. Excavation for Structures:
1. Remove existing unsuitable fill material below the bottom of foundations within and 5 feet beyond the building footprint. Refer to geotechnical report for approximate depth of existing fill to be field verified by Geotechnical Engineer. Excavate below slabs on grade to allow for placement a minimum of 18 inches of LVC material below the floor slab on grade. Over excavate, moisture condition, and recompact soils which have a moisture context less than listed for compaction to a depth of 30 inches below the floor slab on grade.
 2. Conform to elevations and dimensions shown within a tolerance of plus or minus 1 inch (25 mm), and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection.

3. In excavating for footings and foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other work.
 4. Do not place concrete until excavation has been inspected and approved.
- H. Excavation for Pavements:
1. Cut surface under pavements to comply with cross-sections, elevations and grades as shown. Over excavate, moisture condition, and recompact soils which have a moisture context less than listed for compaction to a depth of 18 inches below pavement.
- I. Excavation for Trenches:
1. Dig trenches to the uniform width required for particular item to be installed, sufficiently wide to provide ample working room and shoring, if any. Provide 6 - 9 inch (152 - 228 mm) clearance on both sides of pipe or conduit.
 2. Excavate trenches to depth indicated or required. Carry depth of trenches for piping to establish indicated or proper flow lines and invert elevations. Beyond building perimeter, keep bottoms of trenches sufficiently below finish grade to avoid freeze-ups.
 3. Except as otherwise indicated, excavate for exterior water-bearing piping (water, steam, condensate, drainage) so top of piping is not less than 42 inches (1067 mm) below finished grade.
 4. Grade bottoms of trenches to accurate grade, notching under pipe connections to provide solid bearing for entire body of pipe. Pipe may be bedded in granular material which shall surround pipe approximately 6 inches (152 mm) except where dike is specified.
 5. Do not backfill trenches until tests and inspections have been made and backfilling authorized by Schaefer Architecture. Use care in backfilling to avoid damage or displacement of pipe systems.

3.03 COMPACTION

- A. Roll or tamp using equipment appropriate to conditions under which work is performed. Compact each lift.
- B. Condition soil materials and maintain required moisture content as work proceeds. Rework materials as needed to comply with specifications when in-place work deteriorates or does not comply.
- C. Control soil compaction during construction providing minimum percentage of density and moisture content specified for each area classification indicated below, unless otherwise directed by the Geotechnical Engineer.

1. Fill and backfill within building areas, backfill of foundation walls outside building.

LOCATION	SOIL TYPE	MIN. MOISTURE CONTENT	MINIMUM COMPACTION
Below the LVC	On-Site Soil	Wet of Optimum	95% to 100%
Fill below the LVC	Cohesive PI >20	4% Above Optimum	95% to 100%
	Cohesive PI <20	2% Below Optimum	95% to 100%

	Granular	Workable Moisture	95% to 100%
LVC	Cohesive	2% Below Optimum	95% to 100%
	Granular	Workable Moisture	95% to 100%
	Fly Ash Modified	2% Below Optimum	95% to 100%
Below the LVC	On-Site Soil $PI \leq 20$	2% Below Optimum	95% to 100%
Below the LVC	On-Site High Plasticity Soil $PI \geq 20$	4% Below Optimum	95% to 100%

2. Fill and backfill below pavement areas.

LOCATION	SOIL TYPE	MIN. MOISTURE CONTENT	MINIMUM COMPACTION
Exposed subgrade before fill	On-Site Soil $PI \leq 20$	2% Below Optimum	95% to 100%
Fill	Cohesive $PI \geq 20$	4% Above Optimum	95% to 100%
	Cohesive $PI \leq 20$	2% Below Optimum	95% to 100%
Subgrade the top 8 inches directly below the pavement to be compacted to at least 98%	Fly Ash Modified	Within 2% of Optimum	95% to 100%
	On-Site Soil Cohesive $PI > 20$	4% Above Optimum	95% to 100%
	On-Site Soil Cohesive $PI \leq 20$	2% Below Optimum	95% to 100%
	Granular (AB-3)	Workable	95% to 100%
	On-Site High Plasticity Soil	4% Above Optimum	95% to 100%

3. Fill and backfill of utility trenches outside building areas.

LOCATION	SOIL TYPE	MIN. MOISTURE CONTENT	MINIMUM COMPACTION
Fill	On-Site Soil $PI \leq 20$	2% Below Optimum	90%
	On-Site High Plasticity Soil	4% Above Optimum	95% to 100%

4. Tables above based on Maximum Dry Density (ASTM D698).

3.04 MOISTURE CONTROL - DENSITY:

- A. Condition and maintain required moisture and density in soil layers and subgrade until subsequent layers or until the floor slab or paving are placed.
- B. Protect excavations against drying or over wetting causing the clay bearing and subgrade to shrink or swell.

3.05 BACKFILL AND FILL

- A. Ground Surface Preparation:
 1. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface. Strip 6 inch (152 mm) minimum depth of topsoil with root structure and stockpile for top soil dressing and fill.
 2. Proof-roll the exposed subgrade soils, in the presence of the Soils Engineer, using a rubber tired vehicle weighing at least 20 tons (18 metric tons) to locate soft or unstable soils.
 3. Scarify, plow or otherwise loosen the top 8 inch (203 mm) of the exposed subgrade following proof-rolling operations and the removal of any identified zones of soft or unstable soils. Pulverize and properly moisture condition the scarified soils prior to compacting.
 4. The specified moisture content of the subgrade soils must be maintained during construction. The moisture content of the subgrade soils shall be evaluated prior to the installation of the granular sub-base below the floor slab.
- B. Fill and Backfill Preparation:
 1. Verify that:
 - a. Subgrade and construction below finish grade including, where applicable, drainage system, dampproofing and perimeter insulation are complete.
 - b. Inspection, testing, approval, and recording locations of underground utilities is complete.
 - c. Formwork, trash and debris are removed.
 - d. Permanent or temporary horizontal bracing is in place on walls with one-side ground contact.
 2. Construct five foot long dike in utility trenches outside building in CL & CH soils when no foundation drainage system is provided.
 3. Backfill trenches under floors on-grade up to underfloor granular fill.
- C. Place acceptable conditioned soil material in layers up to required subgrade elevations, for each area classification listed below:
 1. Under Slab on Grade Floors
 - a. Minimum 4 inch (101 mm) granular leveling bed over 18 inch (460 mm) minimum LVC soils. Maintain specified moisture content of soils.
 - b. The upper 8 inch (203 mm) of the subgrade below the LVC soils; add water and rework on-site soils to the specified moisture content.
 2. Foundations
 - a. Including foundations, retaining and tunnel walls-where soil contacts both faces use approved materials as outlined under Soil Materials.
 3. Piping, Conduit, Utilities Under Building
 - a. Backfill with approved under floor materials, as specified above.

4. Piping, Conduit, Utilities Outside Building and Paving
 - a. Excavated materials to bottom of subgrade for paving and to bottom of topsoil otherwise.
5. Pavement Area
 - a. Minimum 9 inch (230 mm) of modified subgrade or approved LVC material below the pavement. Additional fill shall meet the same fill requirements as the fill for the building pad.
6. Walks, Pedestrian Paving
 - a. Minimum 1 inch (25 mm) granular leveling bed over on-site soils or approved soils, scarify and compact top 6 inches (150 mm).
7. Topsoil
 - a. Disturbed areas outside building areas and drives: 4 inch (100 mm)
- D. Placement and Compaction:
 1. Place backfill and fill materials in layers not more than 9 inch (230 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inch (102 mm) in loose depth for material compacted by hand-operated tampers.
 2. Before compaction, moisten or aerate each layer as necessary to provide required moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification.
 3. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
 4. Remove shoring and bracing, and backfill voids with satisfactory materials as work progresses.
 5. Topsoil:
 - a. Place topsoil during dry weather.
 - b. Remove roots, weeds, rocks, and foreign material while spreading.
 - c. Near plants and buildings spread topsoil manually to prevent damage.
 - d. Lightly compact placed topsoil.
- E. Utility Trench Backfill:
 1. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
 2. Trenches under Footings: Reference structural drawings for trenches less than 24 inches (609 mm) below bottom of footing. Backfill trenches with approved fill, compacted and moisture controlled, for trenches more than 24 inches (609 mm) under footings unless structural drawings indicate otherwise.
 3. Place backfill and fill materials evenly adjacent to structures, piping or conduit to required elevations. Take care to prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping or conduit to approximately same elevation in each lift.
 4. Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

3.06 GRADING

- A. Uniformly grade areas within limits of grading including adjacent transition areas. Smooth surface within specified (defined) tolerances. Construct with uniform levels or

slopes between points where elevations are indicated, or between such points and existing grades.

- B. Grade areas adjacent to building to drain away from structures and to prevent ponding.
- C. Finish grade surfaces free from irregular surface changes, rake smooth and leave clean, free of clods.
- D. Walks: Shape subgrade surface to line, grade and cross-section, with finish surface not more than 1/2 inch (12 mm) above or below required elevation. Finish grade topsoil 1 inch (25 mm) below abutting walk surface.
- E. Curbs and Pavements: Shape subgrade surface to line, grade and cross-section, with surface not more than 1/2 inch (12 mm) above or below required subgrade elevation. Earth 1 inch (25 mm) below abutting construction.
- F. Surface Under Building Slabs, Steps, etc.: Subgrade smooth and even, free of voids, compacted as specified within a tolerance of 1/2 inch (12 mm) above or below required elevation.

3.07 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Responsibility of Soil Engineer and/or Inspecting Personnel:
 - 1. Evaluate materials for compaction by performing moisture content and density tests prior to placement and compaction work.
 - 2. Inspect subgrade and excavations for foundations, evaluate and, if necessary, test to assure that the foundation soils provide proper capacities for the structural loading.
 - 3. Perform tests during construction operations as required to assure compliance of all subgrade, fill and backfill.
 - 4. Reject material which in his opinion will be detrimental to fill and/or backfill.
 - 5. Require any extent of manipulation of material to meet specifications.
 - 6. Suspend placement of new material until in-place materials are properly compacted.
 - 7. Require rework of in-place material if work interruptions or weather conditions cause deterioration below acceptable limits.
 - 8. Testing (optimum moisture content/maximum dry density) performed in accordance with ASTM D1556/D1556M (sand cone method) or ASTM D6938 (nuclear method) to verify that specified conditions have been met.
 - 9. When below specification results occur, Contractor shall recompact non complying soils and retest as needed until specifications are met.
 - 10. Submit to Schaefer Architecture and General Contractor two copies of soil compaction test reports and a report certifying that design requirements and specifications have been fulfilled in the construction work.
- C. Responsibility of Contractor:
 - 1. When the testing laboratory is not on the project on a full-time basis, notify testing laboratory whenever fill or backfill is to be placed, so that testing agency can perform tests on subgrade and/or fill as each lift is being placed.
 - 2. Notify testing laboratory of his need for testing services with an 18-hour notice whenever possible or as otherwise arranged to accommodate construction sequencing.
 - 3. Approval of foundation bearing soils is to be obtained from the soils engineer prior to placement of reinforcing steel.

4. Notify soils engineer for his re-evaluation if rain occurs after foundation bearing soils have been approved, but before concrete placement.
- D. Soil Compaction Testing to be completed for the following:
 1. Fill and backfill under building construction.
 2. Subgrade and drainage fill under floors on grade.
 3. Subgrade, fill and backfill under paving and concrete curbs.
 4. Subgrade, fill and backfill under pedestrian paving.
 5. Backfill adjacent to building and site improvements.
 6. Before placement of granular underslab fill, verify subgrade to assure moisture compaction compliance.
- E. Uncontrolled Compaction:
 1. Materials shall be same as approved for controlled fill.
 2. Subgrade and in-place materials shall support fill construction equipment and be compacted sufficiently to preclude settling.
- F. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Schaefer Architecture.
- G. Tests will be performed at the following locations and frequencies:
 1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. (186 sq. m) or less of paved area or building slab, but in no case fewer than three tests.
 2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet (30 m) or less of wall length, but no fewer than two tests.
 3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet (46 m) or less of trench length, but no fewer than two tests.

3.08 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Remove waste materials, including unacceptable and excess excavated material, trash and debris, and legally dispose of it off property of Owner.
- B. Topsoil to remain on property of Owner unless otherwise indicated. Stockpile or spread soil as directed by Schaefer Architecture.

3.09 PROTECTION

- A. Protect newly graded areas from traffic and erosion. Provide temporary erosion control where landscaping is not part of the General Construction contract.

3.10 MAINTENANCE

- A. Erosion deeper than 2 inch (50 mm) in any given area to be repaired by the General Contractor.
- B. Keep all graded areas free of trash and debris.
- C. Repair and re-establish grades in settled or rutted areas to specified tolerances.
- D. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.
- E. Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill materials, compact, and replace surface treatment. At no added cost to Owner, restore

appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

END OF SECTION

Geotechnical Engineering Report

Proposed USD 266 Transportation Center Improvements
NE of 45th Street North and 119th Street West
Maize, Kansas

May 23, 2017
Terracon Project No. 01175071

Prepared for:

Schaefer Johnson Cox Frey Architecture
Wichita, Kansas

Prepared by:

Terracon Consultants, Inc.
Wichita, Kansas

terracon.com

Terracon

Environmental



Facilities



Geotechnical



Materials



May 23, 2017

Schaefer Johnson Cox Frey Architecture
257 N. Broadway
Wichita, Kansas 67202

Attn: Mr. Matt Hamm, AIA
P: 316.684-0171
E: mhamm@sjcf.com

Re: Geotechnical Engineering Report
Proposed USD 266 Transportation Center Improvements
NE of 45th St. North and 119th St. West
Maize, Kansas
Terracon Project Number: 01175071

Dear Mr. Hamm:

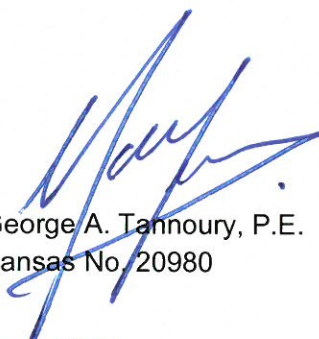
Terracon Consultants, Inc. (Terracon) has completed the geotechnical engineering services for the above referenced project. This study was performed in general accordance with our proposal number P01175071 dated April 14, 2017. This report presents the findings of our subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations, floor slabs, and pavements for the proposed project.

We appreciate the opportunity to be of service to you on this project. We are prepared to provide the construction testing and observation services recommended in this report. If you have any questions concerning this report, or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.



John K. Heinz, P.E.
Kansas No. 12071



George A. Tannoury, P.E.
Kansas No. 20980

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APPENDIX A – FIELD EXPLORATION

Exhibit A-1	Site Location Plan
Exhibit A-2	Boring Exploration Plan
Exhibit A-3	Field Exploration Description
Exhibits A-4 to A-9	Boring Logs
Exhibit A-10	Subsurface Profile

APPENDIX B – LABORATORY TESTING

Exhibit B-1	Laboratory Testing
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APPENDIX C – SUPPORTING DOCUMENTS

Exhibit C-1	General Notes
Exhibit C-2	Unified Soil Classification

EXECUTIVE SUMMARY

A geotechnical study has been performed for the proposed Transportation Center improvements to be located northeast of 45th St. North and 119th St. West in Maize, Kansas. Six geotechnical borings (three at the building areas and three in the pavement areas) designated B-1 through B-6 were performed to depths of 10 to 25 feet below the existing ground surface (BGS) within the proposed building and pavement areas. Based on the information obtained from our subsurface exploration, it is our opinion that the site can be developed for the proposed project. The following geotechnical considerations were identified:

- In our opinion, the proposed building can be supported on shallow footings bearing on newly constructed compacted structural fill and/or medium stiff to stiff native clays.
- Existing fill was encountered to depths of about 2 ½ to 6 feet BGS at two of our six boring locations, and should be expected to occur in other areas of the proposed construction. We have no documentation of field tests taken to record that the existing fill was placed in lifts with proper soil moisture and density controls. We consider the existing fill in its present condition to be unsuitable for building support and it should be removed/reconstructed and/or replaced with new engineered fill as described in this report.
- Some of the near-surface soils are active and prone to volume change with variations in moisture content. For this reason, we recommend an 18 inch thick low volume change zone (LVC) be constructed beneath floor slabs supported-on-grade and possibly moisture conditioning up to 30 inches below the LVC zone if dry conditions are encountered at the time of construction. Construction of the LVC zone may require over-excavation in portions of the building pad if cuts are required to develop design grade.
- On-site native soils free of organics and deleterious materials appear suitable for use as compacted structural fill; however, the near-surface soils do not meet the low plasticity fill criteria and should not be utilized within 18 inches of the finished grade beneath the at-grade building areas.
- Close monitoring of the construction operations discussed herein will be critical in achieving the design subgrade and foundation support. We therefore recommend that Terracon be retained to monitor this portion of the work.

This summary should be used in conjunction with the entire report for design purposes. It should be recognized that details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein. The section titled **GENERAL COMMENTS** should be read for an understanding of the report limitations.

