CONSTRUCTION DOCUMENTS
PROJECT MANUAL

FOR

Arcanum-Butler Local School District
Booster Stadium Phase 3 Improvements:

310 North Main Street
Arcanum, Ohio 45304

OWNER

Arcanum-Butler Local School District

2011 Trojan Avenue
Arcanum, Ohio 45304

Book 1 of 1

GARMANN MILLER

Minster, OH | Columbus, OH | Indianapolis, IN | Fort Wayne, IN

January 6, 2026

Project Number: 23047.03

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Division 00

Procurement Requirements

AIA® Document A701® – 2018

Instructions to Bidders

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

Arcanum-Butler Booster Stadium Phase 3 Improvements
310 North Main Street
Arcanum, OH 45304

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

Arcanum-Butler Local Schools
2011 Trojan Avenue
Arcanum, OH 45304

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

Garmann/Miller & Associates, Inc
38 S. Lincoln Drive, P.O. Box 71
Minster, OH 45865

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

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

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

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

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ARTICLE 1 DEFINITIONS

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

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

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

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

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

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

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

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

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

ARTICLE 2 BIDDER'S REPRESENTATIONS

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

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

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 Distribution

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

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

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

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

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

§ 3.2 Modification or Interpretation of Bidding Documents

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

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

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

§ 3.3 Substitutions

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

§ 3.3.2 Substitution Process

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

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

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

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

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

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

§ 3.4 Addenda

§ 3.4.1 Addenda will be transmitted to Bidders known by the issuing office to have received complete Bidding Documents.
(Indicate how, such as by email, website, host site/platform, paper copy, or other method Addenda will be transmitted.)

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

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

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

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 Preparation of Bids

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

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

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

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

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

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

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

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

§ 4.2 Bid Security

§ 4.2.1 Each Bid shall be accompanied by the following bid security:
(Insert the form and amount of bid security.)

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

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

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

§ 4.3 Submission of Bids

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

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

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

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

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

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

§ 4.4 Modification or Withdrawal of Bid

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

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

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

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 Opening of Bids

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

§ 5.2 Rejection of Bids

Unless otherwise prohibited by law, the Owner shall have the right to reject any or all Bids.

§ 5.3 Acceptance of Bid (Award)

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

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

ARTICLE 6 POST-BID INFORMATION

§ 6.1 Contractor's Qualification Statement

Bidders to whom award of a Contract is under consideration shall submit to the Architect, upon request and within the timeframe specified by the Architect, a properly executed AIA Document A305™, Contractor's Qualification Statement,

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unless such a Statement has been previously required and submitted for this Bid.

§ 6.2 Owner's Financial Capability

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

§ 6.3 Submittals

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

.1 a designation of the Work to be performed with the Bidder's own forces;

.2 names of the principal products and systems proposed for the Work and the manufacturers and suppliers of each; and

.3 names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.

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

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

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

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 Bond Requirements

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

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

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

§ 7.1.4 Unless otherwise indicated below, the Penal Sum of the Payment and Performance Bonds shall be the amount of the Contract Sum.
(If Payment or Performance Bonds are to be in an amount other than 100% of the Contract Sum, indicate the dollar amount or percentage of the Contract Sum.)

§ 7.2 Time of Delivery and Form of Bonds

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

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

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

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

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

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

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

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

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

.4 Building Information Modeling Exhibit, if completed:

.5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda:

Number	Date	Pages

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

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

[ ] The Sustainability Plan:

Title	Date	Pages

[ ] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

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

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KOONTZ BRYANT
JOHNSON WILLIAMS

June 25, 2024

Arcanum-Butler Local Schools-Arcanum Boosters
2011 Trojan Avenue
Arcanum, Ohio 45304

Attn.: Mr. John Stephens
Superintendent

Re: Geotechnical Engineering Investigation for the Proposed Pedestrian Bridge, Pavilion and Concession Stand to be Constructed at the Arcanum Boosters Stadium, Arcanum, Ohio; KBJW Report No. 24-30510-001-01-0624

Gentlemen:

Koontz Bryant Johnson Williams, Inc. (KBJW, formerly CBC Engineers and Associates, Ltd.) is pleased to submit our report of the geotechnical engineering investigation for the above-referenced project. The purpose of this project is to provide a geotechnical evaluation of the physical characteristics of the soil strata for the proposed pedestrian bridge, pavilion and concession stand to be constructed at the Arcanum Boosters Stadium, Arcanum, Ohio. Also noted are other conditions that might affect the design and/or construction of the proposed project based on the results of the testing.

For your convenience, the samples collected that were not used to perform the laboratory tests will be kept in our office for a period of three months. If you have any questions, or if we can be of further service, please call us.

Respectfully submitted,

Koontz Bryant Johnson Williams, Inc.

Deepa Nair, M.S., P.E.
Project Engineer

Mitchell T. Hardert, P.E.
Chief Engineer

STATE OF OHIO
MITCHELL T. HARDERT
E-67613
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1-File

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SECTION I

TEXT

1.0 INTRODUCTION

Authorization to proceed with this project was given by John Stephens of Arcanum Butler Local Schools. Work was to proceed in accordance with KBJW Quotation No. 24-30510-001, Revision No. 1 dated June 4, 2024, and the terms and conditions of the executed agreement dated June 4, 2024.

The proposed new construction is to be located at the Arcanum Boosters Stadium, Arcanum, Ohio. A Vicinity Map is presented in Figure 1 in Section III of this document.

2.0 WORK PERFORMED

2.1 FIELD WORK

Four (4) borings were made in the relative positions shown on the Boring Location Plan (Figure 2) in Section III. The boring logs and resulting data are also included in Section III. The borings were made with an ATV-mounted drilling rig using hollow-stem augers and employing standard penetration resistance methods (ASTM D-1586, which includes 140-pound hammer, 30-inch drop, and two-inch-O.D. split-spoon sampler) at maximum 2.5 foot intervals for 10 feet below the ground surface and at 5 foot intervals to the bottom of the borings The disturbed split-spoon samples were visually classified, logged, sealed in moisture-proof jars, and taken to the KBJW laboratory for study. The depths where these "A"-type split-spoon samples were collected are noted on the boring logs.

2.2 LABORATORY WORK

Twenty-five (25) natural moisture content tests were performed on the "A" type split-spoon samples in accordance with ASTM D-4643. The results of these tests are tabulated in Table 1 as follows, and are also included in Section III of this report:

TABLE 1

RESULTS OF NATURAL MOISTURE CONTENT TESTS (ASTM D-4643)

BORING NO.	DEPTH INCREMENT, (FT.)	NATURAL MOISTURE CONTENT, %
KBJW-1	1.0 – 2.5	17.1
KBJW-1	3.5 – 5.0	19.7
KBJW-1	6.0 – 7.5	17.8
KBJW-1	8.5 – 10.0	17.5
KBJW-1	13.5 – 15.0	11.3
KBJW-1	18.5 – 20.0	8.9
KBJW-2	1.0 – 2.5	17.4
KBJW-2	3.5 – 5.0	16.2
KBJW-2	6.0 – 7.5	17.1
KBJW-2	8.5 – 10.0	18.7
KBJW-2	13.5 – 15.0	13.7
KBJW-2	18.5 – 20.0	11.0
KBJW-2	23.5 – 25.0	11.5
KBJW-3	1.0 – 2.5	15.8
KBJW-3	3.5 – 5.0	13.5
KBJW-3	6.0 – 7.5	19.9
KBJW-3	13.5 – 15.0	11.1
KBJW-3	18.5 – 20.0	8.6
KBJW-4	1.0 – 2.5	16.0
KBJW 4	3.5 – 5.0	7.0
KBJW-4	6.0 – 7.5	9.0
KBJW-4	8.5 – 10.0	10.6
KBJW-4	13.5 – 15.0	8.5
KBJW-4	18.5 – 20.0	11.0
KBJW-4	23.5 – 25.0	11.0

3.0 SOIL CONDITIONS AND GROUNDWATER LEVELS

Four (4) borings were made at the proposed construction site at the locations shown on the Boring Location Plan (Figure 2) in Section III of this report. Borings KBJW-1 and KBJW-2 were made at the proposed pedestrian bridge location, boring KBJW-3 was made at the proposed pavilion location, and boring KBJW-4 was made at the proposed concession stand location. The borings showed the presence of approximately 1 to 2 inches of topsoil overlying the project site. The topsoil was generally underlain in all the borings by existing silty clay fill extending to an

approximate depth of 2.5 feet below the existing site grade. Native, very soft, silty clay was encountered underneath the existing fill in borings KBJW-1 and KBJW-2 (proposed pedestrian bridge location) extending to an approximate depth of 8.5 feet below the existing site grade. SPT blow counts in this stratum varied from 3 to 6. Medium dense sand with varying amounts of gravel was encountered underneath the native soft clay layer extending to an approximate depth of 13.5 below the existing site grade in these borings. SPT blow counts in this stratum varied from 22 to 31. Native stiff, gray, silty clay was encountered underneath the sand and gravel layer extending to the bottom of these borings with SPT blow counts varying from 14 to 34. Native, very soft, silty clay was encountered underneath the existing fill in boring KBJW-3 (proposed pavilion location) extending to an approximate depth of 8.5 feet below the existing site grade. SPT blow counts in this stratum varied from 2 to 4. Medium dense sand with varying amounts of gravel was encountered underneath the native soft clay layer extending to an approximate depth of 13.5 below the existing site grade in this boring with SPT blow counts of 36. Native stiff, gray, silty clay was encountered underneath the sand and gravel layer extending to the bottom of this boring with SPT blow counts varying from 11 to 28. Native, medium dense sand and gravel was encountered underneath the existing fill in boring KBJW-4 (proposed concession stand location) extending to an approximate depth of 6.0 feet below the existing site grade with SPT blow counts of 22. Stiff silty clay was encountered underneath the native sand and gravel zone extending to an approximate depth of 8.5 below the existing site grade in this boring with SPT blow counts of 30. Medium dense sand with varying amounts of gravel was encountered underneath this native clay layer extending to an approximate depth of 13.5 below the existing site grade in this boring with SPT blow counts of 23. Native stiff, gray silty clay was encountered underneath the sand and gravel layer extending to the bottom of the boring with SPT blow counts varying from 17 to 33.

Groundwater observations were made during the drilling operations (by noting the depth of water on the drilling tools) and in the open boreholes following withdrawal of the drilling augers. Free groundwater was encountered at the time of drilling activities at the depths tabulated in Table 2 as follows at the time of drilling activities:

TABLE 2

DEPTH TO FREE GROUNDWATER AT THE TIME OF DRILLING ACTIVITIES
(AS MEASURED BENEATH THE EXISTING SITE GRADE)

BORING NO.	DEPTH TO GROUNDWATER DURING DRILLING ACTIVITIES (FT)	DEPTH TO GROUNDWATER AT THE COMPLETION OF DRILLING ACTIVITIES (FT)
KBJW-1	9.0	9.0
KBJW-2	9.0	12.0
KBJW-3	8.5	18.0
KBJW-4	8.5	13.5

Based on the encountered soil conditions at the project site, the site classification was determined to be "Site Class D" per the Ohio Building Code. In addition, a S_{DS} coefficient of 0.168g was calculated, and a S_{D1} coefficient of 0.116g was also calculated for design based on the aforementioned building code. A "Site Class D" suggests that the soil materials are stiff with standard penetration test "N-values" between 15 and 50.

4.0 DISCUSSION AND RECOMMENDATIONS

4.1 PROJECT DESCRIPTION

Arcanum-Butler Local Schools is currently developing information regarding the proposed pedestrian bridge, pavilion and concession stand to be constructed at the Arcanum Boosters Stadium, Arcanum, Ohio. The existing creek bed at the proposed pedestrian bridge location was estimated to be approximately 8.0 to 9.0 feet below the top of the boring elevations performed at the bridge location. No other details of the proposed project including the detailed spacial geometry of the facility and structural loads from the project have been provided to us at this time. The following recommendations are based on the assumption that no unusual loading conditions or special settlement restrictions apply to the proposed project and the foundations for the future construction are proposed to be shallow foundations. Consequently, if the above information is incorrect or if changes are made, KBJW should be notified so that the new data can be reviewed.

4.2 PROPOSED BRIDGE, PAVILION AND CONCESSION STAND

The existing fill and upper layers of softer silty clay soils encountered at the proposed construction are not suitable for foundation support due to their potential for producing excessive total and/or differential settlement. The footings for the proposed construction would need to bear on the native stiffer silty clay/sand and gravel soils encountered at the approximate depths shown in Table 3 below. The footings for the proposed construction should be extended to bear on such proper bearing soil, or the upper softer silty clay soils encountered should be excavated until such proper soil is reached and the undercut excavations backfilled to the bottom of the proposed footings with lean concrete or compacted engineered fill compacted to at least 95% of the maximum dry unit weight with a moisture content within 2% of the optimum moisture content as determined by the modified Proctor test. It is recommended that the exposed sub-grade found at the bottom of the foundation excavations be compacted to at least 95% of the modified Proctor maximum dry unit weight within 2% of the optimum moisture content as determined by modified Proctor test prior to the addition of lean concrete or compacted fill. This compacted bearing surface should be observed and tested by a representative of this office. Once the bearing surface is deemed to be acceptable based on the field testing and observation, the undercut excavation should be backfilled to the bottom of the footings with lean concrete or compacted engineered fill. Table 3 shows the estimated approximate minimum depth below the existing grade in each boring to reach the suitable bearing soils.

TABLE 3

APPROXIMATE DEPTH TO BEARING SOILS
(AS MEASURED BENEATH THE EXISTING GRADE)

BORING NO.	APPROXIMATE DEPTH TO BEARING SOILS (FT.)	LOCATION
KBJW-1	8.5	PROPOSED BRIDGE
KBJW-2	8.5	PROPOSED BRIDGE
KBJW-3	8.5	PROPOSED PAVILION
KBJW-4	3.5	PROPOSED CONCESSION STAND

Any engineered fill placed should be compacted to at least 95% of the maximum dry unit weight with moisture content within 2% of the optimum moisture content as determined by the modified Proctor test. Excavated material that is free of organic or objectionable materials can

be reused as fill outside the pad areas. In general, any non-organic naturally-occurring soils can be used for structural fill. Cohesive soils with a Liquid Limit (LL) greater than 50, a Plasticity Index (PI) of greater than 25, or an organic content greater than 7 percent as determined by Loss-on-Ignition (ASTM D2974) should not be used for engineered fill. The fill should contain no fragments whose greatest dimension is larger than half the thickness of the lift being placed. Based on the soil conditions encountered in our borings, the on-site soils appear to be suitable for reuse as engineered fill but would require moisture adjustments. The fill should be compacted in accordance with the Specifications for Engineered Fill contained in this report. The spread footing elements founded on such native stiffer silty clay/sand and gravel /compacted engineered fill at the recommended bearing depths can be designed with a net allowable bearing pressure of 2,000 lbs./sq. ft. This net allowable bearing pressure can be increased by a factor of one-third when designing for transient loadings such as wind or earthquake ground motions. All exterior foundations should bear at a depth of at least 32 inches below the final grade for frost considerations, or deeper if required to protect the footings from scour (scour evaluation by others than KBJW). Interior footings (within permanently heated areas) can be located at nominal depths below the finished floor provided the undesirable materials are removed and replaced with engineered fill. Square and continuous footings should be designed at least 2.5 feet and 1.5 feet wide, respectively, even if the anticipated structural loadings would allow for smaller foundation element sizes. These recommendations are provided based on the assumption that suitable native bearing soils are available at the bottom of the foundation excavations. As mentioned earlier the existing fill/upper layers of softer native silty clay encountered in the borings are not suitable for foundation support, and KBJW should be retained to confirm the acceptability of the bearing soil at the bottom of the proposed foundation excavations and verify the recommended bearing capacity once the excavation is completed before the lean concrete/compacted fill is placed.

All soil bearing foundations settle as the result of the externally applied loads. Settlement of the proposed building should be anticipated, although such movements are estimated (based upon our experience in similar soils) to be well within the tolerable limits for the structure (i.e., the total settlement will be less than about 1 inch, while differential settlement will be limited to about one half of this value).

Backfill for utility trenches, foundation excavations, etc., within structures, driveways, or parking lot areas should be placed in successive, horizontal layers. Each layer should be compacted to at least 95% of the maximum modified Proctor dry unit weight within 2% of the optimum moisture content before the next layer is added. In no instance should puddling or jetting the backfill material be allowed as a compaction method. Any silty or clayey soils at foundation depth will soften and the bearing capacity will be reduced if water ponds in the excavation. Soils exposed in the bases of all satisfactory foundation excavations should be protected against any detrimental change in condition such as from disturbance, rain and freezing. Surface run-off water should be drained away from the excavation and not allowed to pond. If possible, all foundation concrete should be placed the same day the excavation is made. If this is not practical, the foundation excavations should be adequately protected. Also, for this reason, proper drainage should be maintained after construction.

All foundations should be located so that the least lateral clear distance between any two foundations will be at least equal to the difference in their bearing elevations (see Figure 3 in Section III of this document). If this distance cannot be maintained, the lower foundation should be designed to account for the load imparted by the upper foundation. If this condition occurs adjacent to a below-grade wall, the wall should be designed for the additional lateral earth pressure due to the upper foundation.

4.2.1 LATERAL AND UPLIFT FORCES ON SHALLOW FOOTINGS

Lateral forces on the foundation elements can be resisted by passive lateral earth pressures against the opposite vertical face of the foundation and by friction along the soil/foundation interface. An allowable resisting passive earth pressure of 200 lbs./sq. ft., and coefficient of friction of 0.30, respectively, can be used for design purposes. The passive resistance should only be used for that portion of the foundation located at a depth greater than 2.5 feet beneath the final grade (Please see Figure 4 in Section III of this text). A factor of safety of 1.5 relative to the lateral capacity should be used in design. It should be noted that lateral movements, on the order of up to 0.5 inch, may occur to mobilize this lateral resisting force.

It is further recommended that only the weight of the footing and the total weight of the soil above and within the periphery of the footing be used for resisting uplift forces. A total soil

unit weight of 120 lbs./cu. ft. should be used for these computations for backfill material compacted as recommended in Section 4.2 (Please see Figure 5 in Section III of this document). It is also recommended that a factor of safety of at least 1.5 be used in calculating uplift resistance due to the weight of the footing and the backfill soil.

4.2.2 LATERAL EARTH PRESSURES ON BELOW GRADE WALLS

The magnitude of lateral earth pressure against subsurface walls (such as abutments walls, designed by others) is dependent on the method of backfill placement, the type of backfill soil, drainage provisions and whether or not the wall is permitted to yield during and/or after placement of the backfill. When a wall is held rigidly against horizontal movement, the lateral pressure against the wall is greater than the "active" earth pressure that is typically used in the design of free-standing retaining walls. Therefore, rigid walls should be designed for higher, "at-rest" pressures (using an at-rest lateral earth pressure coefficient, K_o), while yielding walls can be designed for active pressures (using an active lateral earth pressure coefficient, K_a).

For use in these computations, a total soil unit weight of 130 lbs/cu. ft. should be used. For below-grade walls, a coefficient of earth pressure at-rest (K_o) of 0.5 and a coefficient of "active" earth pressure of 0.33 are recommended, provided a well-graded granular material is used for backfill (Please see Figure 6 in Section III of this document). The granular backfill material should extend upward and outward from the base of the wall on a slope not steeper than about 1 (horizontal) to 1 (vertical). This method of computation presumes that there will be no hydrostatic pressure due to water build-up.

It is recommended that the static weight per axle of equipment utilized for the compaction of the backfill materials not exceed 2 tons per axle for non-vibratory equipment and 1 ton per axle for vibratory equipment. All heavy equipment, including compaction equipment heavier than recommended above, should not be allowed closer to the wall (horizontal distance) than the vertical distance from the backfill surface to the bottom of the wall. If it is desired to use heavier compaction equipment adjacent to the below grade wall, it is recommended that this office be contacted to determine the resulting earth pressures.

4.2.3 SLABS-ON-GRADE

Any existing topsoil/existing fill and other deleterious soft material encountered below the proposed slab-on-grade for the pavilion and concession stand should be excavated to a minimum depth of 36 inches below the bottom of the proposed slab or until all deleterious existing fill/softer material is completely removed, whichever is shallower, the base of the excavation properly stabilized, and the excavation backfilled to the bottom of the slab with compacted engineered fill compacted to at least 95% of the maximum modified Proctor dry unit weight. Slabs-on-grade can then be supported on new compacted structural fill.

It is recommended that all slabs-on-grade be "floating", that is, fully ground supported and not structurally connected to walls or foundations. This is to minimize the possibility of cracking and displacement of the slabs-on-grade because of differential movements between the slab and the foundation. Although the movements are estimated to be within the tolerable limits for structural safety, such movements could be detrimental to the slabs if they were rigidly connected to the foundations.

It is furthermore recommended that the slabs-on-grade be supported on a 4 to 6-inch layer of relatively clean granular material such as sand and gravel or crushed stone. This is to help distribute concentrated loads and equalize moisture conditions beneath the slab. Proper drainage must be incorporated into this granular layer to preclude future wet areas in the finished slab-on-grade. Provided that a minimum of 4 inches of granular material is placed below the new slab-on-grade (and the native soil is prepared as recommended), a modulus of subgrade reaction (k_{30}) of 100 lbs./cu. in. can be used for design of the slabs.

4.2.4 FOUNDATION EXCAVATIONS

Each foundation excavation should be inspected to insure that all loose, soft or otherwise undesirable material is removed and that the foundation will bear on satisfactory material.

If pockets of soft, loose or otherwise unsuitable material are encountered in the footing excavations and it is inconvenient to lower the footings, the proposed footing elevations may be

re-established by backfilling after the undesirable material has been removed. The undercut excavation beneath each footing should extend to suitable bearing soils and the dimensions of the excavation base should be determined by imaginary planes extending outward and down on a 1 (vertical) to 1 (horizontal) slope from the base perimeter of the footing as illustrated in Figure 7 in Section III. The entire excavation should then be refilled with a well-compacted engineered fill, or lean concrete (please note that the width of the lean concrete zone should be at least 1-foot wider than the width of the overlying footing element on all sides). Special care should be exercised to remove any sloughed, loose or soft materials near the base of the excavation slopes. Proper shoring techniques must be adopted during the excavation of the proposed footings below the bearing elevations of any nearby existing footings. All Federal, State, and Local regulations should be strictly adhered to relative to excavation side-slope geometry and any required shoring.

5.0 SLOPE CONSIDERATIONS

A detailed slope stability analysis is beyond the scope of this study. However, it is, recommended that fill slopes less than 10 feet in height be designed for slopes not steeper than 2.5 (horizontal) to 1 (vertical). For any fill greater than 10 feet in height, it is recommended that slopes be not steeper than 3 (horizontal) to 1 (vertical).

In general, temporary cut slopes of 2 (horizontal) to 1 (vertical) should remain stable during a reasonable construction period provided they are not higher than about 10 feet and are not subjected to excessive vibration from construction equipment and are protected from surface erosion. The need for temporary bracing of utility trenches should be anticipated. In general, any permanent cut slopes should be no steeper than about 3 (horizontal) to 1 (vertical).

6.0 CONSTRUCTION DEWATERING

At the time of our investigation, the free groundwater level was noted to be generally around the anticipated excavation depths. Therefore, significant quantities of groundwater should be anticipated in the proposed foundation/slab excavations due to the presence of sand and gravel zones. In order to maintain proper bearing support for the foundations/slabs, the entire foundation/slab excavation area must be dewatered (groundwater level lowered) to at least 2 feet below the deepest excavation elevation prior to the placement of the

backfill/foundations/slabs, and the dewatering of the area maintained until the backfill/foundations/slabs are fully constructed. Sump pumping is generally a suitable method of dewatering in such areas where the required depth of groundwater to be lowered is generally less. Extra care must be exercised when pumping from sumps that extend into silts and other granular soils as observed at this site, as a general deterioration of the bearing soils and a localized "quick" condition could result. Extra care must also be exercised during pumping to ensure that the loss of fines does not occur and filter fabric should be used as necessary to maintain a soil-tight system. It is imperative that the dewatering of the foundations and subgrade soils be continually maintained until the foundations/slabs are fully constructed, and they are providing confinement of the underlying soils. If the groundwater level is allowed to rise to the surface of the excavation areas without the surface being confined, detrimental softening and degradation of the foundation and subgrade soils should be expected that will require remedial measures in order to provide adequate support for the structure. The evaluation and design of any required temporary or permanent dewatering measures to facilitate proper construction and proper in-service conditions is the responsibility of others than KBJW.

7.0 SITE PREPARATION

All areas that will support slabs-on-grade should be properly prepared. After rough grade has been established in cut areas and prior to placement of fill in all fill areas, the exposed subgrade should be carefully inspected by probing and testing as needed. Any topsoil or other deleterious/soft material still in place, frozen, wet, soft or loose soil, and other undesirable materials should be removed and replaced with engineered fill. Based on the test results presented in Table 1 of this document, aeration of the near-surface in-situ soils should be anticipated prior to their placement as engineered fill (or chemical stabilization can also be used). The exposed subgrade should furthermore be inspected by proofrolling with a loaded tandem axle dump truck or other suitable equipment to check for pockets of soft material hidden beneath a thin crust of better soil. Any unsuitable materials thus exposed should be removed and replaced with well-compacted, engineered fill as outlined in the specifications of this document. However, it may also become necessary (due to the presence of soft exposed soil materials) to employ chemical stabilization or to locally incorporate ODOT No. 2 aggregate into the subgrade to increase its stiffness.

Care should be exercised during the grading operations at the site. Due to the nature of the near surface soils, the traffic of heavy equipment, including heavy compaction equipment, may create pumping and general deterioration of the shallower soils, especially if excess surface water is present. If this occurs, it may be necessary to utilize a biaxial/triaxial geogrid, chemical stabilization, or other methodology (such as the incorporation of ODOT No. 2 aggregate into the subgrade) to stabilize the disturbed subgrade. The grading, therefore, should be done during a dry season, if at all possible.

In addition, it must be emphasized that once engineered fill is properly placed on the project site, that these materials can also degrade significantly due to the effects of heavy construction traffic and wet weather. This degradation may in some cases require the excavation and replacement of the engineered fill with aerated, chemically-stabilized fill materials; hence, caution should be exercised to avoid such degradation of these soil materials.

It should be noted that when vibratory rollers are utilized on certain soils types (such as fine grain sands or silts), that shear induced pore water pressures may be developed within these materials which will result in significant "pumping" of these materials (even though these soils may be stiff and pass moisture density tests on engineered fills). Therefore (in these types of soils), it is imperative that the vibrator not be utilized and that these soils be statically rolled in order to preclude the development of such shear induced pore water pressures. These shear induced pore water pressures dissipate over a number of days (depending on the permeability of the soil materials); however in the short term, significant "pumping" of these materials can be witnessed in the field.

8.0 SOIL SWELLING POTENTIAL

Based upon the laboratory tests performed for this study and the mineralogy of typical soils from the general vicinity of the project site, no significant soil swelling is anticipated. To our knowledge, there are no instances of problems associated with soil swelling in the project vicinity.

9.0 LIQUEFACTION

When certain soils (generally only granular soils) below the groundwater table are subjected to dynamic loads, such as those produced by earthquakes, a sudden increase in pore water pressure occurs as the result of shearing of the soil particles past one another. In extreme cases, when these shear induced pore water pressures exceed the strength of the soil, the soil strength can reduce to zero thereby resulting in a phenomenon known as "liquefaction." Conditions at this site have been examined to determine the likelihood for liquefaction of the natural soils during earthquake ground motions.

Soil type, relative density, initial confining pressure (i.e., the depth of the potentially liquefiable soil below the ground surface) and the magnitude of potential ground motions are the most important factors in determining the liquefaction potential of a soil mass. It is generally agreed that saturated, relatively loose (with blow counts or "N" values typically less than about 13) in the upper 50 feet or so are most susceptible to liquefaction.

Clayey soils are generally considered to be non-vulnerable to liquefaction. It is, therefore, concluded that liquefaction (or any significant loss of strength) of the soils underlying the project site during earthquake ground motions is extremely unlikely. To our knowledge, there are no recorded cases of liquefaction of subsurface materials similar to those at this project site. Therefore, no special design measures relative to soil liquefaction appear to be warranted.

10.0 BURIED UTILITY PIPES

Excavations for buried utility pipelines should follow the guidelines set forth previously in this report. Depending on the pipeline material, a minimum thickness of at least 0.5 foot of select fine-grained granular bedding material should be used beneath all below-grade pipes, with a minimum cover thickness of at least 3 feet to afford an "arching" effect and reduce stresses on the pipe. The cover thickness may be reduced if the external loading condition on the pipe is relatively light or if the pipe is designed to withstand the external loading condition. It is not recommended that "pea-gravel" or other "open-work" aggregates be used for trench backfill since these materials are nearly impossible to compact and have a tendency to pond water within their interstices.

11.0 DRAINAGE

Adequate drainage should be provided at the site to minimize any increase in moisture content of the foundation soils. The exterior grade (including all parking areas) should be sloped away from all facility structures to prevent ponding of water.

12.0 CLOSURE

12.1 BASIS OF RECOMMENDATIONS

The evaluations, conclusions, and recommendations in this report are based on our interpretation of the field and laboratory data obtained during the exploration, our understanding of the project and our experience with similar sites and subsurface conditions. Data used during this exploration included, but were not necessarily limited to:

- four (4) exploratory borings performed during this study,
- observations of the project site by our staff,
- results of the laboratory soil tests,
- site plans and drawings furnished by the client,
- supportive interaction with the client; and
- published soil or geologic data of this area.

In the event that changes in the project characteristics are planned, or if additional information or differences from the conditions anticipated in this report become apparent, KBJW should be notified so that the conclusions and recommendations contained in this report can be reviewed and, if necessary, modified or verified in writing.

12.2 LIMITATIONS OF STUDY/RECOMMENDED ADDITIONAL SERVICES

The subsurface conditions discussed in this report and those shown on the boring logs represent an estimate of the subsurface conditions based on interpretation of the boring data using normally accepted geotechnical engineering judgments. Although individual test borings are representative of the subsurface conditions at the boring locations on the dates shown, they are not necessarily indicative of subsurface conditions at other locations or at other times.

Regardless of the thoroughness of a subsurface exploration, there is the possibility that conditions between borings will differ from those at the boring locations, that conditions are not as anticipated by designers, or that the construction process has altered the soil conditions. As variations in the soil profile are encountered, additional subsurface sampling and testing may be necessary to provide data required to re-evaluate the recommendations of this report. Consequently, after submission of this report it is recommended that KBJW be authorized to perform additional services to work with the designer(s) to minimize errors and omissions regarding the interpretation and implementation of this report.

Prior to construction, we recommend that KBJW:

- work with the designers to implement the recommended geotechnical design parameters into plans and specifications,
- consult with the design team regarding interpretation of this report,
- establish criteria for the construction observation and testing for the soil conditions encountered at this site; and
- review final plans and specifications pertaining to geotechnical aspects of design.

During construction, we recommend that KBJW:

- observe the construction, particularly the site preparation, fill placement, and foundation excavation or installation,
- perform in-place density testing of all compacted fill,
- perform materials testing of soil and other materials as required; and
- consult with the design team to make design changes in the event that differing subsurface conditions are encountered.

If KBJW is not retained for these services, we shall assume no responsibility for construction compliance with the design concepts, specifications or recommendations.

12.3 WARRANTY

Our professional services have been performed, our findings obtained and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. No other warranty, express or implied, is made.

While the services of KBJW are a valuable and integral part of the design and construction teams, we do not warrant, guarantee, or insure the quality or completeness of services provided by other members of those teams, the quality, completeness, or satisfactory performance of construction plans and specifications which we have not prepared, nor the ultimate performance of building site materials.

12.3.1 SUBSURFACE EXPLORATION

Subsurface exploration is normally accomplished by test borings, although test pits are sometimes employed. The method of determining the boring location and the surface elevation at the boring is noted in the report, and is presented on the Boring Location Plan or on the boring log. The location and elevation of the boring should be considered accurate only to the degree inherent with the method used.

The boring log includes sampling information, description of the materials recovered, approximate depth of boundaries between soil and rock strata and groundwater data. The boring log represents conditions specifically at the location and time the boring was made. The boundaries between different soil strata are indicated at specific depths; however, these depths are in fact approximate and are somewhat dependent upon the frequency of sampling (The transition between soil strata is often gradual). Free groundwater level readings are made at the times and under conditions stated on the boring logs (Groundwater levels change with time and season). The borehole does not always remain open sufficiently long enough for the measured water level to coincide with the groundwater table.

12.3.2 LABORATORY AND FIELD TESTS

Laboratory and field tests are performed in accordance with specific ASTM standards unless otherwise indicated. All determinations included in a given ASTM standard are not

always required and performed. Each test report indicates the measurements and determinations actually made.

12.3.3 ANALYSIS AND RECOMMENDATIONS

The geotechnical report is prepared primarily to aid in the engineering design of site work and structural foundations. Although the information in the report is expected to be sufficient for these purposes, it is not intended to determine the cost of construction or to stand alone as a construction specification.

Our engineering report recommendations are based primarily on data from test borings made at the locations shown on a boring location plan included in this report. Soil variations may exist between borings and these variations may not become evident until construction. If significant variations are then noted, the geotechnical engineer should be contacted so that field conditions can be examined and recommendations revised if necessary.

The geotechnical engineering report states our understanding as to the location, dimensions and structural features proposed for the site. Any significant changes in the nature, design, or location of the site improvements MUST be communicated to the geotechnical engineer such that the geotechnical analysis, conclusions, and recommendations can be appropriately adjusted. The geotechnical engineer should be given the opportunity to review all drawings that have been prepared based on their recommendations.

12.3.4 CONSTRUCTION MONITORING

Construction monitoring is a vital element of complete geotechnical services. The field engineer/inspector is the owner's "representative" observing the work of the contractor, performing tests as required in the specifications, and reporting data developed from such tests and observations. The field engineer or inspector does not direct the contractor's construction means, methods, operations or personnel. The field inspector/engineer does not interfere with the relationship between the owner and the contractor and, except as an observer, does not become a substitute owner on site. The field inspector/engineer is responsible for his own safety but has no responsibility for the safety of other personnel at the site. The field inspector/engineer is an important member of a team whose responsibility is to watch and test the work being done

and report to the owner whether that work is being carried out in general conformance with the plans and specifications.

12.3.5 GENERAL

The scope of our services did not include an environmental assessment for the presence or absence of hazardous or toxic materials in the soil, surface water, groundwater or air, on, within or beyond the site studied. Any statements in the report or on the boring logs regarding odors, staining of soils or other unusual items or conditions observed are strictly for the information of our client.

To evaluate the site for possible environmental liabilities, we recommend an environmental assessment, consisting of a detailed site reconnaissance, a record review, and report of findings. Additional subsurface drilling and samplings, including groundwater sampling, may be required. KBJW can provide this service and would be pleased to provide a cost proposal to perform such a study, if requested.

This report has been prepared for the exclusive use of the Arcanum-Butler Local Schools and its project team, for specific application to the proposed construction at the Arcanum Boosters Stadium, Arcanum, Ohio (see Figure 1 in Section III of this report). Specific design and construction recommendations have been provided in the various sections of the report. The report shall, therefore, be used in its entirety. This report is not a bidding document and shall not be used for that purpose. Anyone reviewing this report must interpret and draw their own conclusions regarding specific construction techniques and methods chosen. KBJW is not responsible for the independent conclusions, opinions or recommendations made by others based on the field exploratory and laboratory test data presented in this report.

SECTION II

SPECIFICATIONS

I - ENGINEERED FILL BENEATH STRUCTURES

CLEARING AND GRADING SPECIFICATIONS

1.0 GENERAL CONDITIONS

The Contractor shall furnish all labor, materials, and equipment, and perform all work and services necessary to complete in a satisfactory manner the site preparation, excavation, filling, compaction and grading as shown on the plans and as described therein.

This work shall consist of all clearing and grading, removal of existing structures unless otherwise stated, preparation of the land to be filled, filling of the land, spreading and compaction of the fill, and all subsidiary work necessary to complete the grading of the cut and fill areas to conform with the lines, grades, slopes, and specifications.

This work is to be accomplished under the constant and continuous supervision of the Owner or his designated representative.

In these specifications the terms "approved" and "as directed" shall refer to directions to the Contractor from the Owner or his designated representative.

2.0 SUBSURFACE CONDITIONS

Prior to bidding the work, the Contractor shall examine, investigate and inspect the construction site as to the nature and location of the work, and the general and local conditions at the construction site, including without limitation, the character of surface or subsurface conditions and obstacles to be encountered on and around the construction site; and shall make such additional investigation as he may deem necessary for the planning and proper execution of the work. Borings and/or soil investigations shall have been made. Results of these borings and studies will be made available by the Owner to the Contractor upon his request, but the Owner is not responsible for any interpretations or conclusions with respect thereto made by the Contractor on the basis of such information, and the Owner further has no responsibility for the accuracy of the borings and the soil investigations.

If conditions other than those indicated are discovered by the Contractor, the Owner should be notified immediately. The material which the Contractor believes to be a changed condition should not be disturbed so that the Owner can investigate the condition.

3.0 SITE PREPARATION

Within the specified areas, all trees, brush, stumps, logs, tree roots, and structures scheduled for demolition shall be removed and disposed of.

All cut and fill areas shall be properly stripped. Topsoil will be removed to its full depth and stockpiled for use in finish grading. Any rubbish, organic and other objectionable soils, and

other deleterious material shall be disposed of off the site, or as directed by the Owner or his designated representative if on site disposal is provided. In no case shall such objectionable material be allowed in or under the fill unless specifically authorized in writing.

Prior to the addition of fill, the original ground shall be compacted to job specifications as outlined below. Special notice shall be given to the proposed fill area at this time. If wet spots, spongy conditions, or groundwater seepage is found, corrective measures must be taken before the placement of fill.

4.0 FORMATION OF FILL AREAS

Fills shall be formed of satisfactory materials placed in successive horizontal layers of not more than eight (8) inches in loose depth for the full width of the cross-section. The depth of lift may be increased if the Contractor can demonstrate the ability to compact a larger lift. If compaction is accomplished using hand-tamping equipment, lifts will be limited to 4-inch loose lifts. Engineered fill placed shall be compacted to at least 95% of the maximum dry unit weight with a moisture content within 2% of the optimum moisture content as determined by the modified Proctor test.

All material entering the fill shall be free of organic matter such as leaves, grass, roots, and other objectionable material.

The operations on earth work shall be suspended at any time when satisfactory results cannot be obtained because of rain, freezing weather, or other unsatisfactory conditions. The Contractor shall keep the work areas graded to provide the drainage at all times.

The fill material shall be of the proper moisture content before compaction efforts are started. Wetting or drying of the material and manipulation to secure a uniform moisture content throughout the layer shall be required. Should the material be too wet to permit proper compaction or rolling, all work thus affected shall be delayed until the material has dried to the required moisture content. The moisture content of the fill material should be no more than two (2) percentage points higher or lower than optimum unless otherwise authorized. Sprinkling shall be done with equipment that will satisfactorily distribute the water over the disced area. Any areas inaccessible to a roller shall be consolidated and compacted by mechanical tampers. The equipment shall be operated in such a manner that hardpan, cemented gravel, clay or other chunky soil material will be broken up into small particles and become incorporated with the other material in the layer. The fill shall contain no fragments whose greatest dimension is larger than 1/2 of the thickness of the lift being placed.

In the construction of filled areas, starting layers shall be placed in the deepest portion of the fill, and as placement progresses, additional layers shall be constructed in horizontal planes. Original slopes shall be continuously, vertically benched to provide horizontal fill planes. The size of the benches shall be formed so that the base of the bench is horizontal and the back of the bench is vertical. As many benches as are necessary to bring the site to final grade shall be constructed. Filling operations shall begin on the lowest bench, with the fill being placed in horizontal eight (8) inch thick loose lifts unless otherwise authorized. The filling shall progress

in this manner until the entire first bench has been filled, before any fill is placed on the succeeding benches. Proper drainage shall be maintained at all times during benching and filling of the benches, to insure that all water is drained away from the fill area.

Frozen material shall not be placed in the fill nor shall the fill be placed upon frozen material.

The Contractor shall be responsible for the stability of all fills made under the contract, and shall replace any portion, which in the opinion of the Owner or his designated representative, has become displaced due to carelessness or negligence on the part of the Contractor. Fill damaged by inclement weather shall be repaired at the Contractor's expense.

5.0 SLOPE RATIO AND STORM WATER RUN-OFF

Slopes shall not be greater than 2 (horizontal) to 1 (vertical) in both cut and fill, or as illustrated on the construction drawings. Excavations shall be constructed in accordance with all Federal, State and local codes relative to slope geometry.

6.0 GRADING

The Contractor shall furnish, operate, and maintain such equipment as is necessary to construct uniform layers, and control smoothness of grade for maximum compaction and drainage.

7.0 COMPACTING

The compaction equipment shall be approved equipment of such design, weight, and quantity to obtain the required density in accordance with these specifications.

8.0 TESTING AND INSPECTION SERVICES

Testing and inspection services will be provided by the Owner.

SECTION III

BORING LOGS, LAB TESTING RESULTS, & FIGURES

BORING LOG TERMINOLOGY

STRATUM DEPTH

Distance in feet and/or inches below ground surface.

STRATUM ELEVATION

Elevation in feet below ground surface elevation.

DESCRIPTION OF MATERIALS

Major types of soil material existing at boring location. Soil classification based on one of the following systems: Unified Soil Classification System, Ohio State Highway Classification System, Highway Research Board Classification System, Federal Aviation Authority Classification System, Visual Classification.

SAMPLE NO.

Sample numbers are designated consecutively, increasing with depth for each boring.

SAMPLE TYPE

"A" Split spoon, 2" O.D., 1-3/8" I.D., 18" in length.

"B" One of the following:

- Power Auger Sample
- Piston Sample
- Diamond Bit NX: BX: AX:
- Housel Sample
- Wash Sample
- Denison Sample

"C" Shelby Tube 3" O.D. except where noted.

SAMPLE DEPTH

Depth below top of ground at which appropriate sample was taken.

BLOWS PER 6" ON SAMPLER

The number of blows required to drive a 2" O.D., 1-3/8" I.D., split spoon sampler, using a 140 pound hammer with a 30 inch free fall, is recorded for 6" drive increments. (Example: 3/8/9)

"N" BLOWS/FT.

Standard penetration resistance. This value is based on the total number of blows required for the last 12" of penetration. (Example: 3/8/9 $\therefore$ N = 8 + 9 = 17)

WATER OBSERVATIONS

Depth of water recorded in test boring is measured from top of ground to top of water level. Initial depth indicates water level during boring, completion depth indicates water level immediately after boring, and depth of "X" number hours indicates water level after letting water rise or fall over a time period. Water observations in pervious soil are considered reliable ground water levels for that date. Water observations in impervious soils can not be considered accurate ground water measurements for that date unless records are made over several days' time. Factors such as weather, soil porosity, etc., will cause the ground water level to fluctuate for both pervious and impervious soils.

SOIL DESCRIPTION

COLOR

When the color of the soil is uniform throughout, the color recorded will be such as brown, gray, black and may be modified by adjectives such as light and dark. If the soil's predominant color is shaded by a secondary color, the secondary color precedes the primary color, such as: gray-brown, yellow-brown. If two major and distinct colors are swirled throughout the soil, the colors will be modified by the term mottled, such as: mottled brown and gray.

PARTICLE SIZE	VISUAL	SOIL COMPONENTS	
Boulders	Larger than 8"	**Major Component**	**Minor Component Term**
Cobbles	8" to 3"	Gravel	Trace 1-10%
Gravel—Coarse	3" to ¾"	Sand	Some 11-35%
Fine	2 mm. To ¾"	Silt	And 36-50%
Sand —Coarse	2 mm.-0.6 mm. (Pencil lead size)	Clay	
—Medium	0.6 mm.-0.2 mm.	**Moisture Content**	
	(Table sugar and salt size)	**Term**	**Relative Moisture**
—Fine	0.2 mm.-0.06 mm.	Dry	Powdery
	(Powdered sugar and human hair size)	Damp	Moisture content below plastic limit
Silt	0.06 mm.-0.002 mm.	Moist	Moisture content
Clay	0.002 and smaller (Particle size of both Silt and Clay not visible		above plastic limit but below liquid limit
	to naked eye)	Wet	Moisture content above liquid limit

Condition of Soil Relative to Compactness Granular Material		Condition of Soil Relative to Consistency Cohesive Material	
Very Loose	5 blows/ft. or less	Very Soft	3 blows/ft. or less
Loose	6 to 10 blows/ft.	Soft	4 to 5 blows/ft.
Medium Dense	11 to 30 blows/ft.	Medium Stiff	6 to 10 blows/ft.
Dense	31 to 50 blows/ft.	Stiff	11 to 15 blows/ft.
Very Dense	51 blows/ft. or more	Very Stiff	16 to 30 blows/ft.
		Hard	31 blows/ft. or more

STANDARD PENETRATION RESISTANCE (ASTM D1586)

The purpose of this test is to determine the relative consistency of the soils in a boring, or from boring to boring over the site. This method consists of making a hole in the ground and driving a 2 inch O.D. split spoon sampler into the soil with a 140 pound hammer dropped from a height of 30 inches. The sampler is driven 18 inches and the number of blows recorded for each 6 inches of penetration. Values of standard penetration (N) are determined in blows per foot, summarizing the blows required for the last two 6 inch increments of penetration. (Example: 2-6-8; N = 14)

THIN-WALLED SAMPLER (ASTM D1587)

The purpose of the thin-walled sampler is to recover a relatively undisturbed soil sample for laboratory tests. The sampler is a thin-walled seamless tube with a 3 inch outside diameter, which is hydraulically pressed into the ground, at a constant rate. The ends are then sealed to prevent moisture loss, and the tube is returned to the laboratory for tests.