GEOTECHNICAL ENGINEERING REPORT
PROPOSED USD 266 TRANSPORTATION CENTER IMPROVEMENTS
NE OF 45TH STREET NORTH AND 119TH STREET WEST
MAIZE, KANSAS

Terracon Project No. 01175071

May 23, 2017

1.0 INTRODUCTION

We have completed our geotechnical engineering study for the proposed Transportation Center improvements to be located northeast of 45th St. North and 119th St. West in Maize, Kansas. Six geotechnical borings (three at the building areas and three in pavement areas) designated B-1 through B-6 were performed to depths of 10 to 25 feet below the existing ground surface (BGS) within the proposed building and pavement areas. This report specifically addresses geotechnical recommendations for the proposed facility. Logs of the borings along with a site location plan and a boring exploration plan are included in Appendix A of this report.

The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- subsurface soil conditions
- groundwater conditions
- earthwork
- foundation design and construction
- floor slab design and construction
- lateral earth pressure and drainage considerations
- pavement design and construction considerations

2.0 PROJECT INFORMATION

2.1 Site Location

ITEM	DESCRIPTION
Location	This project is located at the NEC of 45th St. North and 119th St. West in Maize, Kansas.
Existing improvements	The existing maintenance building occupies the northwest portion of the property. The remainder of the site is primarily farmland.
Current ground cover	The site is primarily vegetated with wheat/grass or is gravel surfaced.
Existing topography	The site is relatively level to slightly sloping.

2.2 Project Description

ITEM	DESCRIPTION
Structures	The project will include the following: ■ Maintenance Building Addition --- A single-story, slab-on-grade (non-basement) addition with a footprint of about 15,000 square feet. ■ Office Building --- A single-story, slab-on-grade (non-basement) building with a footprint of about 8,000 square feet. ■ Fuel Station Building --- A single-story, slab-on-grade (non-basement) building with a footprint of about 1,200 square feet.
Building construction	The buildings/addition will be steel frame construction.
Finished floor elevation	The maintenance building addition will match finished floor level of the existing building. The office building finished floor level will be 1,372.5 feet Mean Sea Level (MSL). The finished floor level of the fuel station building will be 1,368.75 feet MSL.
Maximum loads (provided by SJCF)	Columns: 50 kips Walls: 4 klf (storm shelter)
Grading	We anticipate that less than about 2 feet of cut/fill will be required to achieve final grades.
Pavements	Paved parking and drive areas are proposed on the west side of the site. Gravel surfaced parking and storage areas are proposed for the center and eastern portions of the site.
Below grade areas	An approximately 8 foot deep pit, with a footprint of about 300 square feet, is planned near the center of the maintenance building addition.
Free-standing retaining walls	None anticipated

3.0 SUBSURFACE CONDITIONS

3.1 Geology

The site is on a high alluvial terrace overlooking the Arkansas River valley to the southeast. The present course of the Arkansas River is about 5 miles east of the site. The native site soils encountered in our borings were alluvial clays overlying older basal sand alluvial deposits. We describe the soil conditions encountered in our borings in more detail below.

3.2 Typical Profile

Based on the results of our borings the subsurface conditions on the project site can be generalized as follows.

Stratum	Approximate Depth to Bottom of Stratum (feet BGS)	Material Description	Consistency/Density/Weathering
Surface	5 inches	Topsoil	N/A
1	2 to 6	Fill: lean clay and sandy lean clay (B-1 and B-2)	N/A
2 ¹	7 to 17	Lean clay and sandy lean clay (B-1 thru B-4)	Medium stiff to stiff
2A	4 to 10 ²	Fat clay and lean to fat clay (B-3, B-5, and B-6)	Medium stiff to stiff
3	10 ³ to 15 ³	Lean clay and sandy lean clay (B-5 and B-6)	Stiff to very stiff
4	19	Clayey sand: fine to medium grained (B-4)	Medium dense
5	20 ⁴ to 25 ⁵	Sand: fine to medium grained (B-1 and B-4)	Medium dense

1. Boring B-2 was terminated in this stratum at a depth of 10 feet
2. Maximum depth explored at borings B-2, B-3 and B-5
3. Maximum depth explored in borings B-6
4. Maximum depth explored in boring B-4
5. Maximum depth explored in boring B-1

We generally classified the near-surface soils as lean clays and fat clay with medium to high plasticity. The tested samples had the following measured liquid limits, plastic limits, and plasticity indices:

Sample Location, Depth (feet BGS)	Liquid Limit	Plastic Limit	Plasticity Index
Boring B-3, 1 – 2½ ft.	38	17	21
Boring B-4, 1 – 2½ ft.	30	16	14
Boring B-5, 1 – 2½ ft.	57	22	35
Boring B-6, 1 – 2½ ft.	47	19	28

We indicated the subsurface conditions encountered at each boring location on the boring logs. The stratification boundaries shown on the borings logs represent the approximate locations of changes in soil types; in situ, the transition between material types may be gradual. Details for each of the borings can be found on the boring logs in Appendix A of this report.

3.3 Groundwater

We monitored the boreholes for the presence and level of groundwater while we were drilling and upon completion of drilling activities. We did not observe groundwater in our borings (maximum boring depth of 25 feet BGS) while drilling or for the short duration that the borings were allowed to remain open. Long-term observations in deeper piezometers or observation wells sealed from the influence of surface water could be used to more accurately define the groundwater levels.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time we performed the borings. You should consider the possibility of groundwater level fluctuations when developing the design and construction plans for the project. Also, it is possible that groundwater could temporarily perch seasonally at shallow depths.

3.4 Site Abnormality

During our drilling and the laboratory testing operations, we detected **hydrocarbon odors** emanating from the sample obtained from boring B-4 sample 6 at this site. Identifying the type of hydrocarbon and its concentration is beyond the scope of this study. The design and construction recommendations presented in our report, do not address the potential effects of contamination on the proposed project. Possible effects include, but are not limited to, vapor accumulation in excavations. In addition, excavation and backfilling, which are often required for removal of contaminants, would alter the subsurface conditions described in this report and may necessitate modification of the recommendations. A designer of any project on this site should be made aware of the information contained in this report.

4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

4.1 Geotechnical Considerations

A grading plan was not available at the time we prepared this report. We anticipate that cuts/fills of about 2 feet required to achieve final grades. We analyzed the foundation support conditions based on this grading assumption and the data obtained from the field and laboratory testing programs. In our opinion, it is feasible to support the proposed buildings on footing foundations bearing on new engineered fill and/or stiff native clay soils. We present below our geotechnical

recommendations related to foundations, building pad subgrade preparation, pavements, and other geotechnical aspects of the project.

Existing fill materials were found to depths of about 2 ½ to 6 feet BGS at two of our six boring locations our boring locations. Fill should be expected to occur (possibly to a greater depth) in other areas across the site. We are not aware that the existing fill has been placed with moisture and density control. Foundations and floor slabs supported on or above existing uncontrolled fill material that has not been uniformly placed and compacted with strict moisture and density control may not perform predictably. We consider the existing fill to be unsuitable to support the proposed building. The depth and composition of the existing fill materials can vary greatly over relatively small lateral and vertical distances. Because of this variability, it may not be possible (until site grading is underway) to accurately predict the amount of fill that will need to be removed and replaced to develop suitable support for the proposed improvements. Caution should be exercised when using the depth and composition of the fill observed at the discrete boring locations, for estimating purposes.

The fill observed in our borings generally appears suitable for re-use as new controlled fill, provided it is properly moisture conditioned and compacted. However, the fill could contain unobserved materials that would render it unsuitable for re-use as new controlled fill. We encourage the owner to secure a base bid for removing and replacing a specified quantity of the existing fill. The owner should also secure unit rates for adding or deducting quantities from the base bid that include costs for exporting unsuitable materials and importing approved replacement materials, if required

Moderately to highly expansive soils are present on this site. This report provides recommendations to help mitigate the effects of soil shrinkage and expansion. However, even if these procedures are followed, some movement and cracking in the structures should be anticipated. The severity of cracking and other damage such as uneven floor slabs will probably increase if any modification of the site results in excessive wetting or drying of the expansive soils. Eliminating the risk of movement and distress may not be feasible, but it may be possible to further reduce the risk of movement if significantly more expensive measures are used during construction. Some of these options could include increasing the thickness of the recommended low volume change zone and/or constructing a structural slab. We would be pleased to discuss other construction alternatives with you upon request.

The owner or contractor could consider a contingency budget to provide for additional earthwork items such as moisture conditioning dry subgrade soils, repairing soft subgrade soils, and removing unsuitable foundation bearing soils.

4.2 Earthwork

4.2.1 Site Preparation

We recommend removing any surface vegetation, topsoil, and existing fill from within and at least 5 feet beyond the building areas presently proposed for construction. After completing these operations and any cuts needed to allow for the moisture conditioned zone (if needed), we recommend the exposed subgrade be thoroughly proofrolled (under the observation of Terracon personnel) with a loaded tandem-axle dump truck or other heavy, rubber-tired construction equipment weighing at least 20 tons, to locate any zones that are soft or unstable. The subgrade in the building areas where excessive rutting or pumping occurs during proofrolling should be removed and replaced or aerated/reworked and recompacted in place to our recommendations for engineered fill (see below for details) prior to placement of areal fill.

4.2.2 Material Types

Engineered fill should meet the following material property requirements:

Fill Type ¹	USCS Classification	Acceptable Location for Placement
Lean clay ²	CL ³ (LL<46 & PI>15)	> 18 inches below building finished subgrade
Lean to fat clay ^{2, 3}	CL/CH ³ (46≤LL<50)	> 18 inches below building finished subgrade
Fat clay ²	CH (LL≥50)	> 18 inches below building finished subgrade
Well graded granular and silty gravel	GM-GW GM ⁴	All locations and elevations
Low Volume Change Material ⁵	CL or GM-GW, GM ⁴ and (LL<40 & 5≤PI<15)	All locations and elevations
On-Site Soils	Varies	The on-site soils typically appear suitable for reuse as engineered fill. However, some of these soils do not meet the low volume change zone criteria and these soils should not be utilized within 18 inches of finished subgrade beneath the proposed buildings.

Continued:

1. Controlled compacted fill should consist of approved materials that are free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to the geotechnical engineer for evaluation of fat clays and lean clays should be performed in the field by a qualified geotechnical engineer or their representative, and could require additional laboratory testing.
2. Delineation of fat clays and lean clays should be performed in the field by a qualified geotechnical engineer or their representative, and could require additional laboratory testing.
3. By our definition, cohesive soils with a liquid limit of 46 to 49 are classified as lean to fat clay (with the borderline symbol CL/CH) to alert of the expansive potential of clay soils with liquid limits close to 50 (see ASTM D2487-11, Section 1.1, Note 1.)
4. Similar to KDOT AB-3 crushed limestone aggregate, limestone screenings, or granular material such as sand, gravel or crushed stone containing at least 15% low plasticity fines (-#200).
5. Low volume change cohesive soil or granular soil having at least 15% low plasticity fines (-#200). See section **4.4.2 Low Volume Change Zone** of this report.

4.2.3 Compaction Requirements

Engineered fill should meet the following compaction requirements:

ITEM	DESCRIPTION
Fill Lift Thickness	9-inches or less in loose thickness when heavy, self-propelled compaction equipment is used or 4 to 6 inches in loose thickness when hand-guided equipment (jumping jack or plate compactor) is used
Compaction Requirements ¹	Building areas: At least 95%, but not more than 100%, of the material's maximum standard Proctor dry density (ASTM D698). Pavement areas: At least 95% of the material's maximum standard Proctor dry density. The final 8 inches directly below pavements should be at least 98% of the material's maximum standard Proctor dry density.
Moisture Content Cohesive Soils with PI of 35 and higher	At least 3 percentage points above the optimum moisture content value as determined by the standard Proctor test at the time of placement and compaction
Moisture Content Cohesive Soils with PI of 25 to 34	At least 2 percentage points above the optimum moisture content value as determined by the standard Proctor test at the time of placement and compaction
Moisture Content Cohesive Soils with PI of 18 to 24	Above the optimum moisture content value as determined by the standard Proctor test at the time of placement and compaction

ITEM	DESCRIPTION
Moisture Content Cohesive Soils with PI less than 18	No drier than 2 percentage points below the optimum moisture content value as determined by the standard Proctor test at the time of placement and compaction
Moisture Content Granular Material ²	Workable moisture levels

1. We recommend the moisture content and compaction be determined for each lift of engineered fill during placement. Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified moisture and compaction requirements are achieved. The zone of fill compacted to meet this criteria should extend at least 5 feet and 2 feet horizontally beyond the building footprints and pavement areas, respectively.
2. Specifically, moisture levels should be maintained low enough to allow for satisfactory compaction to be achieved without the cohesionless fill material pumping when proofrolled.

4.2.4 Utility Trench Backfill

Utility trenches are a common source of water infiltration and migration. All utility trenches that penetrate beneath the structure should be effectively sealed to restrict water intrusion and flow through the trenches that could migrate below the structure. We recommend constructing an effective “trench plug” that extends at least 5 feet out from the face of the building exteriors. The plug material should consist of cementitious “flowable fill” or impervious clay. The trench plug material should be placed to surround the utility line. If used, the clay trench plug material should be placed and compacted to comply with the moisture content and compaction recommendations for areal fill stated previously in this report.

4.2.5 Grading and Drainage

All grades must provide effective drainage away from the structures during and after construction. Water permitted to pond next to the structures can result in greater soil movements than those discussed in this report. These greater movements can result in unacceptable differential floor slab and/or foundation movements, cracked slabs and walls, and roof leaks. Estimated movements described in this report are based on effective drainage for the life of the structures and cannot be relied upon if effective drainage is not maintained. The roofs should have gutters/drains with downspouts that discharge onto pavement or splash blocks at a distance of at least 10 feet from the structures.

Exposed ground should be sloped and maintained at a minimum 10 percent (5 percent where pavement will abut the structures, or less to meet ADA requirements) away from the structure for at least 10 feet beyond the perimeter of the structures. After building construction and landscaping, we recommend verifying final grades to document that effective drainage has been achieved. Grades around the structures should also be periodically inspected and adjusted as necessary, as part of the structures’ maintenance program. Where paving or flatwork abuts the

structures, we recommend a maintenance program to effectively seal and maintain joints to prevent surface water infiltration.

4.2.6 Earthwork Construction Considerations

It is anticipated that excavations for the proposed construction can be accomplished with conventional earthmoving equipment. Upon completion of filling and grading, care should be taken to maintain the subgrade moisture content prior to construction of floor slabs and pavements. Construction traffic over the completed subgrade should be avoided to the extent practical. The site should also be graded to prevent ponding of surface water on the prepared subgrade or in excavations. If the subgrade should become frozen, desiccated, saturated, or disturbed, the affected material should be removed or these materials should be scarified, moisture conditioned, and recompact prior to floor slab and pavement construction and observed by Terracon.

Surface water should not be allowed to pond on the site and soak into the soil during construction. Construction staging should provide drainage of surface water and precipitation away from the building and pavement areas. Any water that collects over or adjacent to construction areas should be promptly removed, along with any softened or disturbed soils. Surface water control in the form of sloping surfaces, drainage ditches and trenches, and sump pits and pumps will be important to avoid ponding and associated delays due to precipitation and seepage.

Based on our understanding of the proposed buildings, we do not expect groundwater to adversely affect construction. If groundwater is encountered during construction, some form of temporary or permanent dewatering may be required. Conventional dewatering methods, such as pumping from sumps, should likely be adequate for temporary removal of any groundwater encountered during excavation at the site.

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, and in accordance with any applicable local, state, and federal safety regulations. The contractor should be aware that slope height, slope inclination, and excavation depth should in no instance exceed those specified by these safety regulations. Flatter slopes than those dictated by these regulations may be required depending upon the soil conditions encountered and other external factors. These regulations are strictly enforced and if they are not followed, the owner, contractor, and/or earthwork and utility subcontractor could be liable and subject to substantial penalties.

Construction site safety is the sole responsibility of the contractor who controls the means, methods and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean that Terracon is assuming any responsibility for construction site safety or the contractor's activities; such responsibility shall neither be implied nor inferred.

4.3 Foundations

In our opinion, the proposed buildings can be supported by a shallow, spread footing foundation system bearing on newly constructed compacted structural fill and/or suitable medium stiff to stiff native clays. Design recommendations for shallow foundations for the proposed buildings are presented in the following paragraphs.

4.3.1 Design Recommendations

DESCRIPTION	<u>Column</u>	<u>Continuous</u>
Net allowable bearing pressure ¹ on suitable medium stiff to stiff native clays and/or newly constructed compacted structural fill ²	2,000 psf	2,000 psf
Minimum footing width	30 inches	12 inches (trenched) 16 inches (formed)
Minimum embedment below finished grade for frost protection ³	36 inches	36 inches
Estimated total settlement ⁴	<1 inch	<1 inch
Estimated differential settlement ⁴	<¾ inch between columns	<¾ inch over 40 feet

1. The recommended net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. Assumes any unsuitable fill or soft soils, if encountered, will be undercut and replaced with engineered fill.
2. All new engineered fill beneath footings should be constructed as recommended in section **4.2.3 Compaction Requirements**.
3. And to reduce the effects of seasonal moisture variations in the subgrade soils. For perimeter footings and footings beneath unheated areas. Where pavement extends at least 10 feet beyond the building, the minimum footing embedment depth could be reduced to 30 inches.
4. The foundation settlement will depend upon the variations within the subsurface soil profile, the structural loading conditions, the embedment depth of the footings, the thickness of compacted fill, and the quality of the earthwork operations. The above settlement estimates have assumed that the maximum loads stated previously will not be exceeded.