UNCONFINED COMPRESSION OR TRIAXIAL TESTS (ASTM D2166)

The unconfined compression test and the triaxial tests are performed to determine the shearing strength of the soil, to use in establishing its safe bearing capacity. In order to perform the unconfined compression tests, it is necessary that the soil exhibit sufficient cohesion to stand in an unsupported cylinder. These tests are normally performed on samples which are 6.0 inches in height and 2.85 inches in diameter. In the triaxial test, various lateral stresses can be applied to more closely simulate the actual field conditions. There are several different types of triaxial tests. These are, however, normally performed on constant strain apparatus with a deformation rate of 0.05 inches per minute.

CONSOLIDATION TEST (ASTM D2435)

The purpose of this test is to determine the compressibility of the soil. This test is performed on a sample of soil which is 2.5 inches in diameter and 1.0 inch in height, and has been trimmed from relatively "undisturbed" samples. The test is performed with a level system or an air activated piston for applying load. The loads are applied in increments and allowed to remain on the sample for a period of 24 hours. The consolidation of the sample under each individual load is measured and a curve of void ratio vs. Pressure is obtained. From the information obtained in this manner and the column loads of the structure, it is possible to calculate the settlement of each individual building column. This information, together with the shearing strength of the soil, is used to determine the safe bearing capacity for a particular structure.

REVISED TO ASTM D4318
ATTERBERG LIMITS (ASTM D423 AND D424)

These tests determine the liquid and plastic limits of soils having a predominant percentage of fine particle (silt and clay) sizes. The liquid limit of a soil is the moisture content expressed as a percent at which the soil changes from a liquid to a plastic state, and the plastic limit is the moisture content at which the soil changes from a plastic to a semi-solid state. Their difference is defined as the plasticity index (P.I. = L.L. - P.L.), which is the change in moisture content required to change the soil from a "semi-solid" to a liquid. These tests furnish information about the soil properties which is important in determining their relative swelling potential and their classifications.

MECHANICAL ANALYSIS (ASTM D422)

This test determines the percent of each particle size of a soil. A sieve analysis is conducted on particle sizes greater than a No. 20 sieve (0.074 mm), and a hydrometer test on particles smaller than the No. 200 sieve. The gradation curve is drawn through the points of cumulative per cent of particle size, and plotted on semi-logarithmic paper for the combined sieve and hydrometer analysis. This test, together with the Atterberg Limits tests, is used to classify a soil.

NATURAL MOISTURE CONTENT (ASTM D2216)

The purpose of this test is to indicate the range of moisture contents present in the soil. A wet sample is weighed, placed in the constant temperature oven at 105° for 24 hours, and re-weighed. The moisture content is the change in weight divided by the dry weight.

PROCTOR TESTS

The purpose of these tests is to determine the maximum density and optimum moisture content of a soil. The Modified Proctor test is performed in accordance with ASTM D1557-70. The test is performed by dropping a 10 pound hammer 25 times from an 18 inch height on each of 5 equal layers of soil in a 1/30 cubic foot mold, which represents a compaction effort of 56,250 foot pounds per cubic foot. The moisture content is then raised, and this procedure is repeated. A moisture density curve is then plotted, with the density on the ordinate axis and the moisture content on the abscissa axis. The moisture content at which the maximum density requirement can be achieved with a minimum compactive effort is designated as the optimum moisture content (O.M.C.). The Standard Proctor test is performed in accordance with ASTM D698-70. This test is similar to the Modified Proctor test and is performed by dropping a 5.5 pound hammer 25 times from a height of 12 inches on 3 equal layers of soil in a 1/30 cubic foot mold, which represents a compaction effort of 12,375 foot pounds per cubic foot. This test gives proportionately lower results than the Modified Proctor test.

FIELD CLASSIFICATION SYSTEM FOR ROCK EXPLORATION

Saprolite A transitional material between soil and rock retains the relic structure of the parent rock and exhibits penetration resistance between 60 blows per foot and 100 blows/2 inches of penetration.

R.Q.D. Rock Quality Designation; Ratio of the core lengths greater than four inches to the total length of the core run.

Description	Percentage Core Recovered	RQD Rock Quality Description	Description of Rock Quality
Incompetent	Less than 40	0 - 25	very poor
Competent	40 - 70	25 - 50	poor
Fairly Competent	70 - 80	50 - 75	fair
Fairly Continuous	80 - 90	75 - 90	good
Continuous	90 - 100	90 - 100	excellent

FIELD HARDNESS: (A measure of resistance to scratching or abrasion)

Very Hard	Cannot be scratched with knife or sharp pick, breaking of hand specimens requires several hard blows of geologist's pick.
Hard	Can be scratched with knife or pick only with difficulty. Hard blow of a hammer required to detach hand specimen.
Moderately Hard	Can be scratched with knife or pick. Gouges or grooves to ¼ inch deep can be excavated by hard blow of point of a geologist's pick. Hand specimens can be detached by moderate blow.
Medium	Can be grooved or gouged 1/16 inch deep by firm pressure on knife or pick point. Can be excavated in small chips to pieces about 1 inch maximum size by hard blows of the point of a geologist's pick.
Soft	Can be gouged or grooved readily with knife or pick point. Can be excavated in chips and pieces several inches in size by moderate blows of a pick point. Small thin pieces can be broken by finger pressure.
Very soft	Can be carved with knife. Can be excavated with point of pick. Pieces 1 inch or more in thickness can be broken with finger pressure. Can be scratched readily by fingernail.

WEATHERING: (The action of the elements in altering the color, texture, and composition of the rock)

Very slightly	Rock generally fresh, joints stained, some joints may contain thin clay coatings, crystals in broken face show bright. Rock rings under hammer if crystalline.
Slightly	Rock generally fresh, joins stained, and discoloration extends into rock up to 1 inch. Joints may contain clay. In granitoid rocks some occasional feldspar crystals are dull and discolored. Crystalline rocks ring under hammer.
Moderately	Significant portions of rock show discoloration and weathering effects. In granitoid rocks, most feldspars are dull and discolored; some may be decomposed to clay. Rock as dull sound under hammer and has a significant loss of strength compared with fresh rock.
Severely	All rock except quartz discolored or stained. Rock "fabric" clear and evident but reduced in strength to strong soil. In granitoid rocks all feldspars kaolinized to some extent. Some fragments of strong rock usually left.
Very severely	All rock except quartz discolored of stained. Rock "fabric" discernible, but mass effectively reduces to "soil" with only fragments of strong rock usually left.
Completely	All rock completely altered to soil-like material.

ROCK FRACTURE FREQUENCY: (Any break in a rock whether or not it has undergone relative displacement.)

Description	Spacing Between Fractures
Extremely fractured	Less than 1 inch
Moderately fractured	1 inch to 4 inches
Slightly fractured	4 inches to 8 inches
Sound	More than 8 inches

Note: Fracture frequency terms are generalized to described the average condition of the rock obtained from the core run. Portions of the rock within the run described may vary from the generalized descriptions. Where a core break appears to be due to drilling and not to natural causes, it has not been considered as a break for accessing fracture frequency. Frequency shown on Record of Soil Exploration represents condition of core as removed form the core barrel.

JOINTS BEDDING, AND FOLIATION:

Joints	Bedding & Foliation	Spacing
Very close	Very thin	Less than 2 inches
Close	Thin	2 inches - 1 foot
Moderately close	Medium	1 foot - 3 feet
Wide	Thick	3 feet - 10 feet
Very wide	Very Thick	More than 10 feet

Notes: Refers to perpendicular distance between discontinuities

Attitude	Angle (degrees)
Horizontal	0 to 5
Shallow to low angle	5 to 35
Moderately dipping	35 to 55
Steep or high angle	55 to 85
Vertical	85 to 90

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BORING LOG

CLIENT: Arcanum-Butler Local Schools
REPORT NO.: 24-30510-001
BORING NO.: KBJW-1
DATE STD.: 6/24/24
DATE FINISHED: 6/24/24
PROJECT: Pedestrian Bridge, Pavilion and Concession Stand
DRILLERS: EnviroCore, Inc.
GROUND ELEV.: --
LOCATION: Arcanum Boosters Stadium, Arcanum, Ohio
METHOD: HSA

SCALE, FT.	STRATUM DEPTH, FT.	CLASSIFICATION OF MATERIAL Major Soil Components: Gravel, Sand, Silt, Clay Minor Component Term: Trace 1-10%, Some 11-35%, And 36-50%	SAMPLE NUMBER & SAMPLE TYPE	DEPTH OF SAMPLE, FT. FROM	DEPTH OF SAMPLE, FT. TO	BLOWS ON SAMPLER PER SPT (6" INTERVAL)	SPT "N", OR RECOVERY (IN. FOR SHELBY TUBES, % FOR ROCK CORE)
0.0	0.0	TOPSOIL					
	2"	FILL, soft, brown, silty CLAY, trace sand and gravel	1A	1.0	2.5	4-3-3	6
2.0		(moist)					
	2.5	ORIGINAL, very soft, brown/gray, silty CLAY,	2A	3.5	5.0	1-2-1	3
4.0		trace sand and gravel (moist)					
6.0			3A	6.0	7.5	2-1-3	4
8.0							
	8.5	Medium dense, brown, silty SAND, some gravel (wet)	4A	8.5	10.0	4-10-21	31
10.0							
12.0							
	13.5	Stiff, gray, silty CLAY, trace sand and gravel (wet)	5A	13.5	15.0	7-8-9	17
14.0							
16.0							
18.0							
			6A	18.5	20.0	10-13-21	34
20.0		BOTTOM OF BORING AT 20.0 ft.					
22.0							
24.0							
26.0							
28.0							
30.0							
32.0							
34.0							
36.0							
38.0							

WATER LEVEL OBSERVATIONS
Noted on rods 9.0 ft.
At completion 9.0 ft.
After -- hours -- ft.

BORING METHOD

HSA	Hollow Stem Auger	MD	Mud Drilling
CFA	Continuous Flight Auger	RC	Rock Coring
DC	Driven Casing	CA	Casing Advancer

TYPE SAMPLE
A - Split Spoon
B - Rock Core
C - Shelby Tube
D - Other

*These Shelby Tube Samples Obtained In An Auxiliary Boring Drilled A Few Feet From This Boring

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BORING LOG

CLIENT: Arcanum-Butler Local Schools | REPORT NO.: 24-30510-001 | BORING NO.: KBJW-2
DATE STD.: 6/24/24 | DATE FINISHED: 6/24/24
PROJECT: Pedestrian Bridge, Pavilion and Concession Stand | DRILLERS: EnviroCore, Inc. | GROUND ELEV.: --
LOCATION: Arcanum Boosters Stadium, Arcanum, Ohio | METHOD: HSA

SCALE, FT.	STRATUM DEPTH, FT.	CLASSIFICATION OF MATERIAL Major Soil Components: Gravel, Sand, Silt, Clay Minor Component Term: Trace 1-10%, Some 11-35%, And 36-50%	SAMPLE NUMBER & SAMPLE TYPE	DEPTH OF SAMPLE, FT. FROM	DEPTH OF SAMPLE, FT. TO	BLOWS ON SAMPLER PER SPT (6" INTERVAL)	SPT "N", OR RECOVERY (IN. FOR SHELBY TUBES, % FOR ROCK CORE)
0.0	0.0	TOPSOIL					
	2"	FILL, soft, brown, silty CLAY, trace sand and gravel	1A	1.0	2.5	3-3-5	8
2.0		(moist)					
	2.5	ORIGINAL, soft, brown/gray, silty CLAY, some sand	2A	3.5	5.0	2-1-4	5
4.0		and gravel (moist)					
6.0			3A	6.0	7.5	3-3-3	6
8.0							
	8.5	Medium dense, brown, silty SAND, some gravel (wet)	4A	8.5	10.0	6-11-11	22
10.0							
12.0							
	13.5	Stiff, gray, silty CLAY, some sand and gravel (wet)	5A	13.5	15.0	6-6-8	14
14.0							
16.0							
18.0							
			6A	18.5	20.0	6-7-7	14
20.0							
22.0							
			7A	23.5	25.0	5-6-10	16
24.0							
		BOTTOM OF BORING AT 25.0 FEET					
26.0							
28.0							
30.0							
32.0							
34.0							
36.0							
38.0							

WATER LEVEL OBSERVATIONS
Noted on rods 9.0 ft.
At completion 12.0 ft.
After -- hours -- ft.

BORING METHOD
HSA Hollow Stem Auger
CFA Continuous Flight Auger
DC Driven Casing
MD Mud Drilling
RC Rock Coring
CA Casing Advancer

TYPE SAMPLE
A - Split Spoon
B - Rock Core
C - Shelby Tube
D - Other

*These Shelby Tube Samples Obtained In An Auxiliary Boring Drilled A Few Feet From This Boring

Koontz Bryant Johnson Williams, Inc.
3171 Research Boulevard
Dayton, OH 45420
(P) (937) 428-6150

BORING LOG

CLIENT: Arcanum-Butler Local Schools
REPORT NO.: 24-30510-001
BORING NO.: KBJW-3
DATE STD.: 6/24/24
DATE FINISHED: 6/24/24
PROJECT: Pedestrian Bridge, Pavilion and Concession Stand
DRILLERS: EnviroCore, Inc.
GROUND ELEV.: --
LOCATION: Arcanum Boosters Stadium, Arcanum, Ohio
METHOD: HSA

SCALE, FT.	STRATUM DEPTH, FT.	CLASSIFICATION OF MATERIAL Major Soil Components: Gravel Sand Silt Clay Minor Component Term: Trace 1-10% Some 11-35% And 36-50%	SAMPLE NUMBER & SAMPLE TYPE	DEPTH OF SAMPLE, FT. FROM	DEPTH OF SAMPLE, FT. TO	BLOWS ON SAMPLER PER SPT (6" INTERVAL)	SPT "N", OR RECOVERY (IN. FOR SHELBY TUBES, % FOR ROCK CORE)
0.0	0.0	TOPSOIL					
	1"	FILL, soft, brown, silty CLAY, trace sand and gravel	1A	1.0	2.5	3-2-2	4
2.0		(moist)					
	2.5	ORIGINAL, very soft, brown/gray, silty CLAY,	2A	3.5	5.0	1-1-1	2
4.0		some sand and gravel (moist)					
6.0			3A	6.0	7.5	WOH-WOH-2	2
8.0							
	8.5	Medium dense, brown, silty SAND, some gravel (wet)	4A	8.5	10.0	16-26-10	36
10.0							
12.0							
	13.5	Stiff, gray, silty CLAY, some sand and gravel (wet)	5A	13.5	15.0	4-5-6	11
14.0							
16.0							
18.0							
			6A	18.5	20.0	7-9-10	19
20.0							
22.0							
			7A	23.5	25.0	10-13-15	28
24.0							
		BOTTOM OF BORING AT 25.0 FEET					
26.0							
28.0							
30.0							
32.0							
34.0							
36.0							
38.0							

WATER LEVEL OBSERVATIONS
Noted on rods 8.5 ft.
At completion 18.0 ft.
After -- hours -- ft.

BORING METHOD
HSA Hollow Stem Auger
CFA Continuous Flight Auger
DC Driven Casing
MD Mud Drilling
RC Rock Coring
CA Casing Advancer

TYPE SAMPLE
A - Split Spoon
B - Rock Core
C - Shelby Tube
D - Other

*These Shelby Tube Samples Obtained In An Auxiliary Boring Drilled A Few Feet From This Boring

Koontz Bryant Johnson Williams, Inc.
3171 Research Boulevard
Dayton, OH 45420
(P) (937) 428-6150

BORING LOG

CLIENT: Arcanum-Butler Local Schools
REPORT NO.: 24-30510-001
BORING NO.: KBJW-4
DATE STD.: 6/24/24
DATE FINISHED: 6/24/24
PROJECT: Pedestrian Bridge, Pavilion and Concession Stand
DRILLERS: EnviroCore, Inc.
GROUND ELEV.: --
LOCATION: Arcanum Boosters Stadium, Arcanum, Ohio
METHOD: HSA

SCALE, FT.	STRATUM DEPTH, FT.	CLASSIFICATION OF MATERIAL Major Soil Components: Gravel, Sand, Silt, Clay Minor Component Term: Trace 1-10%, Some 11-35%, And 36-50%	SAMPLE NUMBER & SAMPLE TYPE	DEPTH OF SAMPLE, FT. FROM	DEPTH OF SAMPLE, FT. TO	BLOWS ON SAMPLER PER SPT (6" INTERVAL)	SPT "N", OR RECOVERY (IN. FOR SHELBY TUBES, % FOR ROCK CORE)
0.0	0.0	TOPSOIL					
	2"	FILL, soft, brown, silty CLAY, trace sand and gravel (moist)	1A	1.0	2.5	5-5-2	7
2.0							
	3.5	ORIGINAL, medium dense, brown, silty SAND, some gravel (wet)	2A	3.5	5.0	7-11-11	22
4.0							
6.0	6.0	Stiff, brown/gray, silty CLAY, some sand, gravel (moist)	3A	6.0	7.5	12-12-18	30
8.0							
	8.5	Medium dense, brown, silty/clayey SAND, some gravel (wet)	4A	8.5	10.0	14-15-8	23
10.0							
12.0							
	13.5	Stiff, gray, silty CLAY, some sand and gravel (wet)	5A	13.5	15.0	10-15-16	31
14.0							
16.0							
18.0							
			6A	18.5	20.0	7-7-10	17
20.0							
22.0							
			7A	23.5	25.0	5-15-18	33
24.0							
		BOTTOM OF BORING AT 25.0 FEET					
26.0							
28.0							
30.0							
32.0							
34.0							
36.0							
38.0							

WATER LEVEL OBSERVATIONS
Noted on rods 8.5 ft.
At completion 13.5 ft.
After -- hours -- ft.

BORING METHOD
HSA Hollow Stem Auger
CFA Continuous Flight Auger
DC Driven Casing
MD Mud Drilling
RC Rock Coring
CA Casing Advancer

TYPE SAMPLE
A - Split Spoon
B - Rock Core
C - Shelby Tube
D - Other

*These Shelby Tube Samples Obtained In An Auxiliary Boring Drilled A Few Feet From This Boring

TABLE 1

RESULTS OF NATURAL MOISTURE CONTENT TESTS (ASTM D-4643)

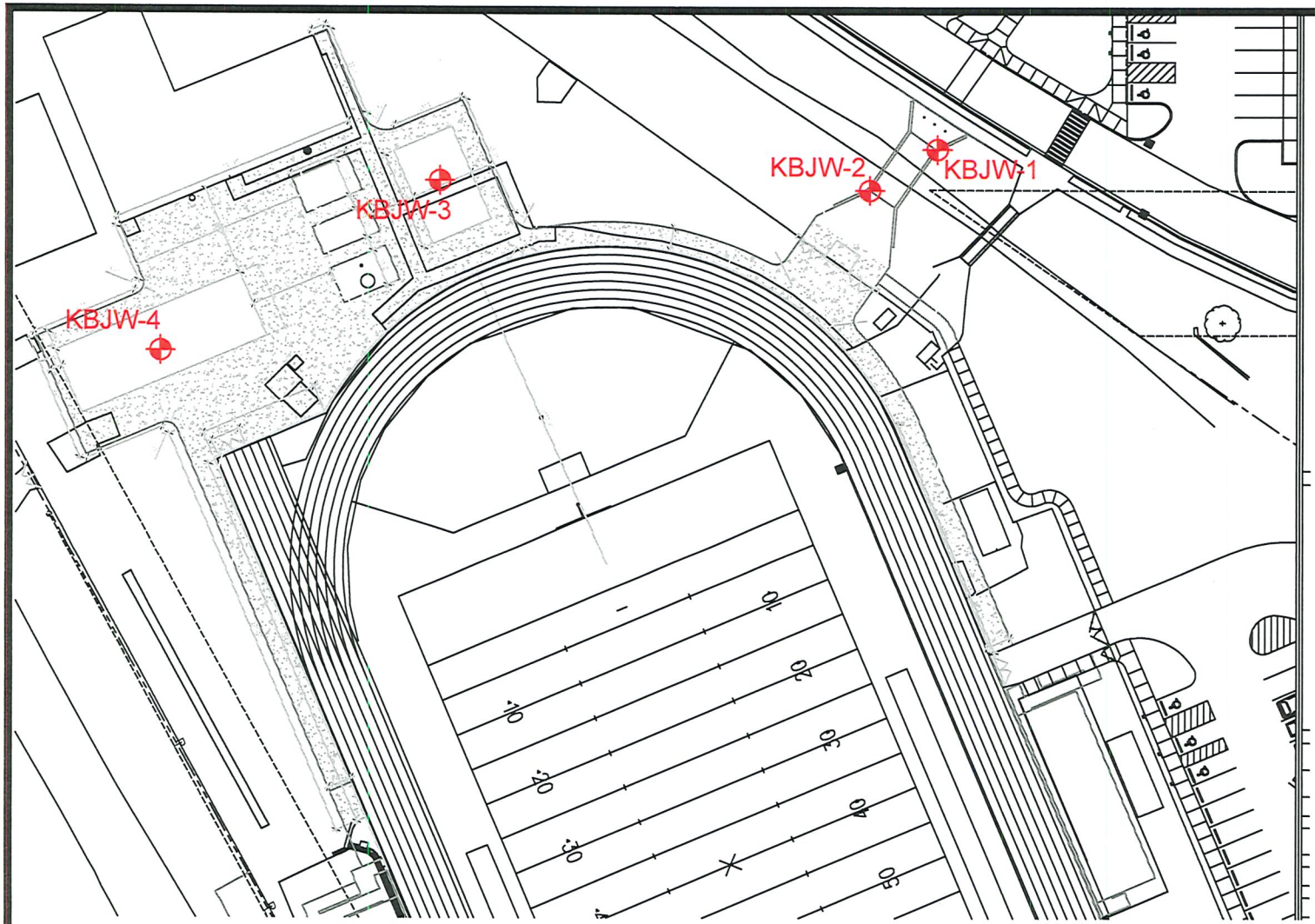
BORING NO.	DEPTH INCREMENT, (FT.)	NATURAL MOISTURE CONTENT, %
KBJW-1	1.0 – 2.5	17.1
KBJW-1	3.5 – 5.0	19.7
KBJW-1	6.0 – 7.5	17.8
KBJW-1	8.5 – 10.0	17.5
KBJW-1	13.5 – 15.0	11.3
KBJW-1	18.5 – 20.0	8.9
KBJW-2	1.0 – 2.5	17.4
KBJW-2	3.5 – 5.0	16.2
KBJW-2	6.0 – 7.5	17.1
KBJW-2	8.5 – 10.0	18.7
KBJW-2	13.5 – 15.0	13.7
KBJW-2	18.5 – 20.0	11.0
KBJW-2	23.5 – 25.0	11.5
KBJW-3	1.0 – 2.5	15.8
KBJW-3	3.5 – 5.0	13.5
KBJW-3	6.0 – 7.5	19.9
KBJW-3	13.5 – 15.0	11.1
KBJW-3	18.5 – 20.0	8.6
KBJW-4	1.0 – 2.5	16.0
KBJW 4	3.5 – 5.0	7.0
KBJW-4	6.0 – 7.5	9.0
KBJW-4	8.5 – 10.0	10.6
KBJW-4	13.5 – 15.0	8.5
KBJW-4	18.5 – 20.0	11.0
KBJW-4	23.5 – 25.0	11.0