4.3.2 Foundation Construction Considerations

The base of all foundation excavations should be free of water and loose soil prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Care should be taken to prevent wetting or drying of the bearing materials during construction.

Extremely wet or dry material or any loose or disturbed material in the bottom of the footing excavations should be removed before foundation concrete is placed. Should the soils at bearing level become excessively dry, disturbed or saturated, or frozen, the affected soil should be removed prior to placing concrete. Consider placing a lean concrete mud-mat over the bearing soils if the excavations must remain open over night or for an extended time.

Regarding construction of footings, we generally anticipate that material suitable for support of the design bearing pressure will be present at the base of the footings. However, there is a possibility that isolated zones of soft, low density fill or native soils could be encountered below footing bearing level, even though field density tests are expected to be performed during fill placement operations. Therefore, we recommend that the geotechnical engineer be retained to observe, test, and evaluate the soil foundation bearing prior to placing reinforcing steel and concrete to determine if additional footing excavation depth is needed.

If unsuitable bearing soils are encountered in footing excavations, the excavations should be extended deeper to suitable soils and the footings could bear directly on these soils at the lower level or on lean concrete backfill placed in the excavations. As an alternative, the footings could also bear on properly compacted backfill extending down to the suitable soils. Overexcavation for compacted backfill placement below footings should extend laterally beyond all edges of the footings at least 8 inches per foot of overexcavation depth below footing base elevation. The overexcavation should then be backfilled up to the footing base elevation with approved materials such as well-graded granular material constructed as described in section **4.2.3 Compaction Requirements**.

Care should be taken during construction not to disturb the soils beneath the existing foundations. Some overlap of stresses between the new and existing footings will occur if the two foundation systems abut each other possibly causing some movement of the existing footings and supported structures. To reduce this overlap of stresses between the new and existing footings we recommend maintaining a clear distance between the edge of the new and existing footings at least equal to one-half the width of the new footings. Connections between the new and existing structures should accommodate some movement between the additions and the adjoining existing buildings.

4.4 Floor Slabs

4.4.1 Building Pad Subgrade Preparation

A factor affecting floor slab performance is the potential for the subgrade soils to shrink/swell due to variations in moisture content. Typically, some increase in the floor slab subgrade moisture content will occur because of gradual accumulation of capillary moisture, which would otherwise evaporate if the floor slab had not been constructed. A soil's swell potential is dependent primarily on its plasticity, and moisture content. The confining pressure provided by the weight of the floor slab and the overburden pressure (including the fill required to develop design grade) also effect swell potential. Subgrade soils with higher plasticity and lower moisture content and confining pressure, generally have greater swell potential.

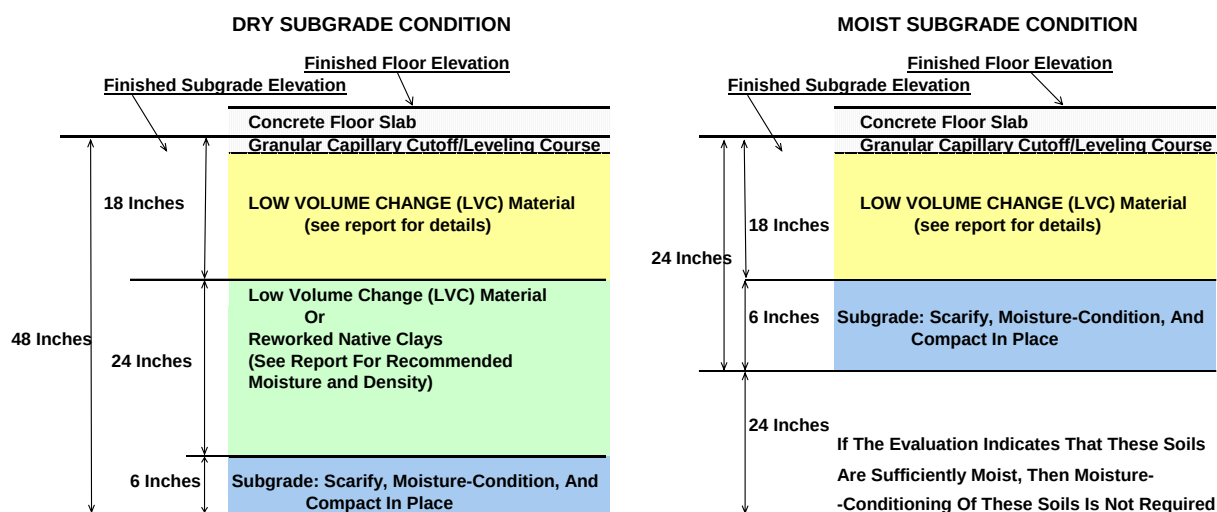
The near-surface soils encountered in our borings have medium to high plasticity and were generally in a relatively moist condition at the time of our subsurface exploration. Based on a method of analyses that uses Atterberg limits values, total unit weight, and our experience with similar soils,

we estimated a potential vertical rise (PVR) of about 1½ inches for these soils. In our opinion, this amount of potential vertical rise could cause excessive heave of floor slabs. Since it is not possible to predict moisture variations over time, we based this soil movement on a relatively dry soil moisture condition in the native soil below the existing fill that we recommend be removed, properly moisture conditioned and compacted. This potential to swell could increase if further drying occurs prior to, or during, construction. To reduce the swell potential to a relatively small amount, less than about 1 inch, we recommend that at least the upper 18 inches of subgrade soils below the floor slab be low volume change (LVC) material that we describe in detail in section **4.4.2 Low Volume Change Zone** of this report.

Because we expect that the medium to high plasticity clay materials could have greater swell potential if they are drier at the start of construction than they were at the time the borings were performed, constructing an 18-inch thick LVC zone may not be adequate to limit floor slab heave to a small amount. Therefore, we recommend that Terracon evaluate the material within 30 inches of the bottom of the LVC zone just prior to placement of any additional fill (see *Building Subgrade Preparation Diagram* below). Where the existing native materials within this depth range at the start of construction are drier than the minimum moisture requirements stated in section **4.2.3 Compaction Requirements** of this report, we recommend corrective procedures be implemented.

These procedures would include over-excavating if dry soils are present and either uniformly increasing their moisture content to the minimum moisture contents stated in section **4.2.3 Compaction Requirements** of this report and reworking/recompacting the soil in lifts, or replacing them with LVC material. If LVC material is used to replace the dried soils, it should be placed at the moisture content values described in section **4.2.3 Compaction Requirements** of this report.

BUILDING SUBGRADE PREPARATION DIAGRAM (NOT TO SCALE)



Note: Presently the near surface soils are typically relatively moist. Also remove and replace unsuitable materials including uncontrolled existing fill that may extend to greater depths than shown in the above diagrams.

Prior to placing additional areal fill where moisture conditioning (as described above) is not needed, we recommend the upper 6 inches of exposed subgrade be scarified and recompact to the compaction requirements and at the moisture contents stated in section **4.2.3 Compaction Requirements** of this report.

4.4.2 Low Volume Change Zone

As stated previously, we recommend the upper 18 inches of material directly below the floor slabs be LVC material. This is primarily to help protect the newly placed fill from moisture fluctuations during construction and provide a layer of soil that will not experience significant volume change as the moisture content fluctuates.

By our definition, LVC materials have a liquid limit (LL) less than 40 and a plasticity index (PI) of at least 5, but less than 15. LVC materials that meet this requirement may include granular soils (such as limestone/concrete screenings or clayey sand) or possibly silty, sandy or lean clays, although laboratory testing of prospective LVC materials proposed for use by the contractor should be conducted to confirm their suitability prior to bidding/construction. Cohesive LVC soils may need extensive “wetting maintenance” by the contractor to maintain the required above optimum moisture content in the cohesive LVC material until construction of the floors. Based on the soils encountered in the borings, the near-surface fat clays do not meet the criteria for LVC material.

If cohesive material meeting the above criteria cannot be readily obtained, an LVC soil may be developed with the clay overburden soils by modifying them with hydrated lime, Class C fly ash, or possibly Cement Kiln Dust (CKD) although using these agents may result in objectionable dusting problems. A lime slurry application (or the use of granular LVC materials) may reduce the dusting problems. It has been our experience that some CKD products have excessively high sulfate contents that would react adversely when mixed with soils, causing undesirable swell and heave. When CKD is considered, we recommend that a recent chemical laboratory analysis is submitted to us for review prior to approval of the CKD product.

For clay materials, it has been our experience that hydrated lime contents of 4% to 6%, CKD contents of 6% to 8%, or Class C fly ash contents of 14% to 16%, based on the dry weight of the soil, would typically be required to appreciably reduce the shrink/swell characteristics of clayey soils not meeting the previously described plasticity requirements for LVC materials. A more precise application rate should be developed based on additional laboratory testing. Recognized guidelines such as those specified by KDOT or City of Wichita (including minimum mixing temperatures) should be followed during the mixing and construction of the fly ash- or lime-modified subgrade. A lime slurry application or the use of a granular LVC material may reduce the dusting problems that could occur with subgrade modification using fly ash. The modified zone should extend at least 3 feet beyond the edges of the proposed building. Soils mixed with Class C fly ash should be compacted within 2 hours following blending operations.

The LVC soils should be placed in lifts not exceeding 9 inches in loose thickness and compacted to at least 95%, but not more than 100%, of maximum dry density. Cohesive soils should be placed and maintained at moisture contents not less than 2 percentage points below their optimum moisture content. Granular soils should be placed at workable moisture content. If lime- or fly ash-modified soils are used, they should be placed and maintained at moisture contents above their optimum moisture content.

Cohesive LVC materials can be swell susceptible if allowed to dry before constructing the floor slab; therefore, it is important that the recommended moisture content of the cohesive LVC material be maintained. As a check, we recommend the subgrade moisture content be evaluated about 3 to 4 days before placing concrete. If drying of the subgrade materials has occurred at this time, measures should be taken to increase the moisture content of the subgrade soils before placing the sand leveling course or concrete, which may also include recompaction. If the subgrade was modified with fly ash and recompaction is required, additional fly ash would be needed.

We suggest constructing the upper 4 to 6 inches of the LVC zone using crushed limestone silty gravel similar to KDOT AB-3-Type material to reduce the above stated swell potential associated with cohesive LVC materials or on-site soils that are allowed to dry excessively. This granular zone would reduce the moisture fluctuations in the bottom portion of the LVC zone and also provide a more stable working surface during construction following inclement weather.

4.4.3 Floor Slab Considerations

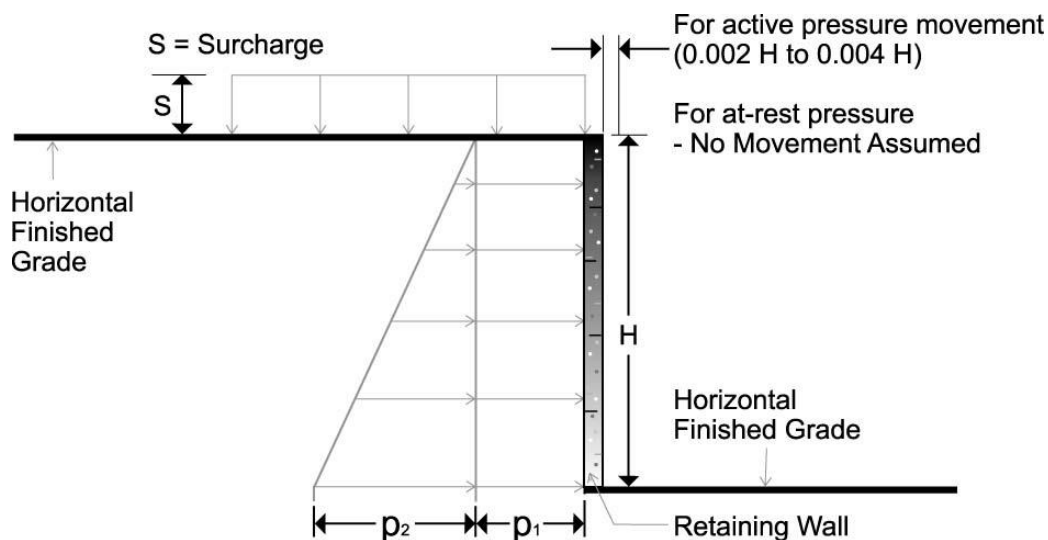
We recommend that all HVAC supply/return ducts be above floor level as air-flow and heat transfer through these ducts can cause substantial post-construction drying and shrinkage of clay subgrade and result in severe floor slab/interior wall distress.

The use of a vapor retarder should be considered beneath concrete slabs on grade that will be covered with wood, tile, carpet or other moisture sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer and slab contractor should refer to ACI 302 for procedures and cautions regarding the use and placement of a vapor retarder.

4.5 Pit Considerations

During construction, the sides of excavations for the below-grade pit area should be sloped or braced for stability to comply with OSHA criteria. You should expect unbalanced lateral pressures to develop against pit walls. Reinforced concrete walls with unbalanced backfill levels on opposite sides should be designed for earth pressures at least equal to those indicated in the following table. Earth pressures will be influenced by structural design of the walls, conditions of wall restraint, methods of construction and/or compaction and the strength of the materials being restrained.

Two wall restraint conditions are shown. Active earth pressure is commonly used for design of free-standing cantilever retaining walls and assumes wall movement. The "at rest" condition assumes no wall movement and would apply to pit walls. The recommended design lateral earth pressures do not include a factor of safety and do not provide for possible hydrostatic pressure on the walls.



EARTH PRESSURE COEFFICIENTS

Earth Pressure Conditions	Coefficient For Backfill Type	Equivalent Fluid Density. (pcf)	Surcharge Pressure, p_1 (psf)	Earth Pressure, p_2 (psf)
Active (K_a)	Granular – 0.33	40	$(0.33)S$	$(40)H$
	Lean Clay – 0.42	50	$(0.42)S$	$(50)H$
At-Rest (K_o)	Granular – 0.46	55	$(0.46)S$	$(55)H$
	Lean Clay – 0.58	70	$(0.58)S$	$(70)H$
Passive (K_p)	Granular – 3.0	360	---	---
	Lean Clay – 2.4	288	---	---

Applicable conditions to the above include:

- For active earth pressure, wall must rotate about base, with top lateral movements of about $0.002 H$ to $0.004 H$, where H is wall height
- For passive earth pressure to develop, wall must move horizontally to mobilize resistance.
- Uniform surcharge, where S is surcharge pressure
- In-situ soil backfill weight a maximum of 120 pcf
- Horizontal backfill, compacted between 95 and 98 percent of standard Proctor maximum dry density
- Loading from heavy compaction equipment not included

- No hydrostatic pressures acting on wall
- No dynamic loading
- No safety factor included in soil parameters
- Ignore passive pressure in frost zone

In addition to the pressures described above, a uniform surcharge load applied adjacent to the pit walls also could impose lateral pressures on these walls. If continuous or isolated loads are imposed beyond the zone that extends up from the bottom of the pit walls at an angle no steeper than 1H:1V, the effect of the vertical loads on the pit walls would be negligible.

Backfill placed against the pit walls should preferably consist of granular soils or low plasticity cohesive soils. For the granular values to be valid, the granular backfill must extend out from the base of the wall at an angle of at least 45 and 60 degrees from vertical for the active/at-rest and passive cases, respectively. To calculate the resistance to sliding, a value of 0.30 should be used as the ultimate coefficient of friction where the footing bears on suitable soil. To reduce the potential for hydrostatic pressure behind pit walls, we recommend that drainage be provided (see below for details). If a mechanism for drainage is not provided, then combined hydrostatic and lateral earth pressures should be calculated using an equivalent fluid weighing 90 and 100 pcf for active and at-rest conditions, respectively if clay backfill is used. For granular backfill, an equivalent fluid weighing 85 and 90 pcf should be used for active and at-rest, respectively.

Compaction of each lift of fill adjacent to foundation walls should be accomplished with hand-operated tampers or other lightweight compactors. Over-compaction may cause excessive lateral earth pressures that could result in wall movement. Final exterior grades should be sloped to provide positive drainage away from foundations.

Although it appears that the groundwater table would be below the proposed pit level, perched water could develop after prolonged periods of rain and the fluctuations in the ground water table could develop. To prevent hydrostatic loading on below-grade walls, we recommend constructing drain lines outside the pit walls at least 1 foot below pit level. We recommend the drain lines be perforated, rigid plastic or metal drain pipes with a minimum diameter of 4 inches. The drain lines should daylight or be connected to a sump equipped with a pump. To prevent intrusion of fines, the drain lines should be surrounded by a minimum thickness of 6 inches of appropriately-sized, graded, granular filter material. As an alternative, the drains could be surrounded with at least 6 inches of free-draining granular material, and the granular material encapsulated with suitable filter fabric. The area above the drain lines extending at least 24 inches out from the wall should be backfilled with free-draining coarse sand with no more than 2% passing the #200 sieve. The upper 2 feet of backfill should be relatively impervious clay to reduce infiltration of surface runoff into the below-grade drainage system.

To prevent hydrostatic loading on pit floor slabs we recommend drain lines be placed in a granular drainage blanket at least 4 inches thick. The blanket should be constructed of free-draining material, such as UD-1, as specified by the KDOT. The drain lines should be spaced on centers (one direction only) not exceeding about 15 feet and should be perforated, rigid plastic or metal drain pipes with a minimum diameter of 4 inches.

4.6 Pavement Subgrade Preparation

We recommend removal of any vegetation, organic topsoil, and all existing fill from the areas to be paved. However, if the Owner is willing to accept the risks associated with constructing pavements on existing fill (possible reduced performance or premature pavement failure), consideration could be given to leaving the existing fill in place unless failures are identified during proofrolling as described previously in section **4.2.1 Site Preparation** of this report.

Following any cuts needed and proofrolling procedures, the upper 9 inches of resulting exposed subgrade prior to fill placement and all additional fill should be compacted to at least 95% of its maximum dry density by ASTM D-698 at moisture contents above its optimum moisture content. Any additional fill should be approved material free of organic matter and debris that is placed in lifts not to exceed 9 inches in loose thickness and compacted to at least 95% of its maximum dry density at moisture contents above optimum moisture content. We recommend the final 18 inches of subgrade beneath pavements and exterior slabs meet the minimum moisture recommendations stated for additional fill in section **4.2.3 Compaction Requirements** in this report. This may require subgrade removal, moisture manipulation, and recompaction.

We recommend modifying the final 8 inches of subgrade in all areas to be paved or removing and replacing the upper 8 inches of subgrade soils with suitable granular material. This would improve subgrade support, reduce swell potential, and reduce the tendency for rutting in untreated wet cohesive subgrades by the paving spreader and loaded dump trucks during the paving operation. The final subgrade should be constructed of one of the following:

- Modified subgrade by blending Class C fly ash, hydrated lime, or cement slurry with on-site clay soil
- Granular subbase of silty gravel meeting KDOT requirements for AB-3 base
- Crushed concrete or limestone subbase over a geo-grid or engineering fabric

If used, we recommend applying the modifying agent at an application rate sufficient to achieve a minimum laboratory CBR value of 25. This can typically be obtained with Class C fly ash contents of about 14% to 16% or lime contents of about 4% to 6%, based on the dry weight of the soil, although this may result in objectionable dusting problems. A more precise application rate should be developed based on additional laboratory testing. A lime slurry application (or the use of granular materials) may reduce the dusting problems.

It has been our experience that some CKD products have excessively high sulfate contents that would react adversely when mixed with soils, causing undesirable swell and heave. When CKD is considered, we recommend that a recent chemical laboratory analysis is submitted to us for review prior to approval of the CKD product.

Because of the potentially deleterious heave that could result if hydrated lime is used to modify shale or soil that contains sulfates, such as gypsum zones or seams, we recommend that shale or overlying soil above the shale **not be modified** with hydrated lime unless extensive additional laboratory and field testing is performed to determine if excessive sulfates are present and if they would react adversely with the hydrated lime.

The lime-, cement slurry-, or fly ash-modified subgrade or silty gravel (KDOT AB-3) subbase should be compacted to at least 98% of its standard Proctor maximum dry density at a final moisture content within 2 percentage points of its optimum moisture content by ASTM D-698. The modified zone should extend at least 1 foot beyond the edge of the pavement. Soils mixed with Class C fly ash should be compacted within 2 hours following blending operations. Recognized guidelines, such as those specified by the KDOT should be followed in the mixing and blending of lime or fly ash-modified material.

Cohesive pavement subgrades, including fly ash-modified materials, can lose strength if subjected to prolonged wetting/drying and/or freeze/thaw conditions or they can become swell susceptible if allowed to dry excessively before paving operations. Therefore, it is important that the recommended moisture content of cohesive, subgrades in pavement areas be maintained. As a check, we recommend the moisture content be evaluated about 1 to 2 days before paving operations. If drying or disturbance/loosening of the subgrade materials has occurred at this time, measures should be taken to adjust their moisture content and/or recompact the subgrade soils before paving operations. If the subgrade was previously modified with fly ash and recompaction is required, additional fly ash would be needed.

4.6.1 Typical Pavement Thicknesses

Specific information on the type and volume of traffic anticipated at this site was not provided. We anticipate that traffic on most of the pavements will consist of personal vehicles (cars and pickups). More repetitions of traffic are anticipated in drive lanes. The following table presents typical minimum thicknesses of pavements constructed on subgrades modified with fly ash or lime for similar projects. The thickness recommendations for parking areas are based on car traffic only. As part of the layout design of the facility we recommend the designer use signs and preventive structures to restrict truck traffic from entering these areas. In addition, during construction we recommend preventing any contractor traffic on areas of stabilized subgrade or partial thickness pavement. Heavy loaded vehicles operating on these surfaces will cause significant damage resulting in deterioration and reduction in pavement life.

TYPICAL MINIMUM PAVEMENT SECTIONS (INCHES)						
COMPONENT	CAR PARKING & DRIVE AREAS, LIGHT DUTY ¹		TRUCK DRIVE AREAS, MEDIUM DUTY ²		BUS/TRUCK DRIVE AREAS, HEAVY DUTY	
PORTLAND CEMENT CONCRETE: Air Entrained 4,000 Psi Compressive 580 Psi Flexural		5.0		6.0		8.0
ASPHALTIC CONCRETE: Surface Course ³ and Base Course ⁴	2.0 3.5		2.0 5.0		2.0 7.0	
MODIFIED SUBGRADE: ■ Class C Fly Ash (about 14% to 16%) or ■ Hydrated Lime (about 4% to 6%) or ■ Crushed Aggregate Base ⁵ or ■ Crushed Aggregate ⁶ on Tensar BX-Type 1 Geogrid or Mirafi HP-370 or equivalent. 5-inch thickness beneath parking areas 7-inch thickness beneath drives	8.0	8.0	8.0	8.0	8.0	8.0

- Based on automobile traffic only. Heavier traffic loads (such as wandering heavy trucks/buses) would require greater pavement thickness (a minimum of 6 inches).
- Based on 15,000 moderate to heavy buses/trucks during the life of the pavement in drive areas. Higher traffic loads would require greater pavement thickness.
- Surface course material should conform to one of the following specifications:
 - City of Wichita Specifications for Type SC-1 Asphalt
 - 1990 KDOT Specifications for Type BM-2 Asphalt with a minimum stability value of 1800 pounds
 - 2007 KDOT Specifications for Class A Commercial Grade Asphalt Type SM-9.5A or SM-12.5A

We recommend the surface course asphalt not contain recycled asphalt product (RAP). The mix design should utilize the appropriate Performance Graded (PG) asphalt cement for the project location and traffic. The approved mix design should have an air void content of 3% to 5% at the optimum asphalt cement content.
- Base course material should conform to one of the following specifications:
 - City of Wichita Specifications for Type BC-1 Asphalt
 - 1990 KDOT Specifications for Type BM-4 Asphalt with a minimum stability value of 1500 pounds
 - 2007 KDOT Specifications for Class A Commercial Grade Asphalt SR-12.5A or Type SR-19A

The maximum allowable recycled asphalt material in the base course mixes should be limited to 35%. The mix design should utilize the appropriate Performance Graded (PG) asphalt cement for the project location and traffic. The approved mix design should have an air void content between 2% and 5% at the optimum asphalt cement content.
- Crushed Aggregate should consist of crushed stone, crushed gravel, or crushed recycled concrete. Virgin crushed aggregate should conform to the quality requirements of 1990 KDOT Specification Section 1105 or 2007 KDOT Specification 1104. The gradation of the material should be similar to KDOT materials AB-1 or AB-3, with a maximum of 15% material passing the #200 sieve.
- Recycled crushed concrete should have a maximum particle size of 2.5 inches, and have a gradation similar to the City of Wichita specification Section 404 for Geogrid Reinforced Aggregate Base. Aggregate materials conforming to other aggregate base course specifications may be considered on a project basis.

Minimizing subgrade saturation is an important factor in maintaining subgrade strength. Water allowed to pond on or adjacent to the pavement could saturate the pavement and cause premature pavement deterioration. We recommend sloping all pavement surfaces to provide rapid surface drainage. Typically, 2% slopes are used to facilitate rapid surface drainage. Positive surface drainage beyond the edge of the paved areas should be maintained. Design measures that could reduce the risk of subgrade saturation and improve long-term pavement performance would include crowning the pavement subgrade to drain toward the edges of the pavement area, rather than to the center, and installing surface drains next to any area where surface water can pond.

For areas subject to concentrated and repetitive loading conditions, such as dumpster pads, truck delivery docks, and ingress/egress aprons, we recommend using at least 7 inches of reinforced Portland cement concrete pavement, underlain by at least 4 inches of crushed stone. Prior to placement of the crushed stone the areas should be thoroughly proofrolled. For dumpster pads, the concrete pavement area should be large enough to support the container and tipping axle of the refuse truck.

Site grading is generally accomplished early in the construction phase. However as construction proceeds, the subgrade may be disturbed due to utility excavations, construction traffic, desiccation, or rainfall. As a result, the pavement subgrade may not be suitable for pavement construction and corrective action will be required. The subgrade should be carefully evaluated at the time of pavement construction for signs of disturbance or excessive rutting. We recommend the pavement areas be rough graded and then thoroughly proofrolled with a loaded tandem axle dump truck prior to final grading and paving. Areas where unsuitable conditions are located should be repaired by removing and replacing the materials with properly compacted fills. All pavement areas should be moisture conditioned and properly compacted to the recommendations in this report immediately prior to paving.

Pavement design methods are intended to provide structural sections with adequate thickness over a particular subgrade such that wheel loads are reduced to a level the subgrade can support. The support characteristics of the subgrade for pavement design do not account for shrink/swell movements of an expansive clay subgrade such as the soils encountered on this project. Thus, the pavement may be adequate from a structural standpoint, yet still experience cracking and deformation due to shrink/swell related movement of the subgrade. It is, therefore, important to minimize moisture changes in the subgrade to reduce shrink/swell movements.

Openings in pavements, such as foliage areas installed to comply with landscape code requirements, are sources for water to collect and migrate beneath pavements, and thereby degrade the subgrade support. This is especially applicable for islands with raised concrete curbs, irrigated foliage, and near-surface site soils of impervious clay. The civil design for the pavements with these conditions should include features to restrict, or to collect and discharge excess water from the

islands. This could include installing an impervious membrane liner beneath the entire island, or as a minimum, installing trenched lean concrete or rolled sheeting (around the perimeter of the island) that seals against the concrete curb of the island and extends from the ground surface to a depth of at least 3 feet. Alternately, trench drains could be installed around the perimeter of the islands at depths of at least 3 feet, backfilled with free-draining granular material, and connected to sumps with pumps or to collector drain lines that flow to storm sewers or positive outfalls.

The typical pavement thicknesses presented in our table assume periodic maintenance will be performed throughout the life of the pavement. Preventive maintenance should be planned and provided for through an on-going pavement management program. Preventive maintenance activities are intended to slow the rate of pavement deterioration, and to preserve the pavement investment. Preventive maintenance consists of both localized maintenance (e.g. crack and joint sealing and patching) and global maintenance (e.g. surface sealing and scheduled overlays). Preventive maintenance is usually the first priority when implementing a planned pavement maintenance program and provides the highest return on investment for pavements. Prior to implementing any maintenance, additional engineering observation is recommended to determine the type and extent of preventive maintenance.

4.7 Gravel Surfaced Yard

Recommendations regarding site preparation, subgrade preparation, and placement and compaction of engineered fill are provided in section **4.2 Earthwork**.

Description	Value
Gravel ¹	Minimum thickness of 6.0" ²

¹ It should be emphasized that gravel surfaced yards, regardless of the thickness or practical subgrade preparation measures, will require on-going maintenance and repairs to keep them in a serviceable condition. It is not practical to design an gravel surfaced section of sufficient thickness that on-going maintenance will not be required. This is due to the porous nature of the gravel that will allow precipitation and surface water to infiltrate and soften the subgrade soils, and the limited near surface strength of unconfined gravel that makes it susceptible to rutting. When potholes, ruts, depressions or yielding subgrades develop they must be repaired prior to applying additional traffic loads. Typical repairs could consist of placing additional gravel in ruts or depressed areas and, in some cases complete removal of gravel surfacing, repair of unstable subgrade, and replacement of the gravel surfacing. Potholes and depressions should not be filled by blading adjacent ridges or high areas into the depressed areas. New material should be added to the depressed areas as they develop. Failure to make timely repairs will result in more rapid deterioration of the yard, making more extensive repairs necessary.

² The base material should be compacted to at least 98 percent of its maximum dry density, as determined by the standard Proctor test method (ASTM D 698). The upper 8 inches of the subgrade below the gravel zone should be scarified and compacted to at least 98% of its maximum dry density at a moisture content.

4.8 Fill Construction Observation and Testing

The exposed subgrade and each lift of compacted fill should be tested, evaluated, and reworked, as necessary, until approved by the geotechnical engineer's representative prior to placement of additional lifts. We recommend that each lift of fill be tested for density and moisture content at a frequency of one test for every 2,500 square feet of compacted fill in the structure areas and 10,000 square feet in pavement areas. We recommend at least one density and moisture content test for every 50 linear feet of compacted utility trench backfill.

5.0 GENERAL COMMENTS

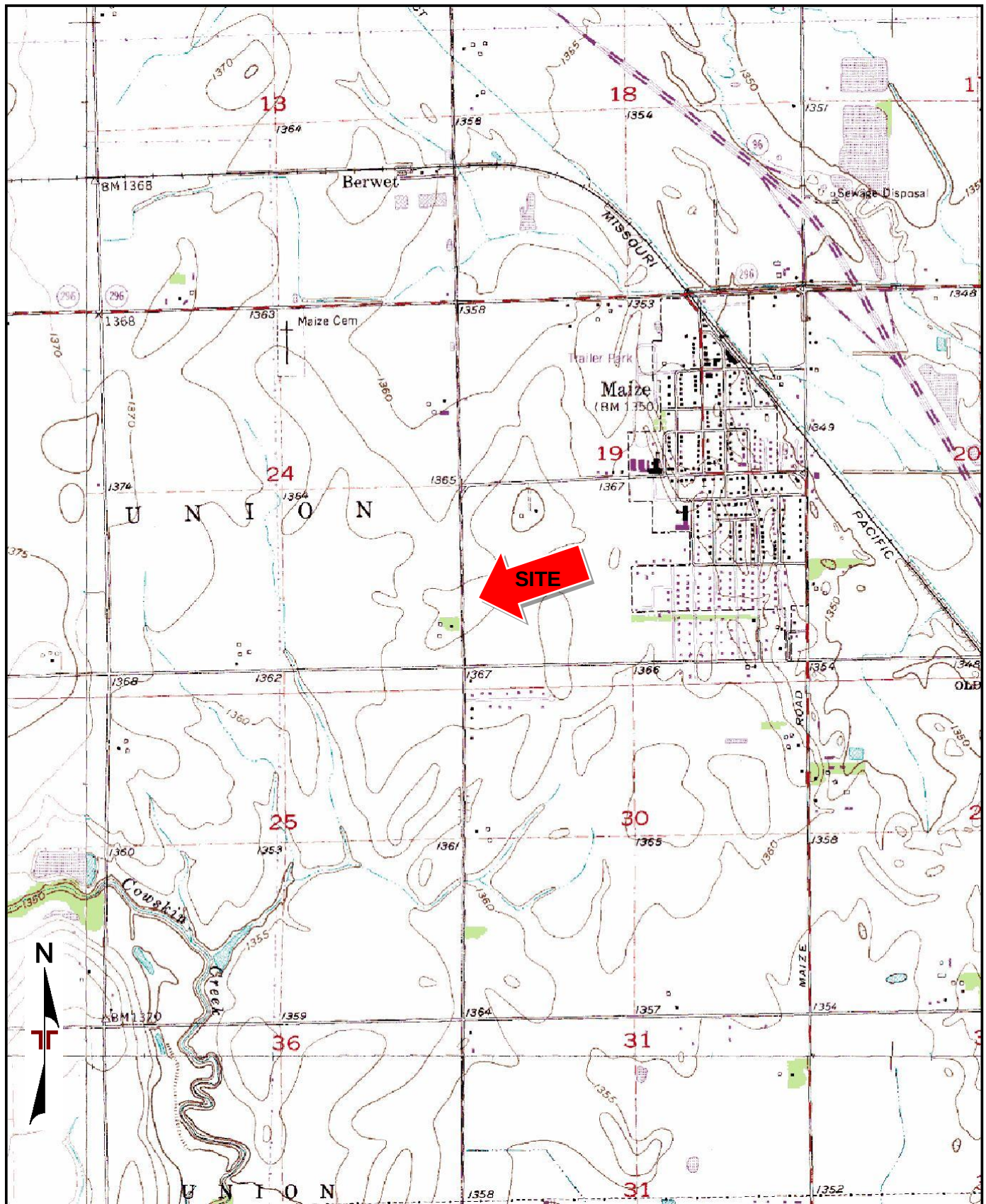
Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon also should be retained to provide observation and testing services during grading, excavation, foundation construction and other earth-related construction phases of the project.