VICINITY MAP

GEOTECHNICAL ENGINEERING INVESTIGATION
FOR THE PROPOSED PEDESTRIAN BRIDGE, PAVILION,
AND CONCESSION STAND TO BE CONSTRUCTED
AT THE ARCANUM BOOSTERS STADIUM,
ARCANUM, OHIO

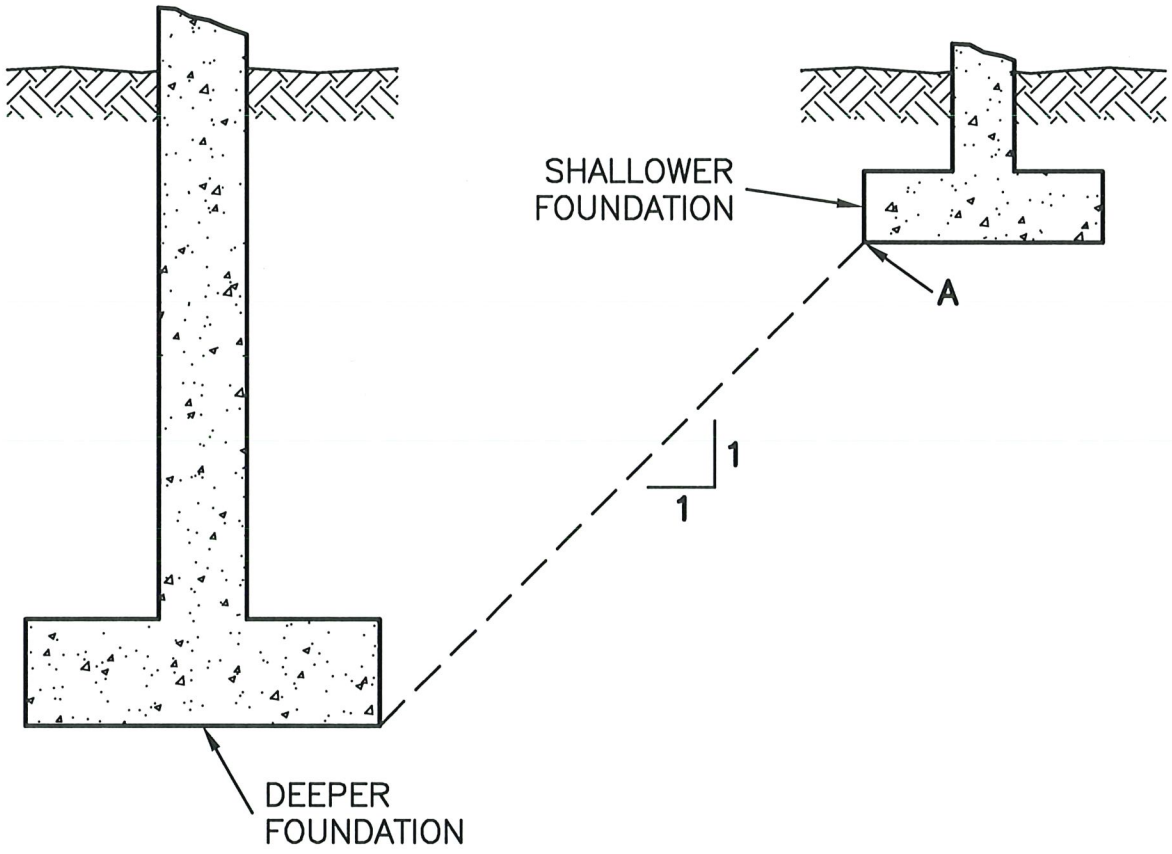
Project No. 24-30510-001	KOONTZ BRYANT JOHNSON WILLIAMS
Scale 1" = 800'	Formerly CBC Engineers
Date: 6/25/24	Figure No. 1



BORING LOCATION PLAN

GEOTECHNICAL ENGINEERING INVESTIGATION
FOR THE PROPOSED PEDESTRIAN BRIDGE, PAVILION,
AND CONCESSION STAND TO BE CONSTRUCTED
AT THE ARCANUM BOOSTERS STADIUM,
ARCANUM, OHIO

Project No. 24-30510-001	KOONTZ BRYANT JOHNSON WILLIAMS Formerly CBC Engineers
Scale 1" = 100'	
Date: 6/25/24	Figure No. 2



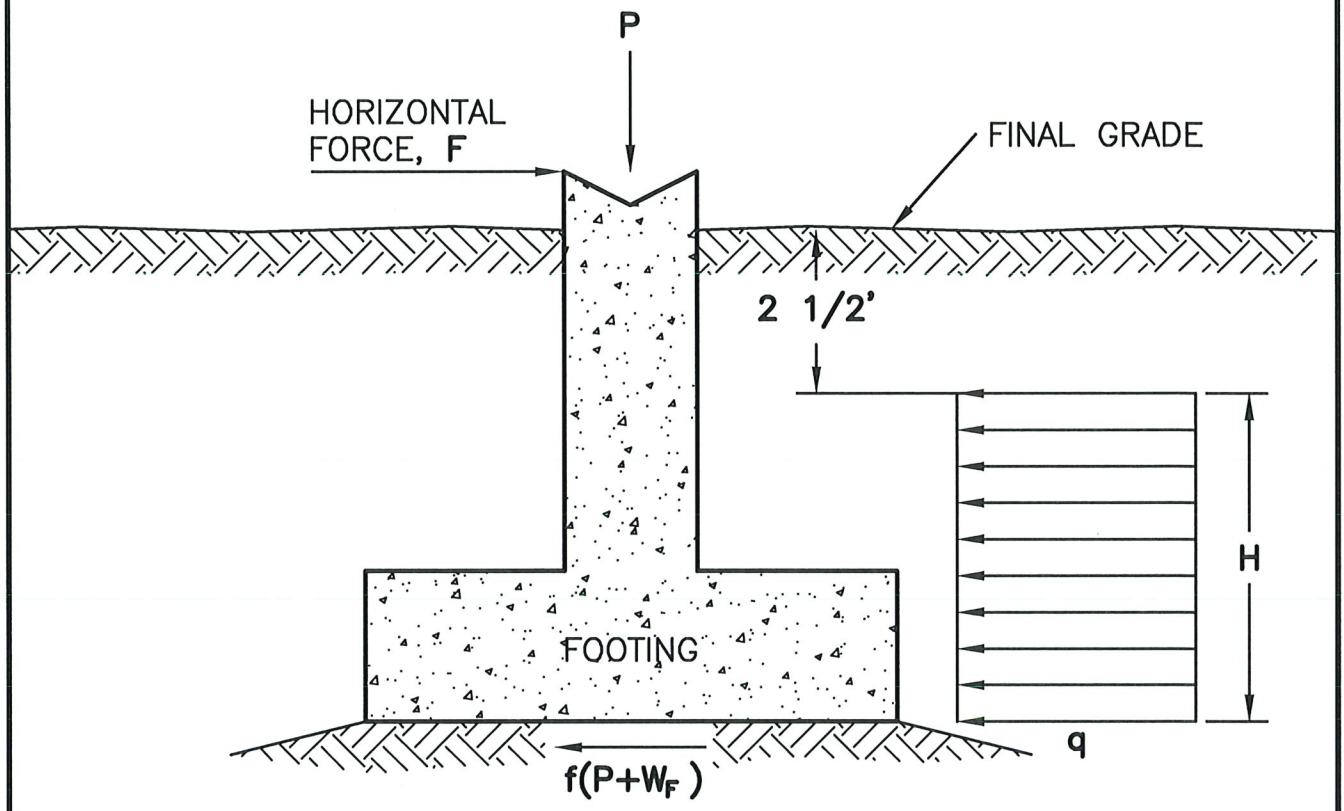
NOTE: POINT "A" OF SHALLOWER FOOTING MUST BE SITUATED BELOW THE DASHED LINE SHOWING THE FOOTING LOCATION LIMIT.

DESIGN ILLUSTRATION:

ADJACENT FOOTINGS

KOONTZ BRYANT JOHNSON WILLIAMS
Formerly CBC Engineers

PROJECT NO.	SCALE:	FIGURE NO.
·	NONE	3



LEGEND:

P = MINIMUM DOWNWARD LOAD

f = COEFFICIENT OF FRICTION AT CONCRETE/SOIL INTERFACE

F = MAXIMUM HORIZONTAL FORCE

W_F = WEIGHT OF FOOTING BELOW FINAL GRADE

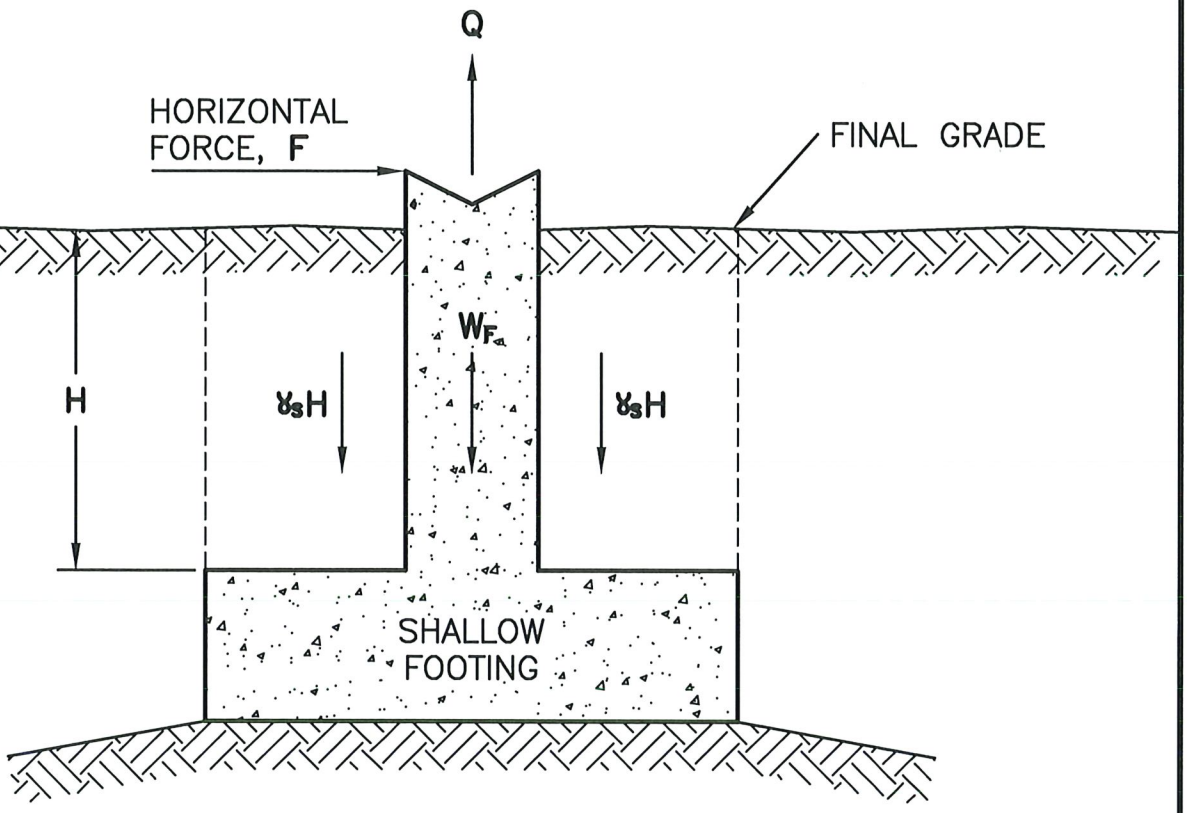
q = RESISTING PASSIVE PRESSURE

DESIGN ILLUSTRATION:

RESISTING LATERAL FORCES FOR SHALLOW FOOTINGS

KOONTZ BRYANT JOHNSON WILLIAMS
Formerly CBC Engineers

PROJECT NO.	SCALE:	FIGURE NO.
.	NONE	4



LEGEND:

Q = MAXIMUM UPLIFT LOAD

γ_S = TOTAL SOIL UNIT WEIGHT

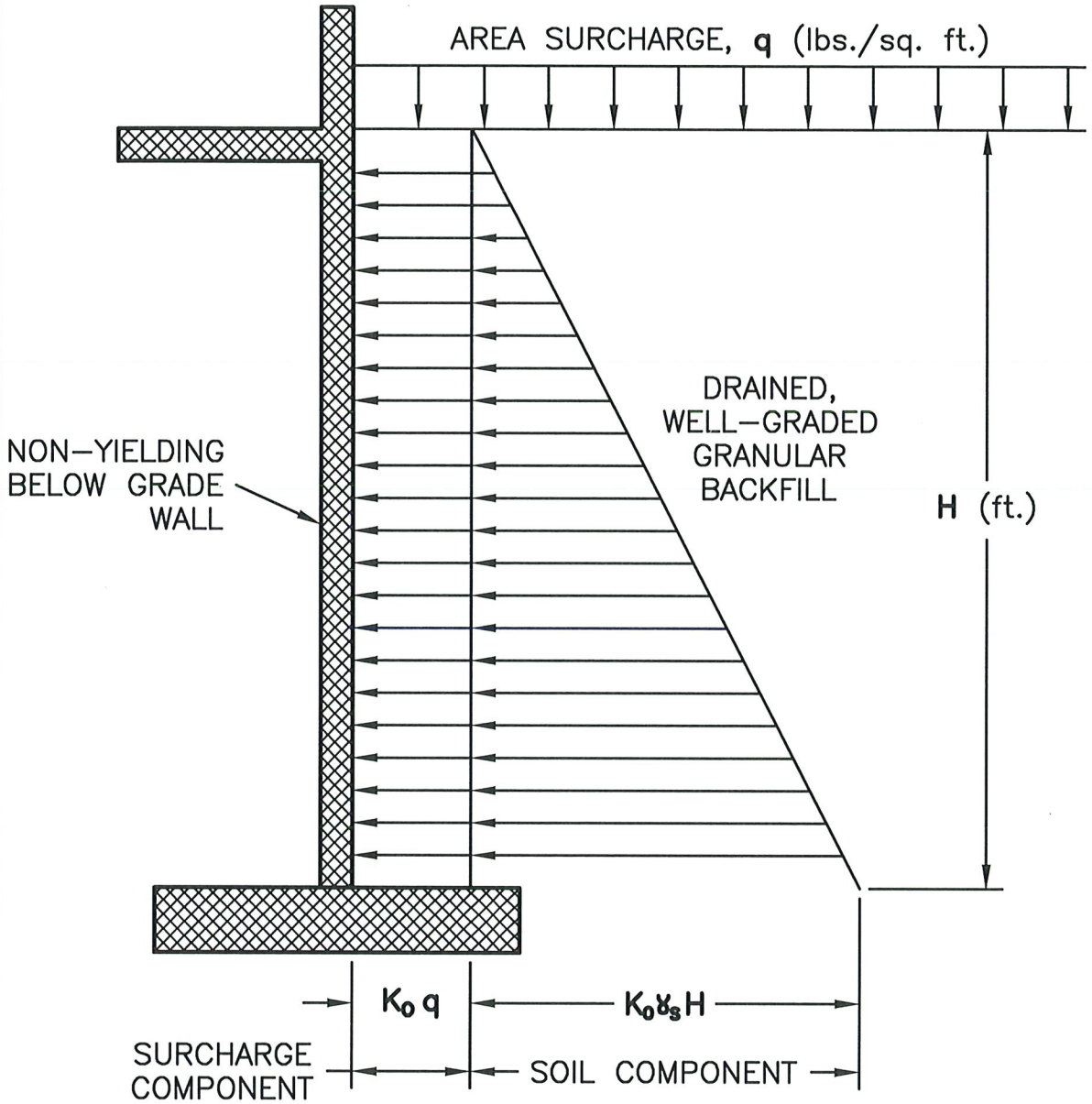
W_F = WEIGHT OF FOOTING BELOW FINAL GRADE

DESIGN ILLUSTRATION:

RESISTING UPLIFT FORCES FOR
SHALLOW FOOTINGS

KOONTZ BRYANT JOHNSON WILLIAMS
Formerly CBC Engineers

PROJECT NO:	SCALE:	FIGURE NO.
.	NONE	5



LEGEND:

γ_s = TOTAL SOIL UNIT WEIGHT, (lbs./cu. ft.)

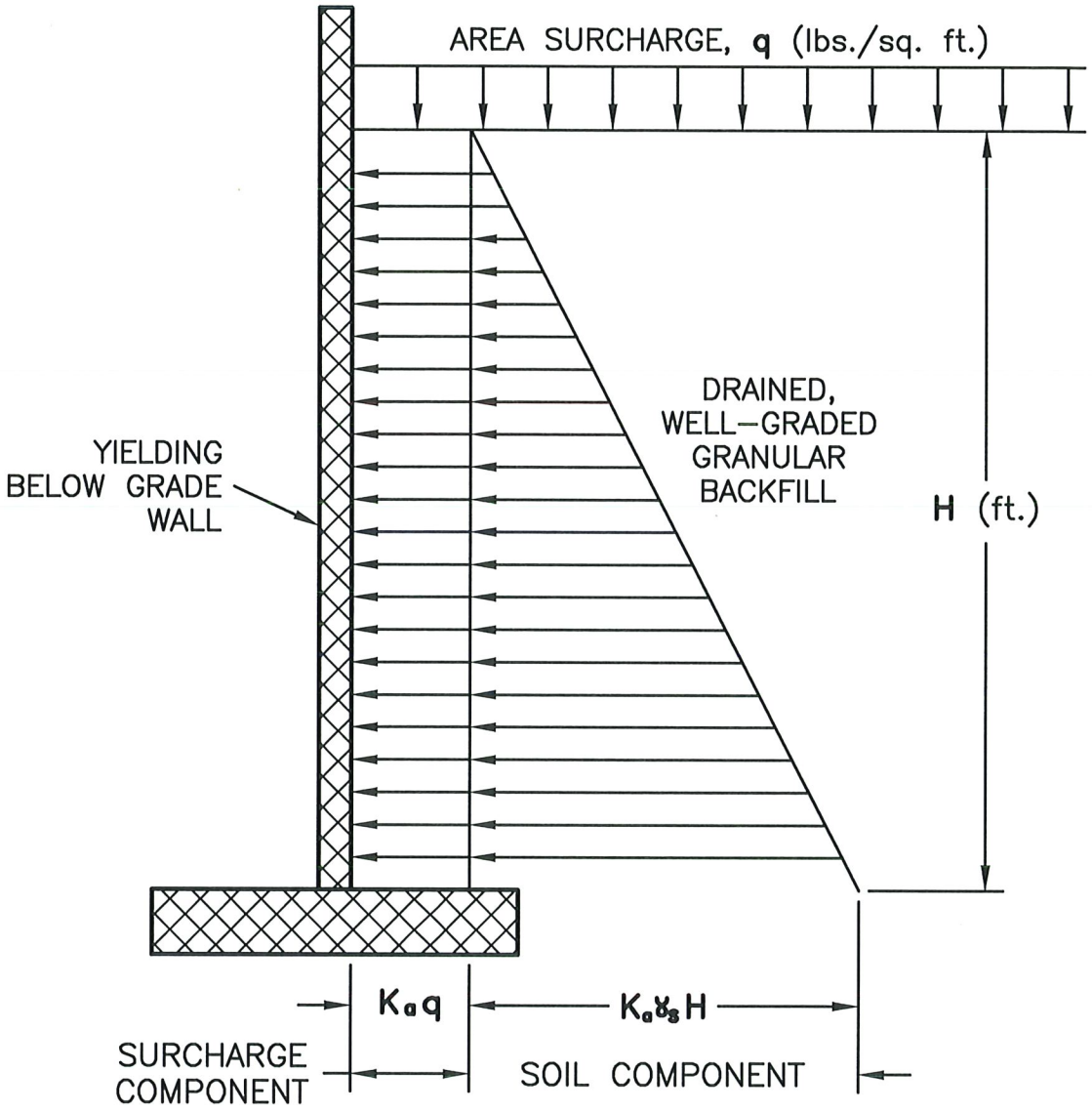
K_0 = AT REST EARTH PRESSURE COEFFICIENT

DESIGN ILLUSTRATION:

LATERAL EARTH PRESSURE AGAINST NON-YIELDING BELOW-GRADE WALL ASSUMING DRAINED BACKFILL WITH NON-HYDROSTATIC PRESSURE

KOONTZ BRYANT JOHNSON WILLIAMS
Formerly CBC Engineers

PROJECT NO.	SCALE:	FIGURE NO.
.	NONE	6



LEGEND:

K_a = ACTIVE EARTH PRESSURE COEFFICIENT

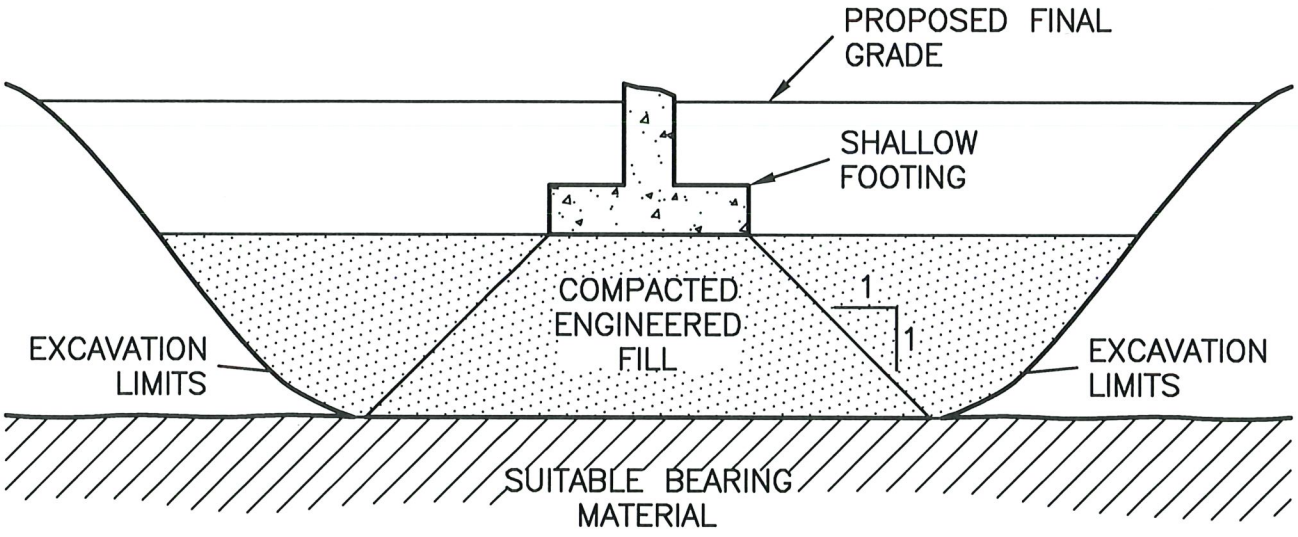
γ_s = TOTAL SOIL UNIT WEIGHT, (lbs./cu. ft.)