The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

APPENDIX A
FIELD EXPLORATION



Project Manager:	JKH
Drawn by:	MSN
Checked by:	JKH
Approved by:	GAT
Project No.	01175071
Scale:	1"=2,000'
File Name:	5071 site plans
Date:	05/18/2017

Terracon
 1815 S Eisenhower St
 Wichita, KS 67209-2810

SITE LOCATION PLAN

Proposed Maize Transportation Center
 45th St. North and 119th St. West
 Maize, KS

Exhibit

A-1

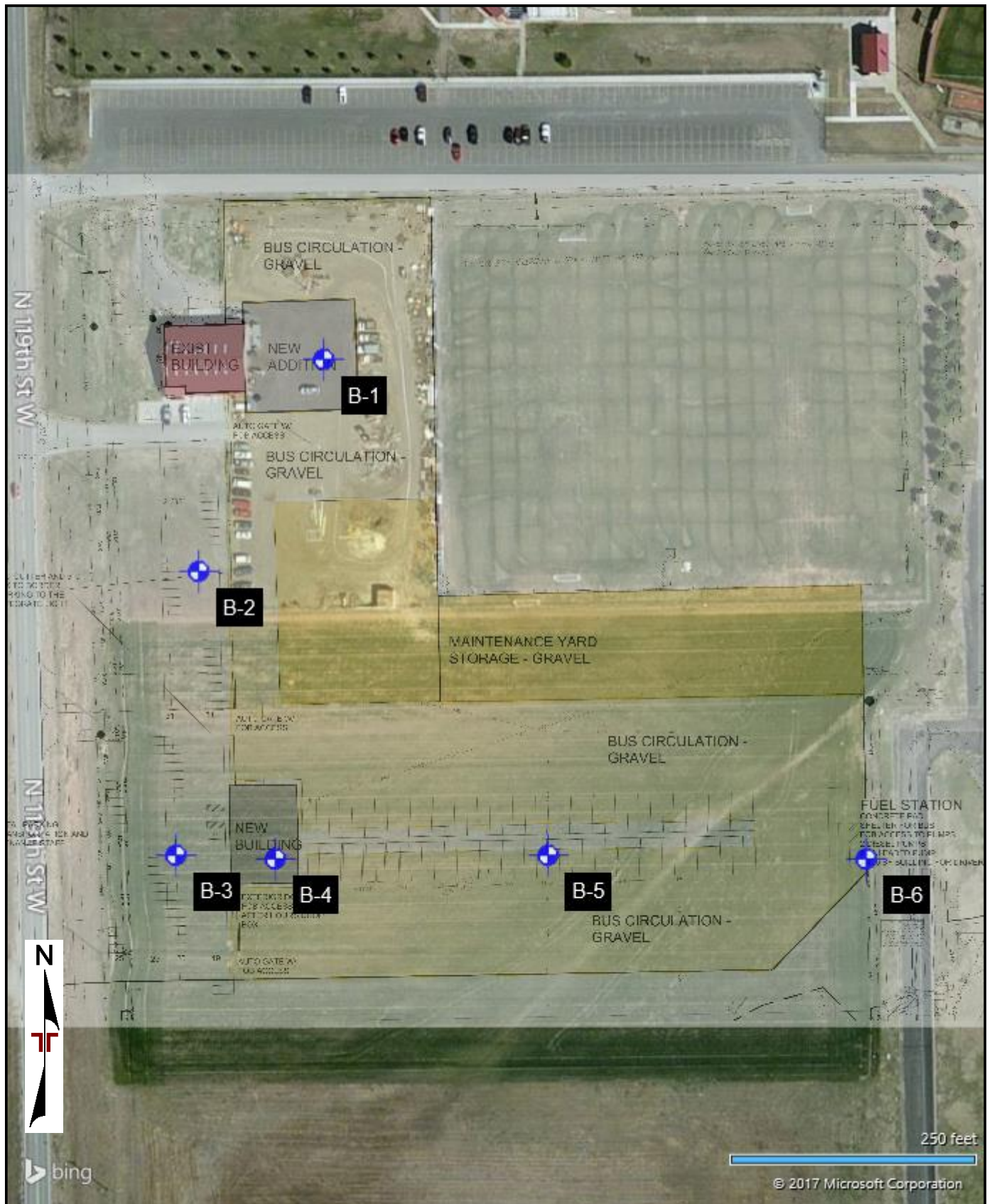


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

Project Manager: JKH	Project No. 01175071	 1815 S Eisenhower St Wichita, KS 67209-2810	BORING EXPLORATION PLAN Proposed Maize Transportation Center 45th St. North and 119th St. West Maize, KS	Exhibit A-2
Drawn by: MSN	Scale: AS SHOWN			
Checked by: JKH	File Name: 5071 site plans			
Approved by: GAT	Date: 05/18/2017			

Field Exploration Description

Terracon's drill crew used a hand-held GPS unit to establish our boring locations in the field at the locations indicated on our boring location plan. The ground surface elevations indicated on the boring logs are approximate and were obtained from topographic information we were provided. Ground surface elevations at the boring locations could differ from actual values due to interpolation and/or superimposing approximate boring locations on the topographic plan. We rounded the elevations on the boring logs to the nearest one-half foot. Consider the approximate locations and ground surface elevations of the borings accurate only to the degree implied by the methods used to make these measurements.

We drilled the borings with a track-mounted drill rig using continuous flight augers to advance the boreholes. We obtained representative samples primarily by the split-barrel sampling procedure. In the split-barrel sampling procedure, a standard, 2-inch O.D., split-barrel sampling spoon is driven into the boring with a 140-pound hammer falling 30 inches. We recorded the number of blows required to advance the sampling spoon the last 12 inches of an 18-inch sampling interval as the standard penetration resistance value, N. We used an automatic SPT hammer to advance the split-barrel. A significantly greater efficiency is achieved with the automatic hammer compared with the conventional safety hammer operated with a cathead and rope. This higher efficiency has an appreciable effect on the standard penetration resistance blow count (N) values. We considered the effect of the automatic hammer's efficiency in our interpretation and analysis.

We also obtained a thin-walled tube sample. In the thin-walled tube sampling procedure, we hydraulically pushed a seamless steel tube with a sharpened cutting edge into the boring to obtain a relatively undisturbed sample of cohesive soil. We reported the sampling depths, penetration distances, and the standard penetration resistance values on the boring logs. In the field we placed the samples into containers, sealed them, and returned them to the laboratory for observation, testing and classification.

Our drill crew prepared boring logs in the field as part of the drilling operations. These boring logs include visual classifications of the materials encountered during drilling and the driller's interpretation of the subsurface conditions between samples. The final boring logs included with this report represent the engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in the laboratory.

BORING LOG NO. B-1

Page 1 of 1

PROJECT: Proposed Maize Transportation Center

CLIENT: Schaefer Johnson Cox Frey Architecture
Wichita, Kansas

SITE: 45th St. North and 119th St. West
Maize, KS

ENGINEER: PEC, PA
Wichita, Kansas

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 37.76888° Longitude: -97.47982° Surface Elev.: 1371 (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS
												LL-PL-PI
	DEPTH ELEVATION (Ft.)											
	0.2 Gravel cover approximately 2" thick	1371										
	FILL - SANDY LEAN CLAY , dark brown and brown			X	6	3-7-8 N=15	1	9000+ (HP)				
				X	10	1-6-6 N=12	2	5000 (HP)		10		
	6.0 SANDY LEAN CLAY (CL) , brown, medium stiff	1365										
				X	6	2-3-3 N=6	3	2000 (HP)		16		
	- becoming orange-brown, stiff below 12'			X	2	6-5-7 N=12	4	5000 (HP)				
	17.0 SAND (SW) , trace clay, fine to medium grained, light brown, medium dense	1354		X	4	6-12-15 N=27	5					
				X	6	7-9-10 N=19	6			14		
	25.0 Boring Terminated at 25 Feet	1346										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Power Auger

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
1815 S Eisenhower St
Wichita, KS

Boring Started: 4/27/2017

Boring Completed: 4/27/2017

Drill Rig: 910

Driller: AS/JK

Project No.: 01175071

Exhibit: A-4

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 01175071 PROPOSED MAIZE TR.GPJ TERRACON_DATATEMPLATE.GDT 5/23/17

BORING LOG NO. B-2

Page 1 of 1

PROJECT: Proposed Maize Transportation Center

CLIENT: Schaefer Johnson Cox Frey Architecture
Wichita, Kansas

SITE: 45th St. North and 119th St. West
Maize, KS

ENGINEER: PEC, PA
Wichita, Kansas

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 37.76829° Longitude: -97.48026°		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS
	DEPTH	ELEVATION (Ft.)											LL-PL-PI
	0.3	1371.5											
	Organic topsoil approximately 4" thick												
	FILL - LEAN CLAY , with sand, brown												
	2.5	1369.5											
	SANDY LEAN CLAY (CL) , orange-brown, very stiff												
	- becoming gray-brown, stiff below 7'												
	10.0	1362											
Boring Terminated at 10 Feet													

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method: Power Auger	See Exhibit A-3 for description of field procedures. See Appendix B for description of laboratory procedures and additional data (if any). See Appendix C for explanation of symbols and abbreviations.	Notes:	
Abandonment Method: Boring backfilled with auger cuttings upon completion.			
WATER LEVEL OBSERVATIONS No free water observed	 1815 S Eisenhower St Wichita, KS	Boring Started: 4/27/2017	Boring Completed: 4/27/2017
		Drill Rig: 910	Driller: AS/JK
		Project No.: 01175071	Exhibit: A-5

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 01175071 PROPOSED MAIZE TR.GPJ TERRACON DATATEMPLATE.GDT 5/23/17

BORING LOG NO. B-3

Page 1 of 1

PROJECT: Proposed Maize Transportation Center

CLIENT: Schaefer Johnson Cox Frey Architecture
Wichita, Kansas

SITE: 45th St. North and 119th St. West
Maize, KS

ENGINEER: PEC, PA
Wichita, Kansas

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 37.7675° Longitude: -97.48034°		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS
	DEPTH	ELEVATION (Ft.)											LL-PL-PI
	0.1	1371											
	Organic topsoil scrapped off												
	LEAN CLAY (CL) , with sand, brown, stiff												
	2.5	1368.5			X	10	2-4-5 N=9	1	4000 (HP)		19		38-17-21
	SANDY LEAN CLAY (CL) , brown, medium stiff												
					X	16	3-2-3 N=5	2	2500 (HP)		12		
	7.0	1364											
	FAT CLAY (CH) , with sand, brown, medium stiff												
	10.0	1361			X	18	2-2-3 N=5	3	3000 (HP)		19		
	Boring Terminated at 10 Feet												

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method: Power Auger	See Exhibit A-3 for description of field procedures. See Appendix B for description of laboratory procedures and additional data (if any). See Appendix C for explanation of symbols and abbreviations.	Notes:	
Abandonment Method: Boring backfilled with auger cuttings upon completion.			
WATER LEVEL OBSERVATIONS No free water observed	 1815 S Eisenhower St Wichita, KS	Boring Started: 4/27/2017	Boring Completed: 4/27/2017
		Drill Rig: 910	Driller: AS/JK
		Project No.: 01175071	Exhibit: A-6

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 01175071 PROPOSED MAIZE TR.GPJ TERRACON_DATATEMPLATE.GDT 5/23/17

BORING LOG NO. B-4

Page 1 of 1

PROJECT: Proposed Maize Transportation Center

CLIENT: Schaefer Johnson Cox Frey Architecture
Wichita, Kansas

SITE: 45th St. North and 119th St. West
Maize, KS

ENGINEER: PEC, PA
Wichita, Kansas

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 37.76749° Longitude: -97.47999°		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS
	DEPTH	ELEVATION (Ft.)											LL-PL-PI
	0.1	1370											
	Organic topsoil scrapped off												
	SANDY LEAN CLAY (CL) , brown, medium stiff				X	14	2-3-3 N=6	1	3000 (HP)		19		30-16-14
			5		X	12	1-2-2 N=4	2	2500 (HP)		18		
						19.5		3	2500 (HP)		17	102	
			10		X	18	1-2-3 N=5	4	2500 (HP)		18		
	12.0	1358											
	CLAYEY SAND (SC) , fine to medium grained, brown, medium dense				X	12	3-5-6 N=11	5	1500 (HP)		11		
			15										
	19.0	1351											
	20.0	1350			X	8	4-4-9 N=13	6	500 (HP)		17		
		Boring Terminated at 20 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Power Auger

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
1815 S Eisenhower St
Wichita, KS

Boring Started: 4/27/2017

Drill Rig: 910

Project No.: 01175071

Boring Completed: 4/27/2017

Driller: AS/JK

Exhibit: A-7

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 01175071 PROPOSED MAIZE TR.GPJ TERRACON_DATATEMPLATE.GDT 5/23/17

BORING LOG NO. B-5

Page 1 of 1

PROJECT: Proposed Maize Transportation Center

CLIENT: Schaefer Johnson Cox Frey Architecture
Wichita, Kansas

SITE: 45th St. North and 119th St. West
Maize, KS

ENGINEER: PEC, PA
Wichita, Kansas

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 37.7675° Longitude: -97.47903° Surface Elev.: 1367 (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS
												LL-PL-PI
	DEPTH ELEVATION (Ft.)											
	0.3 Organic topsoil approximately 3" thick	1367										
	FAT CLAY (CH) , dark gray-brown, medium stiff			X	14	1-2-3 N=5	1	4000 (HP)		25		57-22-35
	3.0	1364										
	LEAN TO FAT CLAY (CL/CH) , gray-brown, stiff			X	14	3-5-7 N=12	2	6000 (HP)		24		
	5.0	1362										
	SANDY LEAN CLAY (CL) , brown to orange-brown, very stiff											
	10.0	1357		X	10	6-9-11 N=20	3	9000+ (HP)		9		
	Boring Terminated at 10 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method: Power Auger	See Exhibit A-3 for description of field procedures. See Appendix B for description of laboratory procedures and additional data (if any). See Appendix C for explanation of symbols and abbreviations.	Notes:
Abandonment Method: Boring backfilled with auger cuttings upon completion.		
WATER LEVEL OBSERVATIONS No free water observed	 1815 S Eisenhower St Wichita, KS	Boring Started: 4/27/2017
		Boring Completed: 4/27/2017
		Drill Rig: 910
		Driller: AS/JK
		Project No.: 01175071
		Exhibit: A-8

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 01175071 PROPOSED MAIZE TR.GPJ TERRACON DATATEMPLATE.GDT 5/23/17

BORING LOG NO. B-6

Page 1 of 1

PROJECT: Proposed Maize Transportation Center

CLIENT: Schaefer Johnson Cox Frey Architecture
Wichita, Kansas

SITE: 45th St. North and 119th St. West
Maize, KS

ENGINEER: PEC, PA
Wichita, Kansas

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 37.76749° Longitude: -97.47791° Surface Elev.: 1367 (Ft.) DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	LABORATORY TORVANE/HP (psf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS
												LL-PL-PI
	0.3 Organic topsoil approximately 4" thick LEAN TO FAT CLAY (CL/CH) , gray-brown, stiff	1366.5										
				X	8	2-4-6 N=10	1	4500 (HP)		25		47-19-28
	4.0 SANDY LEAN CLAY (CL) , brown, medium stiff	1363		X	10	2-3-3 N=6	2	3500 (HP)		16		
	- becoming gray-brown, stiff below 8.5'			X	7	4-5-6 N=11	3	5500 (HP)		15		
				X	18	5-5-5 N=10	4	2500 (HP)		19		
	15.0 Boring Terminated at 15 Feet	1352										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Power Auger

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
1815 S Eisenhower St
Wichita, KS