DESIGN ILLUSTRATION:

LATERAL EARTH PRESSURE AGAINST YIELDING BELOW-GRADE WALL ASSUMING DRAINED BACKFILL WITH NO HYDROSTATIC PRESSURE

KOONTZ BRYANT JOHNSON WILLIAMS
Formerly CBC Engineers

PROJECT NO.	SCALE:	FIGURE NO.
.	NONE	6A



DESIGN ILLUSTRATION:

SHALLOW FOOTINGS IN AN UNDERCUT AREA

KOONTZ BRYANT JOHNSON WILLIAMS
Formerly CBC Engineers

PROJECT NO.	SCALE:	FIGURE NO.
.	NONE	7

GARMANN MILLER

Request for Information

FORM 00 63 13

RFI no. _____

Project name _____
Project location _____
Contractor _____
A/E contact _____

GM project no. _____
Drawing sheet no. _____
Specification section _____
Date answer requested _____

Description of interpretation or clarification needed

Date received _____

Name _____ Phone number _____

Signature _____ Date released _____

A/E Response

Date received _____

Name _____ Phone number _____

Signature _____ Date released _____

Contractor receipt

Upon review of the A/E's response we anticipate the potential contract adjustments indicated to the right:

Date in _____ Date out _____

Name _____

Signature _____ Date _____

- ☐ No change in cost or time
- ☐ Decrease in cost of approx. $_____
- ☐ Increase in cost of approx. $_____
- ☐ Decrease in time of _____ days
- ☐ Increase in time of _____ days

@ creategm.com
Minster, OH | Columbus, OH | Indianapolis, IN | Fort Wayne, IN

AIA® Document A201® – 2017

General Conditions of the Contract for Construction

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

Arcanum-Butler Booster Stadium Phase 3 Improvements
310 North Main Street
Arcanum, OH 45304

THE OWNER:
(Name, legal status and address)

Arcanum-Butler Local Schools
2011 Trojan Avenue
Arcanum, OH 45304

THE ARCHITECT:
(Name, legal status and address)

Garmann/Miller & Associates, Inc.
38 S. Lincoln Drive, P.O. Box 71
Minster, OH 45865

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

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14 TERMINATION OR SUSPENSION OF THE CONTRACT

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

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

§ 1.1.2 The Contract

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

§ 1.1.3 The Work

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

§ 1.1.4 The Project

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

§ 1.1.5 The Drawings

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

§ 1.1.6 The Specifications

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

§ 1.1.7 Instruments of Service

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

§ 1.1.8 Initial Decision Maker

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

§ 1.2 Correlation and Intent of the Contract Documents

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

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

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

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

§ 1.3 Capitalization

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

§ 1.4 Interpretation

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

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

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

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

§ 1.6 Notice

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

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

§ 1.7 Digital Data Use and Transmission

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

§ 1.8 Building Information Models Use and Reliance

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

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ARTICLE 2 OWNER

§ 2.1 General

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

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

§ 2.2 Evidence of the Owner's Financial Arrangements

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

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

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

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

§ 2.3 Information and Services Required of the Owner

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

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

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

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

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

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

§ 2.4 Owner's Right to Stop the Work

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

§ 2.5 Owner's Right to Carry Out the Work

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

ARTICLE 3 CONTRACTOR

§ 3.1 General

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

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

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

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

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

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the

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

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

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

§ 3.3 Supervision and Construction Procedures

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

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

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

§ 3.4 Labor and Materials

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

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

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

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§ 3.5 Warranty

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

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

§ 3.6 Taxes

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

§ 3.7 Permits, Fees, Notices and Compliance with Laws

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

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

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

§ 3.7.4 Concealed or Unknown Conditions

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

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

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct,

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but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

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

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

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

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

§ 3.9 Superintendent

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

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

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

§ 3.10 Contractor's Construction and Submittal Schedules

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

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

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

§ 3.11 Documents and Samples at the Site

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

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constructed.

§ 3.12 Shop Drawings, Product Data and Samples

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

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

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

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

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

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

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

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

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

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

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

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

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

§ 3.13 Use of Site

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

§ 3.14 Cutting and Patching

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

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

§ 3.15 Cleaning Up

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

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

§ 3.16 Access to Work

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

§ 3.17 Royalties, Patents and Copyrights

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

§ 3.18 Indemnification

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

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

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

ARTICLE 4 ARCHITECT

§ 4.1 General

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

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

§ 4.2 Administration of the Contract

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

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

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

§ 4.2.4 Communications

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

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

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§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

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

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

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

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

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

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

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

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

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

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

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

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

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

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

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

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

§ 5.3 Subcontractual Relations

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

§ 5.4 Contingent Assignment of Subcontracts

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

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

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

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

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

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

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

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

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

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

§ 6.2 Mutual Responsibility

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

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

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

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

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

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§ 6.3 Owner's Right to Clean Up

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

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

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

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

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

§ 7.2 Change Orders

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

.1 The change in the Work;

.2 The amount of the adjustment, if any, in the Contract Sum; and

.3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

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

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

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

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;

.2 Unit prices stated in the Contract Documents or subsequently agreed upon;

.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

.4 As provided in Section 7.3.4.

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

.1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;

.2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;

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

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

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

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

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

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

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

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

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

§ 7.4 Minor Changes in the Work

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

ARTICLE 8 TIME

§ 8.1 Definitions

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

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

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

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

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§ 8.2 Progress and Completion

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

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

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

§ 8.3 Delays and Extensions of Time

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

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

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

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

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

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

§ 9.2 Schedule of Values

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

§ 9.3 Applications for Payment

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

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

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

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whom the Contractor intends to pay.

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

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

§ 9.4 Certificates for Payment

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

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

§ 9.5 Decisions to Withhold Certification

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

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- **.4** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- **.5** damage to the Owner or a Separate Contractor;
- **.6** reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;

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or

.7 repeated failure to carry out the Work in accordance with the Contract Documents.

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

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

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

§ 9.6 Progress Payments

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

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

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

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

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

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

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

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

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§ 9.7 Failure of Payment

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

§ 9.8 Substantial Completion

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

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

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

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

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

§ 9.9 Partial Occupancy or Use

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

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

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

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§ 9.10 Final Completion and Final Payment

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

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

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

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

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

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

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

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

§ 10.2 Safety of Persons and Property

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

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

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

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

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

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

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

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

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

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

§ 10.2.8 Injury or Damage to Person or Property

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

§ 10.3 Hazardous Materials and Substances

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

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

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

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

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

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

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

§ 10.4 Emergencies

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

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

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

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

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve

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the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

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

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

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

§ 11.3 Waivers of Subrogation

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

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

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

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

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fire or other hazards however caused.

§11.5 Adjustment and Settlement of Insured Loss

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

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

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

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

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

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

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

§ 12.2.2 After Substantial Completion

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

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

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

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

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

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

§ 12.3 Acceptance of Nonconforming Work

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

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

§ 13.2 Successors and Assigns

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

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

§ 13.3 Rights and Remedies

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

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

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or

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approvals where building codes or applicable laws or regulations so require.

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

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

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

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

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

§ 13.5 Interest

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

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

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

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

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

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

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

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Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;

.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

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

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

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

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

§ 14.3 Suspension by the Owner for Convenience

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

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

.1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

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

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

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

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

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

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

§ 15.1.2 Time Limits on Claims

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

§ 15.1.3 Notice of Claims

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

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

§ 15.1.4 Continuing Contract Performance

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

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

§ 15.1.5 Claims for Additional Cost

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

§ 15.1.6 Claims for Additional Time

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

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

§ 15.1.7 Waiver of Claims for Consequential Damages

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

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

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

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

§ 15.2 Initial Decision

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

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

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

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

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

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

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

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

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may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

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

§ 15.3 Mediation

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

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

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

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

§ 15.4 Arbitration

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

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

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

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

§ 15.4.4 Consolidation or Joinder

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

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similar procedural rules and methods for selecting arbitrator(s).

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

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

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GARMANN MILLER

Division 01

General Requirements

| Submittal Stamp Area |

Contractor stamp

GARMANN MILLER

38 South Lincoln Drive
P.O. Box 71
Minster, Ohio 45865

1156 Dublin Road
Suite 102
Columbus, Ohio 43215

275 Veterans Way
Suite 200
Carmel, Indiana 46032

1690 Broadway
Suite 19-455
Ft. Wayne, Indiana 46802

createm.com

Project name : _____

Contractor name : _____

Contact name : _____

Phone : _____

Architect stamp

Subcontractor

Company : _____

Contact name : _____

Phone number : _____

Submittal # : _____

Date : _____

Description : _____

Specification section(s) : _____

Consultant stamp

- ☐ Product data
- ☐ Shop drawings
- ☐ VOC compliance form
- ☐ Maintenance data
- ☐ LEED MR form
- ☐ Samples
- ☐ Warranty
- ☐ Other : _____

SECTION 00 11 13 - ADVERTISEMENT FOR BIDS

Sealed proposals will be received by Arcanum-Butler Local School District at, 2011 Trojan Avenue, Arcanum, Ohio 45304, Arcanum, Ohio 45304, until February 3rd, 2026 at 1:00.00 PM, at which time and place proposals will be opened publicly and read aloud. Proposals received after February 3rd, 2026 at 1:00.00 PM will be returned unopened. Proposals shall be for the furnishing of materials and the performance of labor necessary for the:

23047.03 Arcanum Booster Stadium Phase 3 Improvements

310 North Main Street

Arcanum, Ohio, 45304

All in accordance with the Contract Documents prepared by Garmann/Miller & Associates, Inc., Minster, OH | Columbus, OH | Indianapolis, IN | Ft. Wayne, IN

A Lump Sum bid for the project will be received.

A prebid meeting will be held at 1:00 PM on January 20th. 2026 at 2011 Trojan Avenue, Arcanum, Ohio 45304. The pre-bid meeting is not mandatory but bidders are strongly encouraged to attend. The facility will be open for inspection at this time.

A Bid Security in the form of a certified check, cashier's check, irrevocable letter of credit, or surety company bond pursuant to Chapter 1305 of the Ohio Revised code in the amount of 10% of the total bid shall accompany each bid; or a bid guaranty bond in accordance with Chapter 153.571 of the Ohio Revised Code in the amount of 100% of the total bid shall accompany each bid.

The Contract Documents, including Drawings and Specifications, are on file for public inspection at the office of the Architect: Garmann/Miller & Associates Inc., Phone 419-628-4240: the office of the Arcanum-Butler Local School District; Construction News Corporation, the McGraw Hill-Dodge Plan Room, the Builders Exchange and iSqFt.

Contract Documents may be purchased from DC Reprographics, 1254 Courtland Ave, Columbus, Ohio 43201; www.DCplanroom.com; Phone 614-297-1200. Each Bidder is responsible for shipping cost or providing a shipping number for billing to the bidders account.

Each bid must be submitted in duplicate on a blank form furnished by the Architect, in a sealed envelope. Mark plainly on the outside of the envelope, the project you are bidding on. No bidder may withdraw their bid for a period of sixty (60) days after the bid opening

The Owner reserves the right to reject any or all bids and to waive informalities, irregularities and/or errors in the bids to the extent permitted by law. This includes the right to extend the date and time for receipt of bids.

This notice is posted on the Arcanum-Butler Local School District web site.

Notice can be accessed at: www.arcanum-butler.k12.oh.us

The Date of this notice: January 6th, 2026

By: Arcanum-Butler Local School District

2011 Trojan Avenue, Arcanum, Ohio 45304

Arcanum, Ohio 45304

SECTION 00 11 30 - ABBREVIATED SCOPE OF WORK

THE FOLLOWING IS AN ABBREVIATED SCOPE OF WORK INTENDED TO PROVIDE POTENTIAL BIDDERS WITH INFORMATION AS TO THE SIZE AND NATURE OF THE PROJECT. BIDDERS ARE TO REFER TO THE DRAWINGS AND SPECIFICATIONS FOR THE COMPLETE SCOPE OF WORK.

Project: **23047.03 Arcanum Booster Stadium Phase 3**
310 North Main Street
Arcanum, Ohio 45304

GM Project Number: **23047.03**

Bid Date: **February 3rd, 2026 at 1:00.00 PM**

Bid Categories: **Lump Sum General Contract**

Estimate of Construction Cost: $ 1,700,000

PROJECT SCOPES OF WORK

General Construction:

Wood framed building with formed metal panel exterior cladding and gypsum interior. Standing seam roof with blown attic insulation.

Site Work:

Scope includes but is not limited to clearing/remove, new concrete pavement, aggregate surfacing, retaining wall, bleachers, grading, excavation, seeding and plants.

Plumbing Work:

Scope includes but is not limited to: new plumbing fixtures with water, sanitary, and vent systems as shown on drawings.

HVAC Work:

Scope includes but is not limited to: new mechanical equipment (exhaust fans and electric heaters) and ductwork as shown on drawings.

Electrical Work:

Electrical scope of work includes, but is not limited to, LED lighting and controls, receptacles, power to concessions stand equipment and mechanical/plumbing equipment. Additionally, provide rough-ins for technology.

Technology Work:

New work includes, but is not limited to: Providing category 6 cabling for the data network, wireless data network, telephones, A/V systems, security/access control, and CCTV systems as indicated on the drawings.

END OF SECTION 00 11 30

SECTION 00 22 13 - SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

MODIFICATIONS TO AIA A701

Article 2 Bidder's Representations

Add the following to Article 2

2.2 A prebid meeting will be held at 1:00 PM on January 20th. 2026 at 2011 Trojan Avenue, Arcanum, Ohio 45304. The pre-bid meeting is not mandatory but bidders are strongly encouraged to attend. The facility will be open for inspection at this time.

Article 3 Bidding Documents

3.1 Distribution

Change Paragraphh 3.1.3 as follows

Bidding documents will be issued directly to sub-bidders as offered in the Notice to Bidders.

3.2 Modification or Interpretation of Bidding Documents

Add Paragraph 3.2.1.1 as follows

3.2.1.1 Each Bidder is responsible for calling to the attention of the Architect any ambiguities, inconsistencies, errors, or omissions which may occur in the documents for their part of the Work. If Bidder fails to request clarification, the bidder will be expected to overcome such conditions without additions to the bid amount.

Add Paragraph 3.2.2.1 as follows

3.2.2.1 Clarification or interpretation can be made via fax, 419-628-4299 or telephone, 419-628-4240 or email to Curt South; csouth@creategm.com

3.4 Addenda

Delete paragraph 3.4.3 and substitute the following

3.4.3 If an addendum is issued within 72 hours prior to the published time for the opening of bids (excluding Saturdays, Sundays, and legal holidays), the the time for opening of bids shall be extended one (1) week with no further advertising required.

Article 4 Bidding Procedures

4.1 Preparation of Bids

Add Paragraph 4.1.1.1

Any substantial change, alteration or wording of the bid form may cause a bid to be rejected as not responsive.

Change Paragraph 4.1.3 as follows

4.1.3 Sum shall be expressed in both words and numbers and in numbers only where no space is provided for words. In case of discrepancy, the amount written in words shall govern.

Add paragraph 4.1.5.1 and 4.1.5.2 as follows

4.1.5.1 A blank entry or an entry of "No Bid", "N/A" or similar entry on any alternate will cause a bid to be rejected as non responsive if that alternate is selected.

4.1.5.2 If an alternate is not selected and an entry of "No Bid", "N/A" or similar entry for the alternative is listed, this action, by itself, will not render the bid as non responsive.

Add Paragraph 4.1.8 as follows

4.1.8 The bidder shall include a signed copy of the Non-Collusion Affidavit and Contractor's Affidavit with their bid, a copy is included in the Project Manual.

4.2 Bid Security

Delete paragraphs 4.2.1, 4.2.2, 4.2.3, and 4.2.4 and substitute the following:

4.2.1 Each bid will be accompanied by a bid security in accordance with Section 153.54 (B), Ohio Revised Code, in the amount of the base bid plus add alternates or:

4.2.2 A signed bond in the form of a certified check, cashier's check or letter of credit, as provided in Section 153.54 (C), ORC. The amount of the certified check, cashier's check or letter of credit shall be equal to ten (10) percent of the base bid plus add alternates or:

4.2.3 Bid guaranty and contract bond in accordance with Chapter 153.571 of the ORC in the amount of 100 percent of the total base bid plus add alternates. If the dollar space on the bid guaranty is left blank, the penal sum will be the full amount of the base bid plus add alternates, stated in dollars and cents. A percentage is not acceptable, pursuant to Section 153.571, ORC.

4.2.4 The bond shall serve as an assurance that the bidder will, upon acceptance of the bid, comply with all conditions precedent for contract execution, within the time specified.

4.2.5 The bond must be issued by a surety authorized by the Department of Insurance to transact business in Ohio. The bond must be issued by a surety capable of demonstrating a record of competent underwriting, efficient management, adequate reserves, and sound investments. These criteria will be met if the surety currently has an A.M. Best Company Policy Holders Rating of "A+", "A" or "A-" or better and has or exceeds the Best Financial Size Category of Class VII. The bond must be signed by an authorized agent, with Power of Attorney, from a surety.

4.2.6 Bond will be returned to all unsuccessful bidders after contract is awarded. If used, a certified check, cashier's check or letter of credit will be returned to the successful bidder upon providing the bond required by Section 153.54 (C), ORC.

4.2.7 If for any reason, other than as authorized by Article 4.4, Modifications or Withdrawal of Bid, the bidder fails to enter into a contract, and the owner awards the contract to the next lowest responsive and responsible bidder, the bidder who failed to enter into a contract shall be liable to the owner for the difference between the bidder's bid and the bid of the next lowest responsive and responsible bidder, or for a penal sum not to exceed (10) percent of the bid amount, whichever is less, pursuant to Section 153.54 ORC.

4.3 Submission of Bids

Add Paragraph 4.3.1.1 as follows

4.3.1.1 Bids shall be submitted on Bid Form included in Project Manual. Submit paper copies of bid(s) in duplicate.

Add Paragraph 4.3.6 as follows

4.3.6 All bids are valid for (60) days after the opening of bids. A bid may be extended thereafter upon mutual agreement, in writing, between the owner and contractor. Awards beyond the sixty (60) day period shall be reviewed for increased cost of the contract only if the cause for delay is no fault of the contractor and substantiated.

4.4 Modification or Withdrawal of Bid

Delete paragraph 4.4.3 and substitute the following:

4.4.3 A bidder may withdraw a bid from consideration after the bid opening if the bid amount was substantially lower than the amounts of other bids, providing the bid was submitted in good faith, and the reason for the bid amount being substantially lower was a clerical mistake as opposed to a judgement mistake, and was actually due to an unintentional and substantial arithmetic error or an unintentional omission of a substantial quantity of work, labor or material made directly in the compilation of the bid amount. Request to withdrawal bid must be made in writing filed with the owner and architect within two business days after conclusion of the bid opening.

Article 5 Consideration of Bids

5.2 Rejection of Bids

Add paragraphs 5.2.1, 5.2.2 and 5.2.3 as follows

5.2.1 If the lowest Bidder is not responsive or responsible, the Owner shall reject such bid and shall notify the Bidder the reasons for the finding.

5.2.2 A Bidder notified that he is not responsive or responsible may object to the Owner's decision by filing a written request for reconsideration, which must be received by the Owner within five (5) days of the date of the notice from the Owner.

5.2.3 Upon receipt of a timely request, the Owner shall meet with the Bidder to listen to the Bidder's objections.

a) No award of contract shall become final until the Owner has met with all Bidders who have filed timely request for reconsideration.

b) If all request for reconsideration are rejected in the Owner's discretion, the award of contract shall become final, or the Owner, in its discretion, may reject all bids.

c) If a request for reconsideration is not rejected, any procedures for the determination of the lowest responsible Bidder that have not already been completed concerning the applicable Bidder shall be completed. Following the completed procedures and evaluation of the Bidder, the Bidder will be notified of the findings.

5.3 Acceptance of Bid (Award)

Add paragraphs 5.3.1.1, 5.3.1.2 and 5.3.1.3

5.3.1.1 Pursuant to Section 153.08, ORC, the contract will be awarded to the lowest responsive and responsible bidder.

5.3.1.2 In determining the lowest Bidder, the owner shall consider the base bid and any selected alternates which the owner determines to accept. The Owner shall have the right to select alternates in any combinations. The lowest bidder will be based on the lowest base bid plus selected alternates, and may result in an award to a Bidder other than the Bidder that submitted the lowest base bid. Voluntary alternates will not be considered in determining the lowest amount.

5.3.1.3 The Bidder acknowledges that although there is an estimate for the cost of the Project, the market conditions may and frequently do result in the estimate being different from the sum of the bids received, either higher or lower. The Bidder understands that the Owner has included alternates, which include deduct and add alternates, to give flexibility in building the Project with funds available. The Bidder further understands and acknowledges that the use of add and deduct alternates is a long held customary practice in the construction industry in the State of Ohio. The Bidder also acknowledges that the Owner will not make a decision about what alternates on which to base the award of contracts until the bids are received, and the Owner can compare its available funds with the base bids and the cost or savings from selecting different alternates.

Delete paragraph 5.3.2 and substitute the following

5.3.2 Subject to the right of the owner to reject each and every bid, the owner will determine the lowest responsive bid by taking into consideration not only the amount of the bid but such of the following criteria as it, in its discretion, deems appropriate and may give such weight thereto as it deems appropriate in determining the responsibility of the bidder:

The bidder's financial ability to complete the contract.

The bidder's experience with projects of similar size and scope and more complex projects.

The conduct and performance of the bidder on previous contracts completed in a timely manner.

The bidders facilities and equipment.

The adequacy, in numbers and experience, of the bidders work force to complete the contract successfully on time and on budget.

The ability of the bidder to execute the contract properly.

The evaluation of the bid substantially below the median of other bids.

Add paragraphs 5.3.3, 5.3.4 and 5.3.5

5.3.3 The Owner shall obtain from the lowest Bidder any information the owner deems appropriate to the consideration of factors showing responsibility. The failure to submit requested information on a timely basis may result in the determination that the bidder is not responsible.

5.3.4 The Bidder authorizes the Owner and its representatives to contact owners, construction managers, contractors, and design professionals on projects on which the Bidder has worked and authorizes and requests such owners, construction managers, contractors, and design professionals to provide a candid evaluation of Bidder's performance. By submitting a bid, the Bidder agrees that if he or any person at his urging, directly or indirectly, brings action against any of such owners, construction managers, contractors, and design professionals or their employees as a result of or related to such candid evaluation and such action is not successful, the Bidder will reimburse such owners, design professionals and/or their employees for all legal fees and expenses incurred by them that are related to such legal action, including the cost of collection. This obligation is expressly intended for the benefit of such owners, construction managers, contractors, design professionals and their employees.

5.3.5 The number of consecutive calendar days required to complete the work shall be considered by the owner in determining the lowest and responsive bidder.

Article 7 Performance Bond and Payment Bond

7.1 Bond Requirements

Delete paragraphs 7.1.1, 7.1.2, 7.1.3, 7.1.4 and substitute the following:

7.1.1 The bidder shall furnish bonds covering the faithful performance of the contract and payment of all obligations arising thereunder.

7.1.2 Prior to award of contract, successful bidders who provided a cashier's check, certified check or letter of credit as bid security shall submit a contract bond in the form of a performance and payment bond in an amount equal to 100% of the contract sum. The performance and payment bond must be signed by an authorized agent of an acceptable surety bonding company and by the bidder. Bond must be issued by a surety company authorized by Ohio Department of Insurance to transact business in the State of Ohio. The bond shall be issued by a surety company which can adequately demonstrate a record of competent underwriting, efficient management, adequate reserves and soundness of investments. These criteria will be met if the surety currently has an A.M. Best Company Policyholder Rating of "A+", "A", or "A-" or better and has or exceeds the Best Financial Size Category of Class VII.

7.1.4 Bond must be countersigned by an Ohio resident agent if bond is issued by an out-of-state agent.

7.1.5 Performance and payment bond must be supported by credentials showing power of attorney and corporate seals to each copy.

Bonds shall remain in effect for 12 months after date of substantial completion is issued by the owner. Certificate by bonding company of compliance is required prior to final acceptance of project.

END OF SECTION 00 22 13

SECTION 00 31 19
EXISTING CONDITION INFORMATION

PART 1 GENERAL

1.01 EXISTING CONDITIONS

A. Certain information relating to existing surface and subsurface conditions and structures is available to bidders but will not be part of Contract Documents, as follows:

B. Geotechnical Report: Entitled, Arcanum-Butler Local Schools-Arcanum Boosters, dated June 25th, 2024.

1. This report identifies properties of below grade conditions and offers recommendations for the design of foundations, prepared primarily for the use of Architect.

1.02 PRELIMINARY DATA

A. Certain preliminary investigations and studies made by the Owner are available to the bidders but will not be part of Contract Documents, as follows:

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 00 31 19

SECTION 00 41 13 - BID FORM

THE PROJECT AND THE PARTIES

TO:

Arcanum-Butler Local School District
2011 Trojan Avenue, Arcanum, Ohio 45304
Arcanum, Ohio45304

FOR:

Project: 23047.03 Arcanum Booster Stadium Phase 3

Project Number: 23047.03
310 North Main Street
Arcanum, Ohio45304

DATE: _____ (Bidder to enter date)

SUBMITTED BY:

Bidder's Full Name: _____

Address: _____

City, State, Zip: _____

Telephone:_____

Fax No.: _____

E-mail: _____

OFFER

Having examined the Place of The Work and all matters referred to in the Instructions to Bidders and the Contract Documents prepared by Garmann/Miller & Associates Inc. for the above mentioned project, we, the undersigned, hereby offer to enter into a Contract to perform the Work for the Sum of:

Item 1 - Contract A, General Construction - Base Bid:

_____

_____ dollars

All Cash and Contingency Allowances described in Section 01 21 00 are included in the Bid Sum.

Item 1a - Alternate 01 - Resinous Flake Flooring:
If Alternate 01 is accepted, add:

_____

_____ dollars

We have included the Bid Bond or security deposit as required by the Advertisement, Notice to Bidders, Instructions to Bidders.

This is a Tax Exempt Project.

Builders Risk Insurance is to be furnished by the Owner.

ACCEPTANCE

This offer shall be open to acceptance and is irrevocable for sixty days from the bid closing date.

If this bid is accepted by Owner within the time period stated above, we will:

Execute the Agreement within ten (10) days of receipt of Notice of Award.

Commence work within ten (10) days after written Notice to Proceed of this bid.

If this bid is accepted within the time stated, and we fail to commence the Work or we fail to provide the required Bond(s), the security deposit shall be forfeited as damages to Owner by reason of our failure, limited in amount to the lesser of the face value of the security deposit or the difference between this bid and the bid upon which a Contract is signed.

In the event our bid is not accepted within the time stated above, the required security deposit shall be returned to the undersigned, in accordance with the provisions of the Instructions to Bidders; unless a mutually satisfactory arrangement is made for its retention and validity for an extended period of time.

CONTRACT TIME

Owners desired start date: February 19th, 2026

Owners desired completion date: August 15th, 2026

If this Bid is accepted, we will:

Complete the Work by August 15th, 2026 or at an earlier date of _____ (Bidder to enter completion date or time frame prior to completion date listed.)

ADDENDA

The following Addenda have been received. The modifications to the Bid Documents noted below have been considered and all costs are included in the Bid Sum.

Addendum # _____ Dated _____.
Addendum # _____ Dated _____.
Addendum # _____ Dated _____.
Addendum # _____ Dated _____.

BID FORM SUPPLEMENTS

Bid Bond

Noncollusion Affidavit

Contractor's Affidavit

BID FORM SIGNATURE(S)

_____

(Bidder - print the full name of your firm)

was hereunto affixed in the presence of:

_____

(Authorized signing officer)

_____

(Authorized signing officer, Title)

SEALED SUBMISSION:

Bid is to be submitted in Duplicate.

Bid is to be submitted in a sealed envelope containing bid and bid form supplements and addressed as follows:

Prime Contract Bid for:
Arcanum-Butler Local School District
310 North Main Street
Arcanum, Ohio 45304

END OF BID FORM

SECTION 00 45 19 - NON-COLLUSION AFFIDAVIT

STATE OF _____

_____

BID Identification

_____

CONTRACTOR

_____, being first duly sworn, deposes and says that they are _____ (sole owner, a partner, president, secretary, etc.) of

_____, the party making the foregoing BID; that such BID is not made in the interest of or on behalf of any undisclosed person, partnership, company, association, organization, or corporation; that such BID is genuine and not collusive or sham: that said BIDDER to put in a false or sham BID, and has not directly or indirectly colluded, conspired, connived, or agreed with any BIDDER or any one else to put in a sham BID, or that any one shall refrain from bidding; that said BIDDER has not in any manner, directly or indirectly, sought by agreement, communication or conference with any one to fix the BID price of said BIDDER or of any other BIDDER, or to fix any overhead, profit, or cost element of such BID price, or of that of any other BIDDER, or to secure any advantage against the OWNER awarding the contract or anyone interested in the proposed contract; that all statements contained in such BID are true; and, further, that said BIDDER has not, directly or indirectly, submitted his BID price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid and will not pay any fee in connection therewith, to any corporation, partnership, company, association, organization, BID depository, or to any member or agent thereof, or to any other individual except to such person or persons as have a partnership or other financial interest with said BIDDER in his general business.

Signed:

_____

(Bidder - print the full name of your firm)
was hereunto affixed in the presence of:

_____

(Authorized signing officer)

_____

(Authorized signing officer, Title)

Subscribed and sworn to before me this _____ day of _____, 20___.

Seal of Notary

SECTION 00 45 21 - CONTRACTOR'S AFFIDAVIT

State of Ohio

County of _____ , ss:

_____(Name) being first duly sworn, deposes and says that he/she is

the _____(Title) of _____(Name of Contractor)

with offices located at _____(Address of Contractor),

and its duly authorized representative, states that effective

the _____ day of _____ 20__ , (date of submission of bid)

_____ (Name of Contractor):

( ) is charged with delinquent personal property taxes on the general list of personal property as set forth below:

County	Amount (include total amount, penalties and interest)
	$
	$
	$
	$

( ) is not charged with delinquent personal property taxes on the general list of personal property in any Ohio county

_____ (Affiant)

Subscribed and sworn to before me this _____ day of _____, 20___.

Seal of Notary

SECTION 00 50 00
CONTRACTING FORMS AND SUPPLEMENTS

PART 1 GENERAL

1.01 CONTRACTOR IS RESPONSIBLE FOR OBTAINING A VALID LICENSE TO USE ALL COPYRIGHTED DOCUMENTS SPECIFIED BUT NOT INCLUDED IN THE PROJECT MANUAL.

1.02 AGREEMENT AND CONDITIONS OF THE CONTRACT

A. See Section 00 73 00 - SUPPLEMENTARY CONDITIONS for the Supplementary Conditions.

B. The Agreement is based on AIA A101.

C. The General Conditions are based on AIA A201.

D. See Section 00 73 00 AIA A201 - SUPPLEMENTARY CONDITIONS

1.03 FORMS

A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in Contract Documents.

B. Bond Forms:
   1. Performance and Payment Bond Form: In Compliance with the Ohio Revised Code.

C. Contractors Bidding Information Form: 00 41 13.01 Contractor Bidding Information

D. Non-Collusion Affidavit: 00 45 19 Non-Collusion Affidavit

E. Contractor's Affidavit: 00 45 21 Contractor's Affidavit

F. Post-Award Certificates and Other Forms:
   1. Contracting Submittal Letter Form: 01 33 23 Contractor Submittal Form.
   2. Application for Payment Forms: AIA G702 with AIA G703 (for Contractors).

G. Clarification and Modification Forms:
   1. Request for Interpretation Form: Garmann/Miller Architect and Engineers, Request for Information Form attached following this section.
   2. Architect's Supplemental Instructions Form: AIA G710.
   3. Construction Change Directive Form: AIA G714.
   4. Request for Proposal Form: AIA G709.
   5. Change Order Form: AIA G701.

H. Closeout Forms:
   1. Certificate of Substantial Completion Form: AIA G704.
   2. Conditional Lien Waiver and Release Upon Progress Payment form: Section 00 61 16.

1.04 REFERENCE STANDARDS

A. AIA A101 - Standard Form of Agreement Between Owner and Contractor where the basis of Payment is a Stipulated Sum; 2007.

B. AIA A201 - General Conditions of the Contract for Construction; 2007.

C. AIA G701 - Change Order; 2001.

D. AIA G702 - Application and Certificate for Payment; 1992.

E. AIA G703 - Continuation Sheet; 1992.

F. AIA G704 - Certificate of Substantial Completion; 2000.

G. AIA G710 - Architect's Supplemental Instructions; 1992.

H. AIA G714 - Construction Change Directive; 2007.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 00 50 00

AIA® Document A101® – 2017

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

AGREEMENT made as of the day of in the year
(In words, indicate day, month and year.)

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

Arcanum-Butler Local Schools
2011 Trojan Avenue
Arcanum, OH 45304

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

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

Arcanum-Butler Booster Stadium Phase 3 Improvements
310 North Main Street
Arcanum, OH 45304

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

Garmann/Miller & Associates, Inc.
38 S. Lincoln Drive
P.O. Box 71
Minster, OH 45865

The Owner and Contractor agree as follows.

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

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

The parties should complete A101®–2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201®–2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

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TABLE OF ARTICLES

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9 ENUMERATION OF CONTRACT DOCUMENTS

EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[ ] The date of this Agreement.

[ ] A date set forth in a notice to proceed issued by the Owner.

[ ] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve

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Substantial Completion of the entire Work:
(Check one of the following boxes and complete the necessary information.)

[ ] Not later than ( ) calendar days from the date of commencement of the Work.

[ ] By the following date:

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be ($), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	Price

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance

§ 4.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item	Price

§ 4.4 Unit prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)

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

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

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ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the day of the month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than ( ) days after the Architect receives the Application for Payment. *(Federal, state or local laws may require payment within a certain period of time.)*

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

- **.1** That portion of the Contract Sum properly allocable to completed Work;
- **.2** That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- **.3** That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

- **.1** The aggregate of any amounts previously paid by the Owner;
- **.2** The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;
- **.3** Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- **.4** For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and
- **.5** Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

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(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

§ 5.1.7.1.1 The following items are not subject to retainage:
(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:
(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:
(Insert any other conditions for release of retainage upon Substantial Completion.)

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

§ 5.3 Interest

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

%

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.

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(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

[ ] Arbitration pursuant to Section 15.4 of AIA Document A201–2017

[ ] Litigation in a court of competent jurisdiction

[ ] Other *(Specify)*

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

§ 7.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:
(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:
(Name, address, email address, and other information)

§ 8.3 The Contractor's representative:

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(Name, address, email address, and other information)

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™–2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with a building information modeling exhibit, if completed, or as otherwise set forth below:
(If other than in accordance with a building information modeling exhibit, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

§ 8.7 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

.1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor

.2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds

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

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

.5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda, if any:

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Number	Date	Pages

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

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

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

[ ] The Sustainability Plan:

Title	Date	Pages

[ ] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.9 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™–2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

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

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
(Printed name and title)	*(Printed name and title)*

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SECTION 00 61 16 - CONDITIONAL LIEN WAIVER AND RELEASE UPON PROGRESS PAYMENT

Known by all those present:

Upon receipt by the undersigned of a check from the Contractor in the amount of:
$_____

Payable to: _____,

and when the check has been properly endorsed and had been paid by the bank upon which it is drawn, document becomes effective to release and satisfy all lien rights, claims, or demands of any kind whatsoever.

Which the undersigned now has against, Arcanum-Butler Local School District, its successors and assigns on the job site located at: 310 North Main Street, Arcanum, Ohio 45304.

This release covers a progress payment for labor, material, and equipment furnished on the Arcanum-Butler Local School District.

This release is valid through _____ (date of submittal) and does not cover retainage.

The undersigned warrants that they either have already paid or will use the monies they receive from the progress payment, to promptly pay in full for all of the labor, subcontractors, and suppliers for all their work, material, equipment or services provided for or to the: 23047.03 Arcanum Booster Stadium Phase 3, up to the date of this waiver.

Date: _____

Company: _____

Signature: _____

By (name & title): _____

Sworn before me in the State of Ohio, in the County of _____,

subscribed and sworn before me this _____ Day of _____, 20_____.

Notary Republic Signature: _____

Notary Republic Name: _____

My commission expires on: _____

(seal & stamp)

END OF SECTION 00 61 16

SECTION 01 11 00
SUMMARY OF WORK

PART 1 GENERAL

1.01 PROJECT

A. Project Name: 23047.03 Arcanum Booster Stadium Phase 3

B. Owner's Name: Arcanum-Butler Local School District

C. Architect's Name: Garmann/Miller & Associates Inc.

D. The Project consists of the construction of

E. The project is a signature project for the Owner and construction of the highest quality facility is vitally important in this respect, each contractor assumes a position of trust confidence in the performance of its duties to the Owner and shall perform its work on the project with the highest degree of competence, diligence, cooperation and workmanship.

1.02 CONTRACT DESCRIPTION

A. Contract Type: A single prime contract based on a Stipulated Price as described in Document 00 50 00 - Contracting Forms and Supplements.

1.03 WORK BY OWNER

A. Owner will supply the following for installation by Contractor:
   1. Reference drawings .

1.04 OWNER OCCUPANCY

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

B. Schedule the Work to accommodate Owner occupancy.

1.05 CONTRACTOR USE OF SITE AND PREMISES

A. Provide access to and from site as required by law and by Owner:

B. Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.

C. Existing building spaces may not be used for storage.

D. Limit disruption of utility services to hours the building is unoccupied.

1.06 WORK SEQUENCE

A. The Owner intends to award contracts soon after the receipt of bids.

B. Coordinate construction schedule and operations with Owner.

1.07 CONTRACT NO. A - GENERAL CONSTRUCTION

A. Provide all Work except Work specifically assigned to other contractors in this Section.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 11 00

SECTION 01 20 00
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

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

B. Documentation of changes in Contract Sum and Contract Time.

C. Change procedures.

D. Procedures for preparation and submittal of application for final payment.

1.02 RELATED REQUIREMENTS

A. Section 00 50 00 - Contracting Forms and Supplements: Forms to be used.

B. Section 00 52 13 - AIA A101 Standard Form Of Agreement: Contract Sum, retainages, payment period, monetary values of unit prices.

C. Section 00 72 13-AIA A201 General Conditions: Additional requirements for progress payments, final payment, changes in the Work.

D. Section 01 21 00 - Allowances: Payment procedures relating to allowances.

1.03 SCHEDULE OF VALUES

A. Submit a printed schedule on AIA Form G703 - Application and Certificate for Payment Continuation Sheet.

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

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

D. Submit Schedule of Values electronically within 15 days after date of Owner-Contractor Agreement.

E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section. Including:
   1. Bonds
   2. Insurances
   3. Permits
   4. Allowances
   5. Mobilization
   6. Project Closeout (punch lists, attic stock, project record drawings, training. final cleaning).

F. Each line item number shall list the material and labor cost.

G. Include within each line item, a direct proportional amount of Contractor's overhead and profit.

H. Revise schedule to list approved Change Orders, with each Application For Payment.

1.04 APPLICATIONS FOR PROGRESS PAYMENTS

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

B. Form: AIA G702 Application and Certificate for Payment and AIA G703 - Continuation Sheet including continuation sheets when required.
   1. AIA G702 shall be an original and the most recent version of the form issued by the American Institute of Architects.
   2. AIA G703 - Continuation Sheet: Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.

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

D. Present required information on electronic media printout or in typewritten form.

E. Execute certification by signature of authorized officer.

F. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.

G. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.

H. Submit electronic copy of each Application for Payment.

I. Include the following with the application:
   1. Transmittal letter as specified for submittals in Section 01 30 00.
   2. Partial release of liens from major subcontractors and vendors.
   3. Affidavits attesting to off-site stored products.

1.05 MODIFICATION PROCEDURES

A. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in Contractor's employ or subcontractors of changes to Contract Documents.

B. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect will issue instructions directly to Contractor.
   1. Architect will advise of minor changes in the Work not involving an adjustment to Contract Sum or Contract Time as authorized by the Conditions of the Contract by issuing supplemental instructions on AIA Form G710 or written form.

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

D. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid . Contractor shall prepare and submit a fixed price quotation within 15 days.

E. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
   1. For change requested by Architect for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
   2. For change ordered by Architect without a quotation from Contractor, the amount will be determined by Architect based on the Contractor's substantiation of costs as specified for Time and Material work.

F. Formula for Changes in the Contract Sum
   1. Definitions
      a. Labor - All field labor shall be priced at the current base rate, excluding fringe benefits. The payroll is based on straight time only and is to include number of hours as rate of pay for each classification of worker.
      b. Fringes - All established payroll taxes, assessment of fringe benefits labor. This may include, but is not limited to. FICA, Federal and State Unemployment, Health and Welfare, Pension Funds, Worker's Compensation and Apprentice Funds.

c. Equipment Rentals - All charges for certain non-owned heavy or specialized equipment at up to 100 percent of the documented rental cost. No rental charges will be allowed for hand tools, minor equipment, simple scaffold, etc.
d. Owned Equipment - All charges for certain owned, heavy or Specialized equipment at up to 100 percent of the cost listed by the Associated Equipment Dealers Blue Book. No recovery will be allowed for hand tools, minor equipment, simple scaffold etc.
e. Trucking - A reasonable delivery charge or per mile trucking charges for delivery of require materials or equipment. Charges for use of a pickup truck will not be allowed.
f. Materials
    1) All materials purchased by the contractor and incorporated into the changed Work, showing costs, quantities, or Unit Prices of all items. Reimbursement of material cost shall only be allowed in the amount the Contractor's actual cost, including any and all discounts, rebates or related credits.
    2) One third (33 percent) of the cost of reusable materials for each use, such as formwork lumber, shoring or temporary enclosures.
g. Overhead - Includes, but not limited to, telephone, telephone charges, facsimile, telegrams, postage, photos, photocopying, hand tools, simple scaffold, tool breakage, tool repair, tool replacement, tool blades, tool bits, home office estimating and expediting, home office clerical and accounting support, home office labor, legal services, supervision, travel and parking expenses.
h. Subcontractor - The reasonable cost for all labor and material provided by a Subcontractor whose pricing is included and complies with these pricing guidelines.

2. The cost of Change Orders shall be:
    a. For each change over $ 500.00, the contractor shall furnish a detailed, written proposal itemized according to these pricing guidelines. Any subcontractor or material supplier pricing shall be itemized according to these pricing guidelines.
    b. For extra work completed by the contractor with his own forces: The sum of Labor, Fringes, Equipment Rentals, Owned Equipment, Trucking and Material plus 15 percent of the sum for overhead and profit.
    c. For extra work completed by Subcontractor of the Contractor: The Subcontractor cost plus 10 percent of the Subcontractor cost for overhead and profit.
3. Miscellaneous:
    a. The following items are allowable at the cost of the Work with no overhead and profit:
        1) The cost of extending the Bond and the cost of extending liability, property damage, builder's risk or specialty coverage insurance
        2) Fees for permits, licenses, inspection, test, etc.
    b. Cost which will not be reimbursed for Change Order Work include the following:
        1) Employee Profit Sharing Plans - regardless of how defined or described, the Contractor will pay these charges from Contractor profit.
        2) Voluntary Employee - examples are United Way and U.S. Bonds, etc.