Boring Started: 4/27/2017

Boring Completed: 4/27/2017

Drill Rig: 910

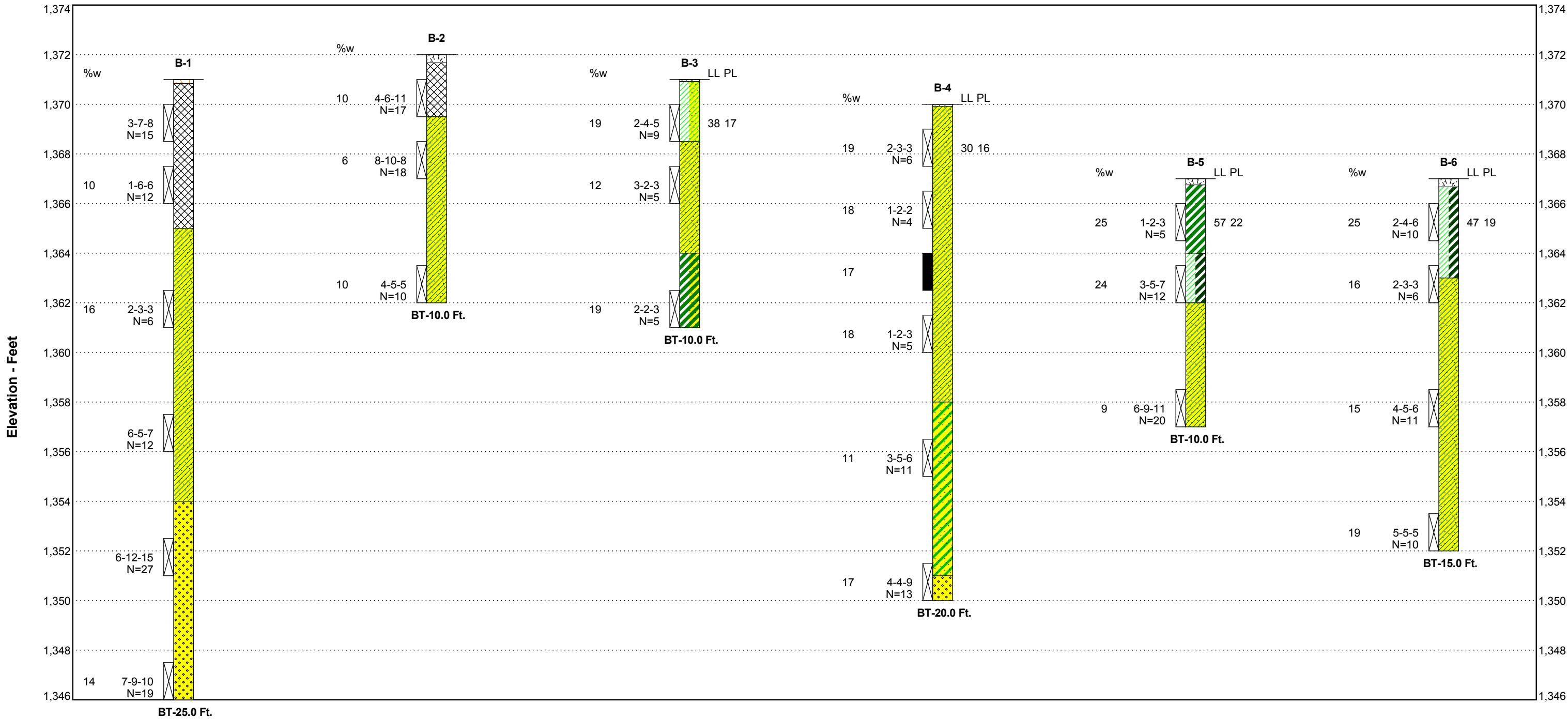
Driller: AS/JK

Project No.: 01175071

Exhibit: A-9

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 01175071 PROPOSED MAIZE TR.GPJ TERRACON DATATEMPLATE.GDT 5/23/17

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. SMART FENCE 01175071 PROPOSED MAIZE TR.GPJ TERRACON_DATATEMPLATE.GDT 5/23/17



Explanation

Moisture Content — %w

Sampling (See General Notes)

Water Level Reading at time of drilling.

Water Level Reading after drilling.

B-1 — Borehole Number

LL PL — Liquid and Plastic Limits

AR — Borehole Lithology

BT — Borehole Termination Type

NOTES:

See Exhibit A-2 for orientation of soil profile.

See General Notes in Appendix C for symbols and soil classifications.

Soils profile provided for illustration purposes only.

Soils between borings may differ

AR - Auger Refusal

BT - Boring Termination

Well-graded Gravel

Fill (made ground)

Sandy Lean Clay

Well-graded Sand

Topsoil

Lean Clay with Sand

Fat Clay with Sand

Clayey Sand

Fat Clay

Lean Clay/Fat Clay

Project Manager:

Drawn by: MSN

Approved by: JKH

Date: 5/23/2017

Project No.: 01175071

Scale: NTS

File Name: 01175071.A-10

Terracon

1815 S Eisenhower St
Wichita, KS

PH. 316-262-0171 FAX. 316-262-6997

SUBSURFACE PROFILE

PROPOSED MAIZE TRANSPORTATION CENTER
45TH ST. NORTH AND 119TH ST. WEST
MAIZE, KS

EXHIBIT

A-10

APPENDIX B
LABORATORY TESTING

Geotechnical Engineering Report

Proposed USD 266 Transportation Center Improvements ■ Maize, Kansas

May 23, 2017 ■ Terracon Project No. 01175071



Laboratory Testing

We tested the split-barrel samples to determine their moisture contents. We estimated the unconfined compressive strength of the cohesive samples with a hand penetrometer. The hand penetrometer test values can be correlated with the unconfined compressive strengths and provide a better estimate of soil consistency than visual and tactual examination alone. In addition, we tested the thin-walled tube samples to determine their dry density. We also estimated the unconfined compressive strength with a hand penetrometer. We performed Atterberg limits tests on representative portions of the near-surface soils to aid in classification and to evaluate their shrink/swell characteristics. The laboratory test results are provided on the boring logs included in Appendix A.

An engineer examined the soil samples in the laboratory as part of the testing program. Based on the material's texture and plasticity, we described and classified the soil samples in accordance with our attached *General Notes* and the *Unified Soil Classification System*, respectively. The estimated group symbols using the *Unified Soil Classification System* are shown in the appropriate column on the boring logs. We are including our *General Notes* and a brief description of the Unified System in Appendix C.

APPENDIX C
SUPPORTING DOCUMENTS

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING	 Shelby Tube  Split Spoon	WATER LEVEL	 Water Initially Encountered  Water Level After a Specified Period of Time  Water Level After a Specified Period of Time	FIELD TESTS	N Standard Penetration Test Resistance (Blows/Ft.) (HP) Hand Penetrometer (T) Torvane (DCP) Dynamic Cone Penetrometer (PID) Photo-Ionization Detector (OVA) Organic Vapor Analyzer
			Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.		

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS	RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
	Descriptive Term (Density)	Standard Penetration or N-Value Blows/Ft.	Descriptive Term (Consistency)	Unconfined Compressive Strength Qu, (psf)	Standard Penetration or N-Value Blows/Ft.
	Very Loose	0 - 3	Very Soft	less than 500	0 - 1
	Loose	4 - 9	Soft	500 to 1,000	2 - 4
	Medium Dense	10 - 29	Medium Stiff	1,000 to 2,000	4 - 8
	Dense	30 - 50	Stiff	2,000 to 4,000	8 - 15
	Very Dense	> 50	Very Stiff	4,000 to 8,000	15 - 30
			Hard	> 8,000	> 30

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A					Soil Classification	
					Group Symbol	Group Name ^B
Coarse Grained Soils: More than 50% retained on No. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines ^C	Cu ≥ 4 and 1 ≤ Cc ≤ 3 ^E		GW	Well-graded gravel ^F
			Cu < 4 and/or 1 > Cc > 3 ^E		GP	Poorly graded gravel ^F
		Gravels with Fines: More than 12% fines ^C	Fines classify as ML or MH		GM	Silty gravel ^{F,G,H}
			Fines classify as CL or CH		GC	Clayey gravel ^{F,G,H}
	Sands: 50% or more of coarse fraction passes No. 4 sieve	Clean Sands: Less than 5% fines ^D	Cu ≥ 6 and 1 ≤ Cc ≤ 3 ^E		SW	Well-graded sand ^I
			Cu < 6 and/or 1 > Cc > 3 ^E		SP	Poorly graded sand ^I
		Sands with Fines: More than 12% fines ^D	Fines classify as ML or MH		SM	Silty sand ^{G,H,I}
			Fines classify as CL or CH		SC	Clayey sand ^{G,H,I}
Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silts and Clays: Liquid limit less than 50	Inorganic:	PI > 7 and plots on or above “A” line ^J		CL	Lean clay ^{K,L,M}
			PI < 4 or plots below “A” line ^J		ML	Silt ^{K,L,M}
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay ^{K,L,M,N}
			Liquid limit - not dried			Organic silt ^{K,L,M,O}
	Silts and Clays: Liquid limit 50 or more	Inorganic:	PI plots on or above “A” line		CH	Fat clay ^{K,L,M}
			PI plots below “A” line		MH	Elastic Silt ^{K,L,M}
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay ^{K,L,M,P}
			Liquid limit - not dried			Organic silt ^{K,L,M,Q}
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

^A Based on the material passing the 3-inch (75-mm) sieve

^B If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^C Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

^D Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

$$^E Cu = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

^F If soil contains $\geq 15\%$ sand, add "with sand" to group name.

^G If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^H If fines are organic, add "with organic fines" to group name.

^I If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

^J If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

^K If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^L If soil contains $\geq 30\%$ plus No. 200 predominantly sand, add "sandy" to group name.

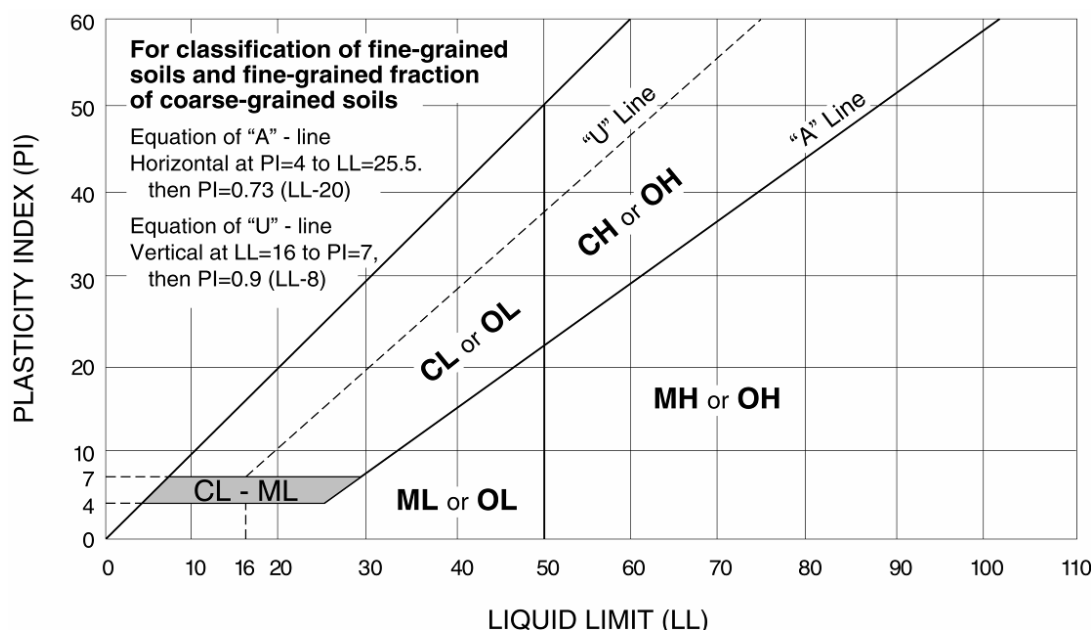
^M If soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^N $PI \geq 4$ and plots on or above "A" line.

^O $PI < 4$ or plots below "A" line.

^P PI plots on or above "A" line.

^Q PI plots below "A" line.



SECTION 31 32 13.16 - CEMENT SOIL STABILIZATION**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Includes the option of excavating, treatment, and placement of cement treated subsoil mix for the floor slabs, asphaltic pavement, and concrete pavement.
- B. Extend treatment at least 36 inch (914 mm) beyond edges of pavement, curbs, and building foundations.

1.02 RELATED REQUIREMENTS

- A. Section 31 20 00 - EARTH MOVING: Fill and subgrade preparation.

1.03 REFERENCE STANDARDS

- A. ASTM C150/C150M - Standard Specification for Portland Cement; 2021.
- B. ASTM D558 - Standard Test Methods for Moisture-Density (Unit Weight) Relations of Soil-Cement Mixtures; 2011.
- C. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method; 2015, with Editorial Revision (2016).
- D. ASTM D1633 - Standard Test Methods for Compressive Strength of Molded Soil-Cement Cylinders; 2017.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Submit mix design and materials mix ratio that will achieve specified requirements.
- C. Test reports on compressive strength of mix.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum five years of experience.

1.06 FIELD CONDITIONS

- A. Do not install mixed materials in wind in excess of 10 mph (16 k/h) or when temperature is below 40 degrees F (5 degrees C).

PART 2 PRODUCTS**2.01 MIX MATERIALS**

- A. Subsoil: Fill specified in Section 31 20 00 - EARTH MOVING.
- B. Cement: ASTM C150/C150M, Portland cement, Type I, Normal.

2.02 EQUIPMENT

- A. Equipment: Capable of excavating subsoil, mixing and placing materials, wetting, consolidating, and compacting material.

2.03 SOIL CEMENT MIX

- A. Mix subsoil, cement, sand and aggregate in accordance with Geotechnical Report.
- B. Add water to the mix to achieve a homogeneous damp mixture without lumping, yet not creating a wet plastic consistency.

2.04 ACCESSORIES

- A. Curing Seal: Asphalt emulsion primer.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Do not backfill over frozen or spongy subgrade surfaces.

3.02 SOIL TREATMENT AND BACKFILLING

- A. Site mix subsoil, backfill and compact. Blend treated subsoil mix to achieve mix formulation and required stabilization.
- B. Place mix material in continuous layers not exceeding 8 inches (200 mm) depth.
- C. Maintain optimum moisture content of mix materials to attain required stabilization. If more than one layer, maintain lower layer at optimum moisture until next layer is placed.
- D. Place mixed materials within 2.5 hours of adding water to mix.
- E. Do not exceed 30 minutes in placing adjacent mixed material.
- F. Commence compaction of mix no later than 60 minutes after placement.
- G. Compact mix to minimum of 97 percent of maximum density determined in accordance with ASTM D558; test in-place density in accordance with ASTM D1556/D1556M.
- H. Slope grade away from building minimum 2 inches in 10 ft (51 mm in 3 m), unless noted otherwise.
- I. Shape to required line, grade, and cross section.
- J. Make grade changes gradual. Blend slopes into level areas.
- K. At end of day, terminate completed Work by forming a straight and vertical construction joint.
- L. Replace damaged fill with new mix to full depth of original mix.
- M. Remove surplus mix materials from site.

3.03 CURING

- A. Immediately following compaction of mix, seal top surface with curing seal.

3.04 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01 40 00 - Quality Requirements.
- B. Compression test and analysis of hardened fill material will be performed in accordance with 31 20 00 - EARTH MOVING.
- C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- D. Throughout this entire operation, the shape of the course shall be maintained by blading, and the surface upon completion shall be smooth and at proper levels required. Should the material due to any reason or cause, lose the required stability, density, and finish, it shall be recompacted, refinished and tested at the expense of the General Contractor.

END OF SECTION

SECTION 31 32 13.19 - LIME SOIL STABILIZATION**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Includes the option of excavating, treatment, and placement of lime treated subsoil mix for the floor slabs, asphaltic pavement, and concrete pavement.
- B. Extend treatment at least 36 inch (914 mm) beyond edges of pavement, curbs, and building foundations.

1.02 RELATED REQUIREMENTS

- A. Section 31 20 00 - EARTH MOVING: Fill and subgrade preparation.

1.03 REFERENCE STANDARDS

- A. AASHTO M 216 - Standard Specification for Lime for Soil Stabilization; 2013 (Reapproved 2017).
- B. ASTM C977 - Standard Specification for Quicklime and Hydrated Lime for Soil Stabilization; 2018.
- C. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)); 2012 (Reapproved 2021).
- D. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method; 2015, with Editorial Revision (2016).
- E. NLA Bull 326 - Lime-Treated Soil Construction Manual: Lime Stabilization & Lime Modification; 2004.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Submit mix design and materials mix ratio that will achieve specified requirements.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with NLA Bull 326.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum five years of experience.

1.06 FIELD CONDITIONS

- A. Do not apply unless the temperature is at least 40 deg F (5 deg C) in the shade, away from artificial heat, and rising.
- B. Do not apply and mix when wind blown dust will be objectionable to neighbors or create safety hazard.

PART 2 PRODUCTS**2.01 MIX MATERIALS**

- A. Subsoil: Fill specified in Section 31 20 00 - EARTH MOVING.
- B. Lime: AASHTO M 216 hydrated lime.
 - 1. Chemical composition such that the minimum available lime index expressed as percentage by weight of calcium and magnesium oxides (non-volatile basis) shall not be less than 90.0% and the fineness shall be such that not more than 0.5% will be retained on a no. 30 sieve nor more than 20.0% will be retained on a no. 200 sieve.
- C. Lime: Pebble Quicklimes

1. Chemical composition such that the minimum available lime index expressed as percentage by weight of calcium and magnesium oxides (non-volatile basis) shall not be less than 90.0%. The fineness of the pebble quicklime shall be such that 100% will pass a 5/8 inch (15.8 mm) sieve and not less than 80% will be retained on a 1/4 inch (6.3 mm) sieve. The available lime index expressed as percentage by weight of calcium and magnesium oxides shall be determined by the "rapid sugar" test as set out in ASTM C25.