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

H. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

I. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

J. Promptly enter changes in Project Record Documents.

1.06 APPLICATION FOR FINAL PAYMENT

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

B. Application for Final Payment will not be considered until the following have been accomplished:
   1. All closeout procedures specified in Section 01 70 00.
   2. Closeout submittals in Section 01 78 00 including but not limited to:
      a. Wavier of Liens
      b. Record Drawings
      c. Operation and Maintenance Data
      d. Warranties and Bonds
      e. Certifications indicating no asbestos and lead solder in potable water systems have been incorporated into the work.
      f. Sign in sheet for Demonstrations and Instructions
      g. Signed receipt for Maintenence Materials (attic stock)
      h. Complete items of work determined by Garmann/Miller & Associates Inc.'s final inspection (completed punch list)

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 20 00

SECTION 01 21 00
ALLOWANCES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cash allowances.

B. Contingency allowance.

C. Payment and modification procedures relating to allowances.

1.02 RELATED REQUIREMENTS

A. Section 01 20 00 - Price and Payment Procedures: Additional payment and modification procedures.

1.03 CASH ALLOWANCES

A. Costs Included in Cash Allowances: Cost of material or product to Contractor or subcontractor, less applicable trade discounts .

B. Costs Not Included in Cash Allowances (included in the Base Bid): Product delivery to site and handling at the site, including unloading, uncrating, and storage; protection of products from elements and from damage; and labor for installation and finishing; overhead, profit and other expenses contemplated for this work.

C. Architect Responsibilities:
   1. Consult with Contractor for consideration and selection of products .
   2. Select products in consultation with Owner and transmit decision to Contractor.
   3. Prepare Change Order.

D. Contractor Responsibilities:
   1. Obtain proposals from suppliers and offer recommendations.
   2. On notification of which products have been selected, execute purchase agreement with designated supplier .
   3. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
   4. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.

E. Differences in costs will be adjusted by Change Order.

1.04 CONTINGENCY ALLOWANCE

A. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, will be included in Change Orders authorizing expenditure of funds from this Contingency Allowance.
   1. All overhead and profit contemplated for the Work performed under each Allowance is to be included in the Base Bid.

B. Funds will be drawn from the Contingency Allowance by Change Order.

C. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

1.05 ALLOWANCES SCHEDULE

A. Contingency Allowance: General Contract - A; Include the stipulated sum/price of $50,000.00 for use upon Owner's instructions.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 21 00

SECTION 01 23 00
ALTERNATES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Description of Alternates.

B. Procedures for pricing Alternates.

C. Documentation of changes to Contract Sum and Contract Time.

1.02 RELATED REQUIREMENTS

A. Document 00 41 00 - Bid Form

1.03 GENERAL

A. Required alternates are worded briefly. Refer to Specification sections and Drawings for additional requirements. Claims for additional compensation will not be granted because of omissions or discrepancies due to the brevity.

B. Bidders shall indicate the addition or deduction amount from the base bid for each alternate requested in the space provided on the bid form.

C. The cost indicated on the bid form shall include material and labor as may be necessary for the identified alternate.

1.04 ACCEPTANCE OF ALTERNATES

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.

B. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

1.05 SCHEDULE OF ALTERNATES

A. Alternate No. 01 - Resinous Flake Flooring:

1. Description: Broadcast Flake system applied over clean and prepped concrete flooring. Provide flake flooring in concessions and restroom locations, as shown on drawings.
   a. Base Bid: Sealed concrete

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 23 00

SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General administrative requirements.

B. Preconstruction meeting.

C. Site mobilization meeting.

D. Progress meetings.

E. Preinstallation meetings.

F. Construction progress schedule.

G. Coordination drawings.

H. Submittal schedule.

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

J. Number of copies of submittals.

K. Submittal procedures.

1.02 RELATED REQUIREMENTS

A. Section 01 33 23 - Contractor Submittal Form

B. Section 01 70 00 - Execution and Closeout Requirements: Additional coordination requirements.

C. Section 01 78 00 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

1.03 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

B. Make the following types of submittals to Architect:
   1. Requests for Interpretation (RFI).
   2. Requests for substitution.
   3. Shop drawings, product data, and samples.
   4. Test and inspection reports.
   5. Design data.
   6. Manufacturer's instructions and field reports.
   7. Applications for payment and change order requests.
   8. Progress schedules.
   9. Coordination drawings.
   10. Correction Punch List and Final Correction Punch List for Substantial Completion.
   11. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

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

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

3. Contractor.
4. All Major Subcontractors.

C. Agenda:
1. Execution of Owner-Contractor Agreement.
2. Submission of executed bonds and insurance certificates.
3. Distribution of Contract Documents.
4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
5. Designation of personnel representing the parties to Contract.
6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, change orders, and contract closeout procedures.
7. Scheduling.
8. Scheduling activities of Special Inspector required by the Authority having Jurisdiction.

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

3.02 PROGRESS MEETINGS

A. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

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

C. Agenda:
1. Review minutes of previous meetings.
2. Review of work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede, or will impede, planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of 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. Scheduling activities of Special Inspector required by the Authority having Jurisdiction
15. Other business relating to work.

D. Record minutes and distribute electronic copies within 5 days after meeting to participants, with an electronic copy to Architect, Owner, participants, and those affected by decisions made.

3.03 PRE-INSTALLATION MEETINGS (CONFERENCE)

A. A pre-installation meeting will be schedule at Project Site before construction activity that requires coordination with other construction and as indicated in the Contract Documents.

B. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting.

C. Review conditions of installation, preparation and installation procedures and coordination of related work including:
   1. Review of scope of work
   2. Review of approved submittals
   3. Manufacturers installation recommendations
   4. Deliveries
   5. Possible conflicts
   6. Compatibility problems
   7. Time schedules
   8. Environmental considerations
      a. Implementation of indoor air quality management plan procedures (LEED)
   9. Warranty requirements
   10. Acceptability of substrates
   11. Inspections and testing requirements

D. Do not proceed with installation if the conference cannot be successfully concluded. Resolve impediments to performance of the work and reconvene the conference at the earliest feasible date

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

C. Submit updated schedule with each Application for Payment.

3.05 SUBMITTAL SCHEDULE

A. Submit to Architect for review a schedule for submittals in tabular format.
   1. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
   2. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.

3.06 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.

3.07 ELECTRONIC FILES

A. Architects' Electronic Digital Files: Electronic copies of CAD Drawings of the Contract Drawings will be provided by the Architect for Contractor's use in preparing submittals. The Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings through an electronic digital file agreement.
   1. Electronic Digital Agreement: Electronic Digital files will be distributed to Contractors upon completion of AIA Document C106 - 2013, Digital Data Licensing Agreement as modified by the Architect for this project.

END OF SECTION 01 30 00

SECTION 01 43 00
QUALITY ASSURANCE

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. Manufacturers' field services.

G. Defect Assessment.

1.02 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittal procedures.

B. Section 01 60 00 - Product Requirements: Requirements for material and product quality.

1.03 REFERENCE STANDARDS

A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008 (Reapproved 2023).

B. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation; 2025a.

C. 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; 2023.

D. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection and/or Testing; 2014a.

E. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2021.

F. ASTM E699 - Standard Specification for Agencies Involved in Testing, Quality Assurance, and Evaluating of Manufactured Building Components; 2016.

G. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2010.

1.04 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 Architect and to Contractor.

1. Include:
    a. Date issued.
    b. Project title and number.
    c. Name of inspector.
    d. Date and time of sampling or inspection.
    e. Identification of product and specifications section.
    f. Location in the Project.
    g. Type of test/inspection.
    h. Date of test/inspection.
    i. Results of test/inspection.
    j. Compliance with Contract Documents.
    k. When requested by Architect, provide interpretation of results.

C. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
   1. Indicate material or product 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 Architect.

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.

E. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
   1. Submit report in duplicate within 30 days of observation to Architect for information.

F. Erection Drawings: Submit drawings for Architect's benefit as contract administrator or for Owner.

1.05 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.
   2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
   3. Qualification Statement: Provide documentation showing testing laboratory is accredited under IAS AC89.

1.06 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. 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. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from Contract Documents by mention or inference otherwise in any reference document.

1.07 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Owner will employ and pay for services of an independent testing agency to perform other specified testing.

B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

C. Testing and Inspection Agency:

1. Testing agency: Comply with requirements of ASTM E329, ASTM E543, ASTM E699, ASTM C1021, ASTM C1077, ASTM C1093, and ASTM D3740.
2. Laboratory: Authorized to operate in State in which Project is located.
3. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.
4. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 TESTING AND INSPECTION

A. See individual specification sections for testing and inspection required.

B. Testing Agency Duties:
   1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
   2. Perform specified sampling and testing of products in accordance with specified standards.
   3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of Work or products.
   5. Perform additional tests and inspections required by Architect.
   6. Submit reports of all tests/inspections specified.

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

D. Contractor Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
   3. Provide incidental labor and facilities:

a. To provide access to Work to be tested/inspected.
b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
c. To facilitate tests/inspections.
d. To provide storage and curing of test samples.

4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

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

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

3.03 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance equipment as applicable, and to initiate instructions when necessary.

B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.04 DEFECT ASSESSMENT

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

END OF SECTION 01 43 00

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.

D. Security requirements.

E. Vehicular access and parking.

F. Waste removal facilities and services.

G. Field offices.

1.02 TELECOMMUNICATIONS SERVICES

A. Job Superintendent to be on site and available via cell phone when work is performed.

1.03 TEMPORARY SANITARY FACILITIES

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

1.04 BARRIERS

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

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

1.05 SECURITY

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

1.06 VEHICULAR ACCESS AND PARKING

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

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

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

D. Coordinate allowed locations for construction parking with owner.

1.07 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 when containers are full.

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

1.08 FIELD OFFICES

A. Coordinate location with owner.

1.09 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. Grade site as indicated.

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

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 50 00

SECTION 01 51 00
TEMPORARY UTILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary Utilities: Electricity and water.

1.02 RELATED REQUIREMENTS

A. Section 01 50 00 - Temporary Facilities and Controls:
   1. Temporary telecommunications services for administrative purposes.
   2. Temporary sanitary facilities required by law.

1.03 TEMPORARY ELECTRICITY

A. Cost:
   1. Electrical Contractor to pay to connect and disconnect to the utilities service, provide temporary lighting and power distribution system for each area and/or floor of the project, and service to General Contractor field office.
   2. General Contractor to pay for cost of energy used.

B. Cost of electricity used: By Owner.

C. Connect to Owner's existing power service.
   1. Do not disrupt Owner's need for continuous service.
   2. Exercise measures to conserve energy.

D. Provide temporary electric feeder from existing building electrical service at location as directed.

E. Complement existing power service capacity and characteristics as required.

F. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required. Provide flexible power cords as required.

G. Permanent convenience receptacles may be utilized during construction.

H. With the exception of General Contractor field office, wiring of Contractor's offices, trailers, storage facilities and the like used during construction shall be the responsibility of the individual contractor requiring the same.

1.04 TEMPORARY WATER SERVICE

A. Cost of Water Used: By Owner.

B. Connect to existing water source.
   1. Exercise measures to conserve water.

C. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 51 00

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 Contractor.

1.02 RELATED REQUIREMENTS

A. Section 31 10 00 - Site Clearing: Limits on clearing; disposition of vegetative clearing debris.

B. Section 31 22 00 - Grading: Temporary and permanent grade changes for erosion control.

C. Section 32 11 23 - AGGREGATE BASE AND SURFACING: Temporary and permanent roadways.

D. Section 32 92 19 - Seeding: Permanent turf for erosion control.

1.03 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; 2021.

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.

D. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles; 2015a.

E. ASTM D4751 - Standard Test Methods for Determining Apparent Opening Size of a Geotextile; 2021a.

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.

1.04 PERFORMANCE REQUIREMENTS

A. Develop and follow an Erosion and Sedimentation Prevention Plan and submit periodic inspection reports.

B. 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 obtain permits and pay for securities required by authority having jurisdiction.
   2. Owner will withhold payment to Contractor equivalent to all fines resulting from non-compliance with applicable regulations.

C. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.

D. 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.

E. 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.

F. 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.

G. 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.

H. 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.

I. Open Water: Prevent standing water that could become stagnant.

J. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Erosion and Sedimentation Control Plan:
1. Include:
a. Site plan identifying soils and vegetation, existing erosion problems, and areas vulnerable to erosion due to topography, soils, vegetation, or drainage.
b. Site plan showing grading; new improvements; temporary roads, traffic accesses, and other temporary construction; and proposed preventive measures.
c. Where extensive areas of soil will be disturbed, include storm water flow and volume calculations, soil loss predictions, and proposed preventive measures.
d. Schedule of temporary preventive measures, in relation to ground disturbing activities.
e. Other information required by law.

f. Format required by law is acceptable, provided any additional information specified is also included.

2. Obtain the approval of the Plan by authorities having jurisdiction.
3. Obtain the approval of the Plan by Owner.

C. Certificate: Mill certificate for silt fence fabric attesting that fabric and factory seams comply with specified requirements, signed by legally authorized official of manufacturer; indicate actual minimum average roll values; identify fabric by roll identification numbers.

D. Inspection Reports: Submit report of each inspection; identify each preventive measure, indicate condition, and specify maintenance or repair required and accomplished.

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, minimum.
2. Bindings: Wire or string, around long dimension.

D. Bale Stakes: One of the following, minimum 3 feet long:
1. Steel U- or T-section, with minimum mass of 1.33 pound per linear foot.
2. Wood, 2 by 2 inches 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, 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, minimum, in cross-machine direction; 124 pounds-force, 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, minimum, when tested in accordance with ASTM D4533/D4533M.
7. Color: Manufacturer's standard, with embedment and fastener lines preprinted.

F. Silt Fence Posts: One of the following, minimum 5 feet long:
1. Steel U- or T-section, with minimum mass of 1.33 pound per linear foot.
2. Softwood, 4 by 4 inches in cross section.
3. Hardwood, 2 by 2 inches in cross section.

G. Gravel: See Section 32 11 23 for aggregate.

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, minimum.
   2. Length: 50 feet, minimum.
   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.
   1. Provide linear sediment barriers:
      a. Along downhill perimeter edge of disturbed areas, including soil stockpiles.
      b. Along the top of the slope or top bank of drainage channels and swales that traverse disturbed areas.
      c. Along the toe of cut slopes and fill slopes.
      d. Perpendicular to flow across the bottom of existing and new drainage channels and swales that traverse disturbed areas or carry runoff from disturbed areas; space at maximum of 200 feet apart.
      e. Across the entrances to culverts that receive runoff from disturbed areas.
   2. Space sediment barriers with the following maximum slope length upslope from barrier:
      a. Slope of Less Than 2 Percent: 100 feet..
      b. Slope Between 2 and 5 Percent: 75 feet.
      c. Slope Between 5 and 10 Percent: 50 feet.
      d. Slope Between 10 and 20 Percent: 25 feet.
      e. Slope Over 20 Percent: 15 feet.

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 thickness of pine needles, sawdust, bark, wood chips, or shredded leaves, or 6 inches 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.
2. Place geotextile fabric full width and length, with minimum 12 inch overlap at joints.
3. Place and compact at least 6 inches of 1 1/2 to 3 1/2 inch 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 high barriers with minimum 36 inch long posts spaced at 6 feet maximum, with fabric embedded at least 4 inches in ground.
3. Where slope gradient is steeper than 3:1 or barriers will be in place over 6 months, use nominal 28 inch high barriers, minimum 48 inch long posts spaced at 6 feet maximum, with fabric embedded at least 6 inches in ground.
4. Where slope gradient is steeper than 3:1 and vertical height of slope between barriers is more than 20 feet, use nominal 32 inch high barriers with woven wire reinforcement and steel posts spaced at 4 feet maximum, with fabric embedded at least 6 inches 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, with extra post.
7. Fasten fabric to wood posts using one of the following:
   a. Four nails per post with 3/4 inch diameter flat or button head, 1 inch long, and 14 gage, 0.083 inch shank diameter.
   b. Five staples per post with at least 17 gage, 0.0453 inch wire, 3/4 inch crown width and 1/2 inch 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 high with post spacing not more than 4 feet.

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 in the ground.
4. Anchor bales with at least two stakes per bale, driven at least 18 inches 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. 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.
4. On soils of very low fertility, apply 10-10-10 fertilizer at rate of 12 to 16 pounds per 1000 sq ft.
5. Incorporate fertilizer into soil before seeding.
6. Apply seed uniformly; if using drill or cultipacker seeders place seed 1/2 to 1 inch 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 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 Architect.

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 01 57 13

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. Procedures for Owner-supplied products.

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

1.02 RELATED REQUIREMENTS

A. Section 01 11 00 - Summary of Work: Lists of products to be removed from existing building.

B. Section 01 30 00 - Administrative Requirements

C. Section 01 43 00 - Quality Assurance: Product quality monitoring.

D. Section 01 60 00.01 - Substitution Request Form.

1.03 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. Submit within 15 days after date of Agreement.
   2. For products specified only by reference standards, list applicable reference standards.

B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

E. Indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

PART 2 PRODUCTS

2.01 GENERAL

A. The Specifications and Drawings are complementary, and what is required by one shall be as if required by all.

B. The Drawings govern dimensions, details and location of Work. The Drawings shall not be scaled.

C. Specifications govern quality of materials and workmanship.

D. In an event of inconsistencies within or between the Drawings and Specifications, the Contractor shall provide the better quality or greater quantity of Work and shall comply with the stricter requirements.

2.02 EXISTING PRODUCTS

A. Reused Products: Reused products include materials and equipment previously used in this or other construction, salvaged and refurbished as specified.

B. Specific Products to be Reused: The reuse of certain materials and equipment already existing on the project site is required.
   1. See Section 01 11 00 for list of items required to be salvaged for reuse and relocation.
   2. If reuse of other existing materials or equipment is desired, submit substitution request.

2.03 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by Contract Documents.

B. Use of products having any of the following characteristics is not permitted:
   1. Made outside the United States, its territories, Canada, or Mexico.
   2. Made using or containing CFC's or HCFC's.
   3. Made of wood from newly cut old growth timber.
   4. Containing lead, cadmium, or asbestos.

C. Provide interchangeable components by the same manufacture for components being replaced.

D. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Size terminal lugs to NFPA 70, include lugs for terminal box.

E. Cord and Plug: Provide minimum 6 foot cord and plug including grounding connector for connection to electric wiring system. Cord of longer length is specified in individual specification sections.

2.04 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.05 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

A. Garmann/Miller & Associates Inc. will consider request for substitutions up to ten (10) calendar days prior to bid opening.

B. Proposed substitutions received by Garmann/Miller & Associates Inc., less than ten (10) days to the bid opening, may not be considered.

C. Submit request using Section 01 60 00.01 - Substitution Request Form.
   1. Submit one copy of request for substitution for consideration. Limit each request to one proposed substitution.

2. Hard Copy Submission: Deliver submittal to Garmann/Miller & Associates Inc. business office.
3. Electronic Submission: Forward via email to Garmann/Miller & Associates Inc.'s Project Manager, Curt South; csouth@creategm.com and Project Coordinator; coordinator@creategm.com.

D. Substitutions will be considered after bid opening when a product, through no fault of the Contractor, becomes unavailable or unsuitable due to regulatory change.

E. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

F. A request for substitution constitutes that the submitter:
1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
2. Agrees to provide the same or better warranty for the substitution product as there is for the specified product.
3. Agrees to coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
4. Waives claims for additional costs or time extension that may subsequently become apparent.
5. Agrees to reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.

G. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

H. Time Frame for Request. When a Substitution Request is received by the office of Garmann / Miller & Associates, Inc, during a normal business day, Architect will have a maximum of three (3) working days to respond to the Substitution Request.
1. Weekends and holidays are not included in the three (3) day response period.
2. Normal working day is considered between 8 AM and 5 PM.
3. Request received between 5 PM and 8 AM may be considered received on the following business day.

3.02 OWNER-SUPPLIED PRODUCTS

A. Owner's Responsibilities:
1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
2. Arrange and pay for product delivery to site.
3. On delivery, inspect products jointly with Contractor.
4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
5. Arrange for manufacturers' warranties, inspections, and service.

B. Contractor's Responsibilities:
1. Review Owner reviewed shop drawings, product data, and samples.
2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
3. Handle, store, install and finish products.
4. Repair or replace items damaged after receipt.

3.03 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.

3.04 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 74 19.

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

C. Store with seals and labels intact and legible.

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

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

F. Provide off-site storage and protection when site does not permit on-site storage or protection.

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

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

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

J. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

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

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

M. 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 01 60 00

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.

C. Cutting and patching.

D. Surveying for laying out the work.

E. Cleaning and protection.

F. Demonstration and instruction of Owner personnel.

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

H. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittals procedures, Electronic document submittal service.

B. Section 01 43 00 - Quality Assurance: Testing and inspection procedures.

C. Section 01 78 00 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.

D. Section 01 79 00 - Demonstration and Training: Demonstration of products and systems to be commissioned and where indicated in specific specification sections

E. Section 02 41 00 - Demolition: Demolition of whole structures and parts thereof; site utility demolition.

F. Section 07 84 00 - Firestopping.

G. Individual Product Specification Sections:
   1. Advance notification to other sections of openings required in work of those sections.

1.03 REFERENCE STANDARDS

A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2022, with Errata (2021).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
   1. On request, submit documentation verifying accuracy of survey work.
   2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in compliance with Contract Documents.
   3. Submit surveys and survey logs for the project record.

C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   4. Visual qualities of sight exposed elements.
   5. Work of Owner or separate Contractor.

D. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.05 QUALIFICATIONS

A. For surveying work, employ a land surveyor registered in Ohio and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

1.06 PROJECT CONDITIONS

A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

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

D. 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 barriers between construction areas and areas continuing to be occupied by Owner.

E. 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.

F. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.07 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements.

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

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

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

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

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

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

1.08 PROHIBITED MATERIAL AND PRACTICES

A. Contractors are advised that the following materials and practices are prohibited in this project. Each Prime Contractor will be held responsible for compliance by his personnel and the personnel of each of his subcontractors.
   1. Use of tobaco products on school property is strictly prohibited.
   2. Use of marking pens of any type on surfaces to remain exposed to view in finished building.
   3. Penetrations of roof membrane without prior coordination with Roofing Contractor.
   4. Burning of any trash or rubbish is prohibited.
   5. Use of cabinetry countertops or other equipment as a work surface, walking surface or any other purpose which could result in damage to countertops or equipment.
   6. Suspension of systems (acoustical ceilings, piping, ductwork, conduits etc) from joist bridging and deck. Each system shall be supported from the building structure (beams, joist, etc).