2.02 EQUIPMENT

- A. Equipment: Capable of excavating subsoil, mixing and placing materials, wetting, consolidation, and compaction of material.

2.03 LIME/SOIL MIX

- A. Mix materials in accordance with Kansas Department of Transportation standard guidelines.
- B. For Pebble Quicklimes and Dry Hydrated Lime:
 1. Spread uniformly on dry soil.
 2. Thoroughly mix into the subgrade before adding water.
- C. For Lime Slurry:
 1. Use distributor trucks with recirculation pumps to agitate slurry constantly to maintain uniform mixture. The use of compressed air to aid in the mixing of the slurry will not be permitted.
 2. Mix with water and apply to dry soil as a slurry using approved pressure distributing equipment.
- D. Thoroughly mix water, soil and lime until, in the opinion of the Soil Engineer, a homogeneous, friable mixture, free of clods and lumps has been attained.
 1. Non-slaking materials shall pass no. 4 sieve, of the remainder of the material at least 60% shall pass no. 4 sieve and 100% shall pass 3/4 inch (19 mm) inch sieve.
- E. If total thickness of material to be treated in one operation, treated material may be windrowed and stored while other material is prepared or initial material may be spread and compacted and a subsequent layer prepared.
- F. Use sufficient water to insure proper chemical action between stabilizing agent and soil. Amount will vary; normally 3% - 5% above optimum for treated mixture will be required.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not place fill over frozen or spongy subgrade surfaces.

3.02 SOIL TREATMENT AND BACKFILLING

- A. Site mix subsoil, backfill and compact. Blend treated subsoil mix to achieve mix formulation and required stabilization.
- B. Initial Mixing:
 1. Seal surface by lightly rolling with flat steel or pneumatic rollage to retard loss of moisture.
 2. Age for at least 96 hours unless soil engineer approves shorter time.
 3. Maintain not less than 2% below optimum moisture during aging process.
- C. Cured Material:

1. Pulverize and remix until 100% of the mixed material by dry weight passes a 1 1/2 inch (38.1 mm) sieve and at least 60% by dry weight will pass a no. 4 sieve, exclusive of stone and gravel.
2. Adjust moisture during final mixing so that moisture will be within two percentage points above or below optimum of the mix.
3. Maintain not less than 2% below optimum moisture during aging process.
- D. Place mix material in continuous layers not exceeding 8 inches (200 mm) depth.
- E. Maintain optimum moisture content of mix materials to attain required stabilization.
- F. Do not exceed 30 minutes in placing adjacent mixed material.
- G. Commence compaction of mix no later than 60 minutes after placement. Compact with sheep foot rollers.
- H. Compact to maximum density indicated in Section 31 20 00 - EARTH MOVING. Test in-place density in accordance with Section 31 20 00 - EARTH MOVING.
- I. Slope grade away from building minimum 2 inches in 10 ft (150 mm in 3 m), unless noted otherwise.
- J. Shape to required line, grade, and cross section.
- K. Make grade changes gradual. Blend slope into level areas.
- L. At end of day, terminate completed Work by forming a straight and vertical construction joint.
- M. Replace damaged fill with new mix to full depth of original mix.
- N. Remove surplus mix materials from site.

3.03 CURING

- A. Finish final layer of compacted, treated material with pneumatic or other, flat roller, sufficiently light to prevent hair line cracking.
- B. Moist cure for at least 3 days before subsequent construction or traffic is permitted, unless otherwise directed by Soil Engineer.

3.04 TOLERANCES

- A. Top Surface of Fill: Plus or minus 1/2 inch (12 mm) from required elevations.

3.05 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01 40 00.
- B. Compression test and analysis of hardened fill material will be performed in accordance with 31 20 00 - EARTH MOVING.
- C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- D. Throughout this entire operation, the shape of the course shall be maintained by blading, and the surface upon completion shall be smooth and at proper levels required. Should the material due to any reason or cause, lose the required stability, density, and finish, it shall be recompacted, refinished and tested at the expense of the General Contractor.

END OF SECTION

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SECTION 31 32 13.23 - FLY ASH SOIL STABILIZATION**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Includes the option of excavating, treatment, and placement of fly ash treated subsoil mix for the floor slabs, asphaltic pavement, and concrete pavement.
- B. Extend treatment at least 36 inch (914 mm) beyond edges of pavement, curbs, and building foundations.

1.02 RELATED REQUIREMENTS

- A. Section 31 20 00 - EARTH MOVING: Fill and subgrade preparation.

1.03 REFERENCE STANDARDS

- A. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2019.
- B. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method; 2015, with Editorial Revision (2016).
- C. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)); 2012 (Reapproved 2021).

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Submit mix design and materials mix ratio that will achieve specified requirements.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum five years of experience.

1.06 FIELD CONDITIONS

- A. Do not apply unless the temperature is at least 40 deg F (5 deg C) in the shade, away from artificial heat, and rising.
- B. Do not apply and mix when wind blown dust will be objectionable to neighbors or create safety hazard.

PART 2 PRODUCTS**2.01 MIX MATERIAL**

- A. Subsoil: Fill specified in Section 31 20 00 - EARTH MOVING.
- B. Fly Ash: ASTM C618 Type C.

2.02 EQUIPMENT

- A. Equipment: Capable of excavating subsoil, mixing and placing materials, wetting, consolidation, and compaction of material.
 - 1. The spreader truck shall demonstrate the ability to maintain a consistent spread rate over variable travel speeds.

2.03 FLY ASH/SOIL MIX

- A. Mix materials in accordance with Kansas Department of Transportation standard guidelines.
- B. Spread uniformly on dry soil.
- C. Thoroughly mix into the subgrade before adding water.

- D. Thoroughly mix water, soil and fly ash until, in the opinion of the Soil Engineer, a homogeneous, friable mixture, free of clods and lumps has been attained.
 - 1. Non-slaking materials shall pass no. 4 sieve, of the remainder of the material at least 60% shall pass no. 4 sieve and 100% shall pass 3/4 inch (19 mm) inch sieve.
- E. If total thickness of material to be treated in one operation, treated material may be windrowed and stored while other material is prepared or initial material may be spread and compacted and a subsequent layer prepared.
- F. Use sufficient water to insure proper chemical action between stabilizing agent and soil. Amount will vary; normally 3% - 5% above optimum for treated mixture will be required.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not place fill over frozen or spongy subgrade surfaces.

3.02 SOIL TREATMENT AND BACKFILLING

- A. Site mix subsoil, backfill and compact. Blend treated subsoil mix to achieve mix formulation and required stabilization.
- B. Place mix material in continuous layers not exceeding 8 inches (200 mm) depth.
- C. Maintain optimum moisture content of mix materials to attain required stabilization.
- D. Compact within 120 minutes after blending operations with sheep foot rollers.
- E. Compact to maximum density indicated in Section 31 20 00 - EARTH MOVING. Test in-place density in accordance with Section 31 20 00 - EARTH MOVING.
- F. Shape to required line, grade, and cross section.
- G. Make grade changes gradual. Blend slope into level areas.
- H. Replace damaged fill with new mix to full depth of original mix.
- I. Remove surplus mix materials from site.

3.03 CURING

- A. No curing required.

3.04 TOLERANCES

- A. Top Surface of Fill: Plus or minus 1/2 inch (12 mm) from required elevations.

3.05 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01 40 00 - Quality Requirements.
- B. Compression test and analysis of hardened fill material will be performed in accordance with 31 20 00 - EARTH MOVING.
- C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- D. Throughout this entire operation, the shape of the course shall be maintained by blading, and the surface upon completion shall be smooth and at proper levels required. Should the material due to any reason or cause, lose the required stability, density, and finish, it shall be recompacted, refinished and tested at the expense of the General Contractor.

END OF SECTION

SECTION 32 12 16 - ASPHALT PAVING**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Double course bituminous concrete paving. (Base Bid)
- B. Paving may be sequenced, that is, base course may be installed and used by construction traffic during progress of job. At completion, make a thorough inspection. Reconstruct damaged and deteriorated areas and damaged subgrade at no cost to the Owner. Wearing course, striping and accessories shall not be installed until project is near completion.

1.02 RELATED REQUIREMENTS

- A. Section 31 20 00 - EARTH MOVING: Preparation of subgrade for paving.

1.03 REFERENCE STANDARDS

- A. AI MS-2 - Asphalt Mix Design Methods; 2015.
- B. AI MS-19 - Basic Asphalt Emulsion Manual; 2008.
- C. ASTM D1188 - Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples.
- D. ASTM D2027/D2027M - Standard Specification for Cutback Asphalt (Medium-Curing Type); 2019.
- E. ASTM D2726/D2726M - Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Asphalt Mixtures.
- F. ASTM D3549 - Standard Test Method for Thickness or Height of Compacted Asphalt Mixture Specimens.
- G. ASTM D946 - Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction; 2009a.
- H. ASTM D977 - Standard Specification for Emulsified Asphalt.
- I. ASTM D979 - Standard Practice for Sampling Bituminous Paving Mixtures.
- J. Specifications for State Road and Bridge Construction; Kansas Department of Transportation; 2015 edition.

1.04 QUALITY ASSURANCE

- A. Perform Work in accordance with Specifications for State Road and Bridge Construction; Kansas Department of Transportation; 2015 edition..
- B. Mixing Plant: Conform to Specifications for State Road and Bridge Construction; Kansas Department of Transportation; 2015 edition..
- C. Obtain materials from same source throughout.

1.05 FIELD CONDITIONS

- A. Asphalt: Do not place asphalt when ambient air or base surface temperature is less than 40 degrees F (4 degrees C) for base coarse and less than 50 degrees F (10 degrees C) for wearing coarse, or surface is wet or frozen.
- B. Prime Coat: Do not place when ambient air or base surface temperature is less than 60 degrees F (15.6 degrees C) or surface is wet.
- C. Tack Coat: Do not place when ambient air or base surface temperature is less than 60 degrees F (15.6 degrees C) or surface is wet.

- D. Paving subcontractor: Shall be responsible for operations, shaping of subgrade, rework of prepared subgrade as necessary and construction grades, lines and profiles in accordance with drawings.
- E. The General Contractor: Shall be responsible for establishing reference grade.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Comply with applicable code for paving work on public property.

2.02 MATERIALS

- A. Asphalt Cement: ASTM D 946.
- B. Aggregate for Base Course: In accordance with Kansas Department of Transportation standards.
 - 1. Uniformly graded mixture of clean durable particles of crushed stone, sand and mineral filler.
 - 2. Free of soft, disintegrated particles, vegetable or organic materials, lumps of clay or adherent particles.
 - 3. Well graded, moderately sharp to sharp sands or screenings.
- C. Aggregate for Wearing Course: In accordance with Kansas Department of Transportation standards.
 - 1. Uniformly graded mixture of clean durable particles of crushed stone, sand and mineral filler.
 - 2. Free of soft, disintegrated particles, vegetable or organic materials, lumps of clay or adherent particles.
 - 3. Well graded, moderately sharp to sharp sands or screenings.
- D. Primer: ASTM D2027/D2027M, MC-70 Cut-back petroleum asphalt.
 - 1. Use on rock base subgrade, lime modified subgrade or fly ash modified subgrade.
- E. Tack Coat: ASTM D977, SS1H Emulsified asphalt.
- F. Water: Potable.

2.03 ASPHALT PAVING MIXES AND MIX DESIGN

- A. Use dry material to avoid foaming. Mix uniformly.
 - 1. Mix aggregate and asphalt to thoroughly coat all particles.
 - 2. Overheated material shall be set aside and retested and not used until and unless retested materials meet original criteria.
- B. Base Course: State of Kansas Department of Transportation Highways standards.
 - 1. Mix design 1990 KDOT Specification - Type BM-4, 35% RAP Maximum
- C. Wearing Course: State of Kansas Department of Transportation Highways standards.
 - 1. Mix design 1990 KDOT Specification - Type BM-2, 0% RAP

2.04 SOURCE QUALITY CONTROL

- A. Test mix design and samples in accordance with AI MS-2.
 - 1. Test the following at the plant:
 - a. Aggregate gradation of individual components.
 - b. Combined aggregate gradation.
 - c. Accuracy of measuring and temperature control devices.
 - d. Temperature of mix.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that compacted subgrade is dry and ready to support paving and imposed loads.
- B. Rework subgrade as required by soil compaction control and earthwork sections if weather or other conditions deteriorate previously prepared subgrade.
- C. Maintain moisture and degree of compaction specified in soil control until asphalt cement base is laid.
- D. The surface of the subgrade before laying asphalt cement shall be stable, uniform, smooth, and true to grade and cross section.
- E. Paving shall not be done when it is raining or if the area to be paved has free water on the surface; primed when specifications require.
- F. Paving shall not be done on prior lifts of asphalt base unless the surface is clean, dry, and dust free.
- G. Verify gradients and elevations of base are correct.

3.02 PREPARATION - PRIMER

- A. Apply primer in accordance with manufacturer's instructions.
- B. Apply primer on aggregate base or modified subbase at uniform rate of 1/3 gal/sq yd (1.5 L/sq m).
- C. Apply primer to contact surfaces of curbs, gutters and the vertical faces of existing pavement and all structures in contact with the new pavement.
- D. Cut back joints of previously laid paving to even vertical surface for full depth of the course or construction. Coat edge exposed with hot or cut back asphalt.
- E. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
- F. Protect primed substrate from damage until ready to receive paving

3.03 PREPARATION - TACK COAT

- A. Apply tack coat in accordance with manufacturer's instructions.
- B. Apply tack coat on asphalt or concrete surfaces over subgrade surface at uniform rate of 0.15 gal/sq yd (0.7 L/sq m).
- C. Apply uniformly to surfaces of existing pavement before installing new pavement.
- D. Apply uniformly between all layers of asphalt, unless installed on the same day.
- E. Allow tack coat to cure undisturbed before applying asphalt paving.
- F. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.04 PLACING ASPHALT PAVEMENT - DOUBLE COURSE

- A. Deliver and lay materials while hot between 225 - 325 degrees F (107 - 162 degrees C).
- B. Spread and strike off with a self powered machine capable of laying a course of proper depth, grade, and profile.
- C. Irregularities in the surface of the pavement course shall be corrected directly behind the paver.
- D. Excess material forming high spots shall be removed.
- E. Indented areas shall be filled with hot mix and smoothed.

- F. In spreading do not lap previously laid lane with the screed.
- G. Base course shall be placed in one or more lifts. The maximum lift thickness shall be that which can be demonstrated to be laid in a single lift and compacted to required uniform density and smoothness.
- H. If it is impractical to use a paver or spreader box, asphalt base and surface courses may be spread and finished by hand.
- I. Placing by hand shall be performed carefully to avoid segregation of the mix.
- J. Broadcasting of the material will not be permitted.
- K. Any lumps that do not break down readily shall be removed.
- L. When no other construction occurs at edge of paving, thicken and extend paving beyond and cut paving at designated edge to neat edge line or thicken and form neat edge at designated line.
- M. Construct joints to ensure a continuous bond between adjoining paving sections.
 - 1. Clean contact surfaces and apply tack coat to joints.
 - 2. Offset longitudinal joints, in successive courses, a minimum of 6 inch (150 mm).
 - 3. Offset transverse joints, in successive courses, a minimum of 24 inch (600 mm).

3.05 COMPACTION

- A. Start rolling as soon as the asphalt concrete material can be compacted without detrimental displacement.
- B. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.
- C. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.
- D. In areas too small for the roller, a vibrating plate compactor or hand tamper shall be used to achieve thorough compaction.
- E. Skin patching of rolled surfaces is not permitted.
- F. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly
- G. Contaminated and/or defective material shall be removed and replaced with good materials.
- H. Test for grade and section profile immediately after initial compression. Correct by adding or removing materials, continue rolling.
- I. After final rolling check again. Excessive irregularities or areas that retain water on the surface shall be corrected by removing and reworking the defective work.

3.06 TOLERANCES

- A. Flatness: Maximum variation of 1/4 inch (6 mm) measured with 10 foot (3 m) straight edge.
- B. Compacted Thickness: Within 1/4 inch (6 mm) of specified or indicated thickness.
- C. Variation from True Elevation: Within 1/2 inch (12 mm).
- D. No water ponding of water longer than 24 hours shall be permitted.

3.07 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for general requirements for quality control.
- B. Provide field inspection and testing. Take samples and perform tests in accordance with AI MS-2.

C. Take the following field tests:

1. In-Place Density: Testing agency will take samples of compacted pavement according to ASTM D979.
 - a. In-place density of compacted pavement will be determined by testing core samples according to ASTM D1188 or ASTM D2726/D2726M.
2. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D3549.

3.08 PROTECTION

- A. Immediately after placement, protect pavement from mechanical injury for two days or until surface temperature is less than 140 degrees F (60 degrees C).

3.09 SCHEDULE

- A. Pavement at Bus Lane Areas (heavy duty): Two courses; 3 inch (76 mm) wearing course and 5 inch (127 mm) base course.

END OF SECTION

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SECTION 32 13 13 - CONCRETE PAVING**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Concrete parking areas. (Alternate Bid in lieu of Asphalt Paving.)

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete.
- B. Section 07 92 00 - Joint Sealants: Sealing joints.

1.03 REFERENCE STANDARDS

- A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).
- B. ACI 301 - Specifications for Structural Concrete; 2016.
- C. ACI 302.1R - Guide to Concrete Floor and Slab Construction; 2015.
- D. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000 (Reapproved 2009).
- E. ACI 305R - Guide to Hot Weather Concreting; 2010.
- F. ACI 306R - Guide to Cold Weather Concreting; 2016.
- G. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2020.
- H. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2018a.
- I. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2018.
- J. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2021.
- K. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2021a.
- L. ASTM C150/C150M - Standard Specification for Portland Cement; 2021.
- M. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2016.
- N. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a (Reapproved 2016).
- O. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2019.
- P. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2019.
- Q. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2018.
- R. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2018.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit reports for each concrete material and mix design test.

1.05 QUALITY ASSURANCE

- A. Follow recommendations of ACI 305R when concreting during hot weather.
- B. Follow recommendations of ACI 306R when concreting during cold weather.

PART 2 PRODUCTS**2.01 FORM MATERIALS**

- A. Steel form material, profiled to suit conditions.
- B. Joint Filler: Preformed; non-extruding bituminous type (ASTM D1751) or sponge rubber or cork (ASTM D1752).
 - 1. Thickness: 1/2 inch (12 mm).
- C. Form Release Agent: Colorless mineral oil that will not stain concrete, absorb moisture, impair natural bonding of concrete finish coatings, or affect color characteristics of concrete finish coatings.

2.02 REINFORCEMENT

- A. Steel Welded Wire Reinforcement: Plain type, ASTM A1064/A1064M; in flat sheets; unfinished.
- B. Dowels: ASTM A615/A615M, Grade 40 - 40,000 psi (280 MPa) yield strength; deformed billet steel bars; unfinished finish.
- C. Dowels at Expansion Joints: ASTM A615/A615M Grade 40 (280); smooth steel bars; unfinished finish.

2.03 CONCRETE MATERIALS

- A. Obtain cementitious materials from same source throughout.
- B. Cement: ASTM C150/C150M, Normal - Type I Portland cement, gray color.
- C. Fine and Coarse Mix Aggregates: ASTM C33/C33M.
 - 1. Fine Aggregates: Clean, sharp, natural sand free from loam, clay, lumps or other deleterious substances.
 - 2. Coarse Aggregates: Clean, uncoated, processed from natural rock or stone containing no clay, loam or foreign matter. Unless otherwise noted or mass concrete, use aggregate meeting #57 or #67 grading requirements.
- D. Fly Ash: Do not use fly ash in exposed, finished concrete.
- E. Water: Clean, and not detrimental to concrete.
- F. Air-Entraining Admixtures: ASTM C260/C260M.
- G. Chemical Admixtures: ASTM C494/C494M, Type B - Retarding, Type C - Accelerating, Type D - Water Reducing and Retarding, Type E - Water Reducing and Accelerating, Type F - Water Reducing High Range, and Type G - Water Reducing High Range and Retarding.
 - 1. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

2.04 ACCESSORIES

- A. Curing Compound: ASTM C309, Type 1, Class B.
- B. Slab Isolation Joint Filler: 1/2 inch (13 mm) thick, height equal to slab thickness, with removable top section that will form 1/2 inch (13 mm) deep sealant pocket after removal.
 - 1. Material: Closed-cell, non-absorbent, compressible polymer foam in sheet form.
- C. Tactile Warning Surfaces: Reference drawings and details for type and locations.
- D. Evaporation Retarder: ACI 302.1R: "Evaporation Retardant/Monomolecular Film", temporary protection from rapid moisture loss.

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 Schaefer Architecture for preparing and reporting proposed mix designs.
- C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.
- D. Concrete Properties:
 - 1. Compressive strength, when tested in accordance with ASTM C39/C39M at 28 days; 4000 psi (27.6 MPa).
 - 2. Water-Cement Ratio: Maximum 45 percent by weight.
 - 3. Total Air Content: 4-7 percent, determined in accordance with ASTM C173/C173M.
 - 4. Maximum Slump: 4 inches (100 mm).
 - 5. Maximum Aggregate Size: 3/4 inch (19 mm).
- E. Aggregates: Proportion aggregates to provide a minimum of 50% coarse aggregate ratio to total aggregate.

2.06 MIXING

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

PART 3 EXECUTION**3.01 EXAMINATION**

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

3.02 SUBBASE

- A. See Section 31 20 00 - EARTH MOVING for construction of base course for work of this Section.
- B. Verify that compacted subgrade is dry and ready to support paving and imposed loads.
- C. Rework subgrade as required by soil compaction control and earthwork sections if weather or other conditions deteriorate previously prepared subgrade.
- D. Maintain moisture and degree of compaction specified in soil control until concrete is installed.
- E. Verify gradients and elevations of base are correct.

3.03 PREPARATION

- A. Moisten base to minimize absorption of water from fresh concrete.

3.04 FORMING

- A. Place and secure forms to correct location, dimension, profile, and gradient.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.
- D. Concrete pours and keyway to run parallel with length of drives.
- E. Form shall be full depth of concrete.
- F. Leave forms in place for at least 12 hours after placing and finishing concrete.

- G. Clean and oil forms each time they are used.

3.05 REINFORCEMENT

- A. Place reinforcement at midheight of slabs-on-grade.
- B. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh plus 2 inch (50.8 mm), and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- C. Interrupt reinforcement at expansion joints. Continue steel reinforcement across construction joints.
- D. Place dowels at curb and gutters if poured separately.
- E. Place smooth dowels at expansion joints as detailed on drawings.

3.06 COLD AND HOT WEATHER CONCRETING

- A. Follow recommendations of ACI 305R when concreting during hot weather.
- B. Follow recommendations of ACI 306R when concreting during cold weather.
- C. Do not place concrete when base surface temperature is less than 40 degrees F (4 degrees C), or surface is wet or frozen.

3.07 PLACING CONCRETE

- A. Place concrete as specified in Section 03 30 00.
- B. Ensure reinforcement, inserts, embedded parts, formed joints are not disturbed during concrete placement.
- C. Paving shall not be done when it is raining.

3.08 JOINTS

- A. Align curb, gutter, and sidewalk joints.
- B. Construction Joints: Provide preformed keyway-section forms or bulkhead forms with keys unless otherwise indicated. Embed keys at least 1 1/2 inches (38 mm) into concrete.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting building elements, concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.
 - 1. Terminate joint filler not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) 1 inch below finished surface for the installation of joint sealant.
 - 2. Locate expansion joints at intervals of 50 feet (15.25 m) unless otherwise indicated.
- D. Contraction (Control) Joints: Construct contraction joints in slabs-on-grade to form panels of patterns as noted or shown. Use tool cuts 1/8 inch (3 mm) wide by one-fourth of slab depth or inserts 1/4 inch (6 mm) wide by one-fourth of slab depth or saw cutting to a depth not less than 10 percent of slab thickness with a 1 inch (25 mm) minimum depth.
 - 1. Tooled Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces. Tool edges in exposed slabs.
 - 2. Saw Cutting: Slabs may be sawed if cut immediately and within 2 hours following final troweling using a "Soff-cut" saw or early entry dry-cutting saw system. Install cuts as soon as concrete will support weight of saw and operator without disturbing final finish.

3. If joint pattern is not shown, provide joints at a maximum spacing in feet equal to two times the slab thickness in inches.

3.09 FINISHING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Evaporation Retarder: In hot, dry, and windy weather apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq ft x h (1 kg/sq m x h) before and during finishing operations. Apply according to manufacturer's instructions after screeding and bull floating, but before power floating and troweling.
- C. Area Paving: Light broom, texture perpendicular to pavement direction.
- D. Sidewalk Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius (6 mm radius).
- E. Median Barrier: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius (6 mm radius).
- F. Curbs and Gutters: Light broom, texture parallel to pavement direction.
- G. Inclined Vehicular Ramps: Broomed perpendicular to slope.
- H. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.10 TOLERANCES

- A. Maximum Variation of Surface Flatness: 1/4 inch (6 mm) in 10 ft (3 m).
- B. Maximum Variation From True Position: 1/4 inch (6 mm).
- C. Thickness: Plus 3/8 inch (10 mm), minus 1/4 inch (6 mm).

3.11 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.
 1. Provide free access to concrete operations at project site and cooperate with appointed firm.
 2. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.
- B. Compressive Strength Tests: ASTM C39/C39M; for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cu yd (76 cu m) or less of each class of concrete placed.
 1. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
 2. Perform one slump test for each set of test cylinders taken.
 3. One specimen tested at 7 days, two specimens tested at 28 days.
- C. Air Content Test: ASTM C173/C173M, volumetric method for lightweight or normal weight concrete; ASTM C231, pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
- D. Concrete Temperature: ASTM C1064; one test hourly when air temperature is 40 deg F (4 def C) and below, when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.

- E. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.12 PROTECTION

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

END OF SECTION

SECTION 32 31 13 - CHAIN LINK FENCES AND GATES**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Posts, rails, and frames.
- B. Wire fabric.
- C. Concrete.
- D. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete anchorage for posts.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM A392 - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric; 2011a (Reapproved 2017).
- D. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2018a.
- E. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2021a.
- F. ASTM F567 - Standard Practice for Installation of Chain-Link Fence; 2014a.
- G. ASTM F668 - Standard Specification for Polyvinyl Chloride (PVC) and Other Organic Polymer-Coated Steel Chain-Link Fence Fabric; 2017.
- H. ASTM F1043 - Standard Specification for Strength and Protective Coatings on Steel Industrial Fence Framework; 2018.
- I. ASTM F1083 - Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures; 2018.
- J. ASTM F1665 - Standard Specification for Poly(Vinyl Chloride)(PVC) and Other Conforming Organic Polymer-Coated Steel Barbed Wire Used with Chain-Link Fence; 2008 (Reapproved 2013).
- K. CLFMI CLF-SFR0111 - Security Fencing Recommendations; 2014.
- L. FS RR-F-191/1D - Fencing, Wire and Post Metal (Chain-Link Fence Fabric); 1990.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on fabric, posts, accessories, fittings and hardware.
- C. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, and schedule of components.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of experience.
- B. Fence Installer: Company with demonstrated successful experience installing similar projects and products, with not less than five years of experience.

PART 2 PRODUCTS**2.01 COMPONENTS**

- A. Line Posts:
 - 1. Line Posts heights up to 6 feet (1.83 m): 2.38 inch (60.3 mm) diameter.
 - a. Nominal weight per foot: 3.65 lbs/ft (5.43 kg/m).
 - 2. Provide and install a 4 inch (101.6 mm) diameter line posts at every 50 feet (15.24 m). Nominal weight per foot: 9.12 lbs/ft (13.57 kg/m).
- B. Corner and Terminal Posts:
 - 1. Corner and Terminal Posts heights up to 6 feet (1.83 m): 2.88 inch (73.0 mm) diameter.
 - a. Nominal weight per foot: 5.80 lbs/ft (8.63 kg/m).
- C. Top and Brace Rail: 1.66 inch (42 mm) diameter, plain end, sleeve coupled.
 - 1. Over 12 feet (3.66 m) fence, provide top, bottom and 2 intermediate rails.
- D. Bottom Rail: 1.66 inch (42 mm) diameter, plain end, sleeve coupled.
- E. Fabric: diamond mesh interwoven wire, 9 gauge, 0.1483 inch (3.8 mm) thick, top selvage twisted tight, bottom selvage knuckle end closed for fabric heights over 6 feet (1.8 m). For fabric heights 6 feet (1.8 m) and below, provide top and bottom selvage knuckle end closed.
- F. Tension Wire: 7 gauge, 0.177 inch (4.5 mm) thick steel, single strand.
- G. Tension Band: 0.074 inch (1.88 mm) thick steel.
 - 1. Space not over 15 inches (380 mm) o.c., to secure fabric and tension bars to posts.
- H. Tension Bars: 3/16 inch (4.76 mm) x 3/4 inch (19.05 mm) thick steel.
 - 1. One piece lengths equal to full height of fabric and two for each corner and pull post, except where fabric is integrally woven into post.
- I. Tie Wire: 9 gage (4 mm) thick steel.

2.02 MATERIALS

- A. Posts, Rails, and Frames:
- B. ASTM A1011/A1011M, Designation SS; hot-rolled steel strip, cold formed to pipe configuration, longitudinally welded construction, minimum yield strength of 50 ksi (345 MPa); zinc coating complying with ASTM F1043 and ASTM F1083.
- C. Line Posts: Type I round in accordance with FS RR-F-191/1D.
- D. Terminal, Corner, Rail, Brace Posts: Type I round Type I round in accordance with FS RR-F-191/1D.
- E. Wire Fabric:
 - 1. ASTM A392 zinc coated steel chain link fabric.
 - 2. PVC-coated steel.
- F. Concrete:
- G. Type specified in Section 03 30 00.
 - 1. Ready-mixed, complying with ASTM C94/C94M; normal Portland cement; 2,500 psi (17 MPa) strength at 28 days, 3 inch (75 mm) slump; 1 inch (25 mm) nominal size aggregate, 2% to 4% entrained air.

2.03 ACCESSORIES

- A. Caps: Cast steel galvanized; sized to post diameter, set screw retainer.
 - 1. Provide line post caps with loop to receive tension wire or top rail.

- B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; steel.

2.04 FINISHES

- A. Components (Other than Fabric): Galvanized in accordance with ASTM A123/A123M, at 1.7 ounces per square foot (530 g/sq m).
- B. Components and Fabric: Vinyl coated over coating of 1.8 ounces per square foot galvanizing (over coating of 550 g/sq m galvanizing).
- C. Fabric: Minimum average zinc coating Class 1, 1.2 oz/sq ft (366 g/sq m).
- D. Tension Wire: ASTM-824 type II; zinc-coated Class 2, 1.2 oz/sq ft (366 g/sq m).
- E. Tie Wire: ASTM A 641; zinc coated Class 3, 1.2 oz/sq ft (366 g/sq m).
- F. Hardware: Hot-dip galvanized to weight required by ASTM A153/A153M.
- G. Accessories: Same finish as framing.
- H. Color: PVC Coated fabric and painted steel: Black.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install framework, fabric, accessories in accordance with ASTM F567.
- B. Place fabric on outside of posts and rails.
- C. Excavation:
 - 1. Align and drill holes for posts in firm, undisturbed or compacted soil.
 - 2. If size not shown excavate holes to diameter equal to 3 times post outside diameter but not less than 8 inch (203 mm). Oversize the hole if needed to provide at least 2 inch (50 mm) concrete cover around posts.
 - 3. Unless otherwise indicated, excavate hole depths approximately 3 inch (76 mm) lower than post bottom.
- D. Set all posts plumb in concrete footings with top of footing 2 inches (50 mm) above finish grade. Slope top of concrete for water runoff.
 - 1. Place concrete around posts and vibrate or tamp for consolidation. Check each post for vertical, alignment and top elevation. Hold in position during placement and finishing operations.
- E. Line Post Footing Depth Below Finish Grade: 3 feet (.9 m).
- F. Line Post Spacing: Space at maximum 96 inch (2440 mm).
- G. Corner and Terminal Post Footing Depth Below Finish Grade: 3 feet (.9 m), except gate posts with gates over 12 feet (3.6 m) long shall be set 4 feet (1.2 m) deep.
- H. Brace each corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail one bay from end posts and at both sides of corner and pull posts.
 - 1. Install so posts are plumb when diagonal rod is under proper tension.
- I. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.
- J. Install tension wire before stretching fabric, pull wire taut, without sags.
 - 1. Extended along bottom of fence fabric.
 - 2. Install bottom tension wire within 6 inch (152 mm) of bottom of fabric and tie to each post with not less than same diameter and type of wire.
- K. Do not stretch fabric until concrete foundation has cured 28 days.

- L. Stretch fabric between terminal posts or at intervals of 100 feet (30 m) maximum, whichever is less.
- M. Position bottom of fabric 2 inches (50 mm) above finished grade.
- N. Attach fabric to end and corner posts with tension bars and tension bands.
 - 1. Thread tension bars through fabric or clamp to fabric 4 inch (101 mm) o.c., and secure to posts with tension bands spaced 15 inch (381 mm) o.c.
 - 2. Pull fabric taut and anchor to framework so fabric remains under tension after pulling force is released.
- O. Use U-shaped tie wires, conforming to diameter of pipe to which attached, clasping pipe and fabric firmly with ends twisted at least 2 full turns. Bend wire to minimize hazard to persons or clothing.
 - 1. Tie fabric to line posts at 12 inch (304 mm).
 - 2. Tie fabric to rails and braces at 24 inch (609 mm).
 - 3. Tie fabric to tension wire at 12 inch (304 mm).

3.02 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch (6 mm).
- B. Maximum Offset From True Position: 1 inch (25 mm).
- C. Do not infringe on adjacent property lines.

END OF SECTION