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. Cut, move, or remove items as necessary for access to alterations and renovation work. Replace and restore at completion.

B. Remove unsuitable material not marked for salvage, such as rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished work.

C. Remove debris and abandoned items from area and from concealed spaces.

D. Close openings in exterior surfaces to protect existing work and salvage items from weather and extremes of temperature and humidity. Insulate ducts and piping to prevent condensation in exposed areas.

E. Prepare surfaces and remove surface finishes to provide for proper installation of new work and finishes.

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

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

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

3.03 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Architect of any discrepancies discovered.

C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

D. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.

F. Utilize recognized engineering survey practices.

G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
   2. Grid or axis for structures.
   3. Building foundation, column locations, ground floor elevations.

H. Periodically verify layouts by same means.

I. Maintain a complete and accurate log of control and survey work as it progresses.

3.04 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

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

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.05 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as indicated.
   2. Report discrepancies to Architect before disturbing existing installation.
   3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Remove existing work as indicated and as required to accomplish new work.
   1. Remove items indicated on drawings.
   2. Relocate items indicated on drawings.
   3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.

4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

C. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
   2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
   3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
      a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
      b. Provide temporary connections as required to maintain existing systems in service.
      c. A minimum of 3 days notice must be given the CM for any planned utility outages. See Section 02 41 00 Demolition.
   4. Verify that abandoned services serve only abandoned facilities.
   5. Remove abandoned pipe, ducts, conduits, and equipment , including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

D. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.

E. Adapt existing work to fit new work: Make as neat and smooth transition as possible.

F. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

G. Refinish existing surfaces as indicated:

H. 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.

I. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.

J. Clean existing systems and equipment.

K. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

L. Do not begin new construction in alterations areas before demolition is complete.

M. Comply with all other applicable requirements of this section.

3.06 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. See Alterations article above for additional requirements.

C. Perform whatever cutting and patching is necessary to:
   1. Complete the work.

2. Fit products together to integrate with other work.
3. Provide openings for penetration of mechanical, electrical, and other services.
4. Match work that has been cut to adjacent work.
5. Repair areas adjacent to cuts to required condition.
6. Repair new work damaged by subsequent work.
7. Remove samples of installed work for testing when requested.
8. Remove and replace defective and non-complying work.

D. Each trade is responsible for cutting and patching for their work unless otherwise noted.

E. Execute cutting and patching including excavation and fill to complete the work, to uncover work in order to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing when requested, to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit products together to integrate with other work.

F. 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.

G. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

H. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

I. Restore work with new products in accordance with requirements of Contract Documents.

J. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

K. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material, to full thickness of the penetrated element.

L. Patching:
1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
2. Match color, texture, and appearance.
3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

M. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

N. Make neat transitions. Patch work to match adjacent work in texture and appearance. Where new work abuts or aligns with existing, perform a smooth and even transition.

3.07 PROGRESS CLEANING BY EACH CONTRACTOR

A. Contractors shall provide daily cleanup and removal of rubbish/refuse resulting from their operations including but not limited to bulky debris, packaging, containers, unused material.

B. Remove pile of debris from the building daily. No pile of debris shall be left in the building overnight.

C. At reasonable intervals during the progress of Work, not less than once a week, perform a cleaning of dirt, dust and debris. Broom clean floor and paved surfaces and raked clean other surfaces of ground.

D. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
1. Do not burn or bury rubbish and waste material on project site.

2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.

E. Roadway shall remain clear.

3.08 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.09 DEMONSTRATION AND INSTRUCTION

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

B. See Individual Specification Sections for demonstrations required.

C. The Owner reserves the right to record (electronically on audio tape, video tape or compact disc) any or all of each demonstration. The recordings are intended to be used by the Owner in maintaining the equipment or material installed.

3.10 ADJUSTING

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

3.11 FINAL CLEANING

A. Each Contractor shall perform his respective final clean up and shall leave the Work of the completed project in a clean neat condition.

B. Execute final cleaning prior to final project assessment.
   1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.

C. Each Contractor shall perform shall perform his respective final clean up and shall leave the Work of the completed project in a clean neat condition including the following:
   1. Conduct an inspection of sight-exposed interior and exterior surfaces and work areas, to verify that the entire Work is left in broom clean condition.
   2. Tunnels and closed off spaces shall be cleaned of packing boxes, wood frame members and other waste materials used in the construction.
   3. The entire system of piping and equipment shall be cleaned internally. The Contractor installing those item shall open all direct pockets and strainers, completely blowing down as required and clean strainer screens of all accumulated debris
   4. Tanks, fixtures and pumps shall be drained and proved free of sludge and accumulated matter.
   5. Temporary labels, stickers etc., shall be removed from fixtures and equipment (Do not remove permanent nameplates, equipment model numbers, rating etc.)
   6. Use cleaning materials that are nonhazardous.
   7. 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.

8. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
9. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
10. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

D. The General Contractor will do final cleaning which will consist of the following to a degree acceptable to the Architect.
1. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels and other foreign material from sight-exposed interior and exterior surfaces.
2. Vacuum all carpeting. Clean and wax VCT floors including a minimum of three (3) coats of wax or the number of coats specified by the manufacturers which ever is greater. Wax to be approved by the Owner prior to waxing.
3. Wash and shine glazing and mirrors.
4. Polish glossy surfaces to a clear shine.
5. Dust cabinets work and remove markings
6. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
7. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.
8. Clean site; sweep paved areas, rake clean landscaped surfaces.
9. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.12 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.
1. Provide copies to Architect.

B. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.

C. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.

D. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.

E. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

F. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.

G. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

3.13 MAINTENANCE

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

B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.

C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION 01 70 00

SECTION 01 78 00
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project Record Documents.

B. Operation and Maintenance Data.

C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Section 01 70 00 - Execution and Closeout Requirements: Contract closeout procedures.

C. Individual Product Sections: Specific requirements for operation and maintenance data.

D. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.

B. Operation and Maintenance Data:
   1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
   2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
   4. Submit two sets of revised final documents in final form within 10 days after final inspection.
   5. Submit two electronic sets of final documents in final form within 10 days after final inspection. Electronic format shall be PDF's on CD's or USB flash drives.

C. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
   2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

D. Certifications:
   1. Submit copies of the certifications listed in this section:
      a. Certification stating that no flux or solder used for drinking water piping .
      b. Certification stating that asbestos containing material was not incorporated into the Work.

E. Receipts:
   1. Submit copies of the receipt signed by owner for completed training sessions.
      a. See individual specifications sections for training required.
   2. Submit copies of the receipt signed by owner for maintenance material (attic stock).
      a. See individual specifications sections for maintenance material (attic stock) required.

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. Addenda.
   3. Change Orders and other modifications to the Contract.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Record Drawings 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. For Each Product, Applied Material, and Finish:
   1. Product data, with catalog number, size, composition, and color and texture designations.

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. 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. Additional Requirements: As specified in individual product specification sections.

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into durable manuals for 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 tabbed divider for each system.

C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 3 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.

F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.

H. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.

I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

J. Arrangement of Contents: Organize each volume in parts as follows:
   1. Project Directory.
   2. Table of Contents, of all volumes, and of this volume.
   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 Architect or others, provide a tab labeled "Design Data" and provide a binder large enough to allow for insertion of at least 20 pages of typed text.

K. One (1) electronic copy of the Operation and Maintenance Manuals shall be placed on a CD, Thumb Drive, or other form of Mass Storage Device, for the Owners use. Files must be in a PDF format or format approved by the Owner.

3.06 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.

F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.

G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.

H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION 01 78 00

SECTION 01 79 00
DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 SUMMARY

A. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
   1. Finishes, including flooring, wall finishes, ceiling finishes.
   2. Items specified in individual product Sections.

1.02 RELATED REQUIREMENTS

A. Section 01 78 00 - Closeout Submittals: Operation and maintenance manuals.

B. Other Specification Sections: Additional requirements for demonstration and training.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Draft Training Plans: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
   1. Submit to Commissioning Authority for review and inclusion in overall training plan.
   2. Submit not less than four weeks prior to start of training.
   3. Revise and resubmit until acceptable.
   4. Provide an overall schedule showing all training sessions.
   5. Include at least the following for each training session:
      a. Identification, date, time, and duration.
      b. Description of products and/or systems to be covered.
      c. Name of firm and person conducting training; include qualifications.
      d. Intended audience, such as job description.
      e. Objectives of training and suggested methods of ensuring adequate training.
      f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
      g. Media to be used, such a slides, hand-outs, etc.
      h. Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.

C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
   1. Include applicable portion of O&M manuals.
   2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
   3. Provide one extra copy of each training manual to be included with operation and maintenance data.

D. Training Reports:
   1. Identification of each training session, date, time, and duration.
   2. Sign-in sheet showing names and job titles of attendees.
   3. Include Commissioning Authority's formal acceptance of training session.

E. Video Recordings: Submit digital video recording of each demonstration and training session for Owner's subsequent use.
   1. Format: DVD Disc.
   2. Label each disc and container with session identification and date.

1.04 QUALITY ASSURANCE

A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.

1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 TRAINING - GENERAL

A. Commissioning Authority will prepare the Training Plan based on draft plans submitted.

B. Conduct training on-site unless otherwise indicated.

C. Owner will provide classroom and seating at no cost to Contractor.

D. Do not start training until Functional Testing is complete, unless otherwise specified or approved by the Commissioning Authority.

E. Provide training in minimum two hour segments.

F. The Commissioning Authority is responsible for determining that the training was satisfactorily completed and will provide approval forms.

G. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.

H. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
   1. The location of the O&M manuals and procedures for use and preservation; backup copies.
   2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
   3. Typical uses of the O&M manuals.

I. Product- and System-Specific Training:
   1. Review the applicable O&M manuals.
   2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
   3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
   4. Provide hands-on training on all operational modes possible and preventive maintenance.
   5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
   6. Discuss common troubleshooting problems and solutions.
   7. Discuss any peculiarities of equipment installation or operation.
   8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
   9. Review recommended tools and spare parts inventory suggestions of manufacturers.
   10. Review spare parts and tools required to be furnished by Contractor.
   11. Review spare parts suppliers and sources and procurement procedures.

J. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

END OF SECTION 01 79 00

GARMANN MILLER

Division 02

Existing Conditions

SECTION 01 60 00.01 - SUBSTITUTION REQUEST FORM
(DURING BIDDING PHASE)

To: Garmann Miller Date:_____

Project: 23047.03 Arcanum Booster Stadium Phase 3

We hereby submit for your consideration the following product instead of the specified item for the above project:

Section	Section Name	Article/Paragraph	Specified Item

Proposed Substitution: _____

Manufacturer: _____ Model: _____

Submit with request all necessary samples and substantiating data to prove equal quality and performance to that which is specified. Clearly mark manufacturer's literature to indicate equality in performance.

Does the Substitution affect dimensions shown on Drawings?

Yes _____No _____If yes, clearly indicate changes:

_____

Will the undersigned pay for changes to the building design, including engineering and detailing costs caused by the requested substitution?

Yes _____No _____If no, fully explain:

What affect does substitution have on other Contracts or other trades?

_____

What affect does substitution have on the delivery and construction schedule?

_____

Differences between proposed substitution and specified item.

_____

Manufacturer's warranties of the proposed and specified items are:

Same: _____ Different: _____ Explain on an Attachment

The undersigned states that the function, appearance and quality are equivalent or superior to the specified item.

Submitted by		For use by Garmann Miller	
Signature		Accepted	
Title		Not Accepted	
Firm		Accepted as Noted	
Address		Received Too Late	
email		Insufficient Data	
Telephone		By	
Fax		Date	

END OF SECTION 01 60 00.01

SECTION 02 41 00
DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Selective demolition of built site elements.

B. Abandonment and removal of existing utilities and utility structures.

C. Protection of designated vegetation.

1.02 RELATED REQUIREMENTS

A. Section 01 11 00 - Summary of Work: Limitations on Contractor's use of site and premises.

B. Section 01 11 00 - Summary of Work: Sequencing and staging requirements.

C. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

D. Section 01 70 00 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

E. Section 31 10 00 - Site Clearing: Vegetation and existing debris removal.

F. Section 31 22 00 - Grading: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

G. Section 31 23 23 - Fill: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

1.03 REFERENCE STANDARDS

A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2022, with Errata (2021).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Site Plan: Showing:
   1. Vegetation to be protected.
   2. Areas for temporary construction and field offices.

C. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fill Material: As specified in Section 31 23 23 - Fill.
   1. Recyclable Fill: Concrete and masonry products from on site demolition:
      a. Remove reinforcing and separate to salvaged metals.
      b. Remove brick and clay masonry.
      c. Crush concrete and masonry waste to less than 3 inch in each direction.
      d. Material subject to the approval by representative of the testing agency.

B. Aggregates: As specified in Section 32 11 23 Aggregate Base and Surfacing
   1. Recyclable Aggregate: Concrete and masonry products from on site demolition:
      a. Remove reinforcing and separate to salvaged metals.
      b. Remove brick and clay masonry.
      c. Crush concrete and masonry waste to less than 1 1/2 inch in each direction.

d. Crush concrete and masonry waste with at least four (4) parts of specified aggregate for each part of concrete waste.
e. Material subject to the approval by representative of the testing agency.

2. Use of Reclaimed Base:
   a. Contractor may use a blend of new material in combination with reclaimed aggregate material.
   b. Material subject to the approval by representative of the testing agency.

PART 3 EXECUTION

3.01 SCOPE

A. Remove paving and curbs as required to accomplish new work.

B. Within area of new construction, remove foundation walls and footings in their entirety.

C. Outside area of new construction, remove foundation walls and footings to a minimum of 2 feet below finished grade.

D. Remove concrete slabs on grade within site boundaries.

E. Remove manholes and manhole covers, curb inlets and catch basins.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Comply with applicable requirements of NFPA 241.
   3. Use of explosives is not permitted.
   4. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
   5. Provide, erect, and maintain temporary barriers and security devices.
   6. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
   7. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   8. Do not close or obstruct roadways or sidewalks without permit.
   9. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
   10. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

B. Do not begin removal until receipt of notification to proceed fromOwner.

C. Protect existing structures and other elements that are not to be removed.
   1. Provide bracing and shoring.
   2. Prevent movement or settlement of adjacent structures.
   3. Stop work immediately if adjacent structures appear to be in danger.

D. 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.

E. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

F. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

G. Perform demolition in a manner that maximizes salvage and recycling of materials.
   1. Dismantle existing construction and separate materials.
   2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

H. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.03 EXISTING UTILITIES

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

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

3.04 PROTECTION OF EXISTING TO REMAIN

A. Protect designated items to remain as indicated on the drawings.

B. Protect vegetation including trees and shrubbery as indicated on the drawings.

C. Perform cutting to accomplish removals neatly.

3.05 DAMAGED WORK

A. Restoration: If work to remain is damaged or destroyed due to subsequent construction/demolition operations, compensate or replace at no cost to Owner.

B. Vegetation Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction/demolition operations, compensate or replace at no cost to Owner.
   1. Trees and vegetation will be considered dead when main leader has died back or when 25 percent or more of crown has died .
   2. If a tree is deemed damaged or dead by the owner's representative, $500 per caliper inch of tree will be assessed.

3.06 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Remove from site all materials not to be reused on site; do not burn or bury.

C. Recycling, Salvage, and Reuse:
   1. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.

2. Recyclable Fill: Concrete and masonry products from on site demolition:
    a. As specified in Section 31 23 23 Fill
    b. Remove reinforcing and separate to salvaged metals.
    c. Remove brick and clay masonry.
    d. Crush concrete and masonry waste to less than 3 inch in each direction.
    e. Material subject to the approval by representative of the testing agency.
3. Recyclable Aggregate: Concrete and masonry products from on site demolition:
    a. As specified in Section 32 11 23 Aggregate Base and Surfacing
    b. Remove reinforcing and separate to salvaged metals.
    c. Remove brick and clay masonry.
    d. Crush concrete and masonry waste to less than 1 1/2 inch in each direction.
    e. Material subject to the approval by representative of the testing agency.
4. Use of Reclaimed Asphalt Base:
    a. As specified in Section 32 11 23 Aggregate Base and Surfacing
    b. Material subject to the approval by representative of the testing agency.
5. Reclaimed Pavement:
    a. As specified in Section 32 12 16 Asphalt Paving

D. Leave site in clean condition, ready for subsequent work.

E. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION 02 41 00

GARMANN MILLER

Division 03

Concrete

SECTION 03 15 21
UNDER SLAB VAPOR/TERMITE/GAS BARRIER

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water Vapor barrier sheet.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Vapor barrier placement under concrete slab-on-grade.

B. Section 32 11 23 - Aggregate and Base Surfacing: Aggregate base preparation.

1.03 REFERENCE STANDARDS

A. ACI 302.1R - Guide for Concrete Floor and Slab Construction; 2004 (Errata 2007).

B. ACI 302.2R - Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials; 2006.

C. 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; 2011.

D. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2011.

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.

C. Test Reports: Submit manufacturer's summary of independent laboratory and field testing for effectiveness in subterranean termite exclusion.

D. Manufacturer's Installation Instructions.

E. Installer Qualifications: Company specializing in performing work of the type specified with minimum five (5) years documented experience.

F. Summary of test results per paragraph 9.3 of ASTM E1745

G. Manufacturer's samples and literature.

H. Provide third party documentation that all testing was performed on a single production roll per ASTM E1745 Section 8.1.

I. Warranty: Submit warranty and ensure that forms have been completed in Owner's name.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing this type of work and having minimum of five (5) years documented experience.

B. Pre-pour inspection: Complete by a representative of the manufactured material prior to placing of concrete. If time does not allow, representative from Architects office shall be on site to inspect prior to placing concrete.

1.06 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANFACTURER

A. Basis of Design:

1. Stego Wrap Vapor Barrier (15 mil); Stego Industries, LLC; www.stegoindustries.com.

B. Other Approved Manufacturer's
   1. Viper II Under Slab Vapor Barrier (15 mil); ISI Building Products; www.isibp.com
   2. Moistop Ultra Under Slab Vapor Barrier (15 mil); Henry; www.henry.com
   3. Yellow Guard Under Slab Vapor Barrier (15 mil); Husky Yellow Guard; www.yellowguard.com
   4. Substitutions: Not permitted.

2.02 MATERIALS

A. Vapor barrier sheet: ASTM E1745,Class A

B. Water vapor permeance: 0.010 perms, maximum.

C. Thickness: 15 mils.

2.03 ACCESSORIES

A. Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations.
   1. Seams: Stego Tape
   2. Sealing Penetrations of Vapor Barrier: Stego Mastic & Stego Tape
   3. Perimeter Edge seal:
      a. Stego Crete Claw
      b. Stego Term Bar
      c. Stego Tack Tape, double sided tack tape
   4. Penetration Prevention: Beast Foot by Stego Industries, LLC.
   5. Vapor Barrier Safe Screed System; Beast Screed by Stego Industries, LLC.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that soil surfaces are unfrozen.

B. Verify final grading is complete.

C. Pre-pour inspection shall be completed by a representative of the manufactured material prior to placing of concrete. If time does not allow, representative from Architects office shall be on site to inspect and sign-off on installation prior to placing concrete.

3.02 INSTALLATION

A. Install vapor barrier in accordance with manufacturer's instructions and ASTM E1643.

B. Install vapor barrier under interior slabs on grade; lap sheet over footings and seal to foundation walls.

C. Lap joints minimum 6 inches.

D. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions.

E. No penetration of vapor barrier is allowed except for reinforcing steel and permanent utilities.

F. Repair damaged vapor retarder before covering with other materials.

G. Comply with ASTM E1643.

H. Install barrier in accordance with ASTM E1643.
   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 of concrete whenever possible.

2. Extend barrier to the perimeter of the slab and turn up slab edge. Terminate barrier at the top of the slab, otherwise;
    a. at a point acceptable to the structural engineer,
    b. where obstructed by impediments such as dowels, waterstops, or any other site condition requiring early termination of the vapor barrier.
3. At a point of termination, seal vapor barrier to the foundation wall, grade beam, or slab itself.
    a. Seal vapor barrier to the entire slab perimeter using Crete Claw material per manufacturer's instructions.
    b. Seal vapor barrier to the entire perimeter wall or footing / grade beam with double sided Tack Tape, or both Term Bar and Tack Tape per manufacturer's instructions.
    c. Ensure the concrete is clean and dry prior to adhering tape.
4. Apply seam tap / Crete Claw to clean and dry vapor barrier.
5. Seal all penetrations (including pipes) per manufacturer's instructions.
6. For interior forming applications, avoid the use of non-permanent stakes driven through the vapor barrier. Use blunt end and or threaded nail stakes (screed pad post) and insert into Beast Foot. Ensure Beast Foot's peel-and-stick adhesive base is fully adhered to the vapor barrier.
7. If non-permanent stakes must be driven through the vapor barrier, repair as recommended by vapor barrier manufacturer.
8. Use reinforcing bar supports with base section that eliminate or minimize the potential of puncture of the vapor barrier.
9. Repair damaged areas with vapor barrier material of same or better permeance, puncture, and tensile strength.
10. For vapor barrier-safe concrete screeding applications, install Beast Screed (vapor barrier-safe screed system) per manufacturer's instructions prior to placing concrete.

3.03 PROTECTION

A. Protect sheet materials from damage after completed installation.

B. Repair damage to installed sheet materials with manufacturer's recommended products and according to the manufacturer's written instructions.

END OF SECTION 03 15 21

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, and Division 01 Specifications, apply to this Section.

1.02 DESCRIPTION

A. Basic specification: Perform work of this Section according to ACI 301-16, "Specifications for Structural Concrete", except as specifically modified herein.

B. Work included: All cast-in-place concrete work shown on the Drawings and required by these Specifications. Allow for the installation of cast-in items furnished under other Sections. Install anchor bolts for structural steel. Provide and install grout under steel column base plates and beam bearing areas.

C. Related work specified elsewhere: The general provisions of the Contract apply to the work of this Section, as though reproduced herein. Carefully examine all other Sections and all Drawings for related work such as concrete pads, piers, curbs, and bases required for equipment of all trades. Coordinate dimensions and details of equipment being supplied, prior to placing concrete. Cooperate with other trades who will provide and install items of work (sleeves, piping, conduit, inserts, etc.) to be cast in the concrete. Place no concrete until all such items are in place.

1.03 QUALITY ASSURANCE

A. Reference standards:
1. ACI 301, Specifications for Structural Concrete
2. ACI 318, Building Code Requirements for Structural Concrete.
3. ACI 117, Specification for Tolerances for Concrete Construction and Materials
4. ACI 347R, Guide to Formwork for Concrete.
5. ACI 302.1R, Guide to Concrete Floor and Slab Construction.
6. “Placing Reinforcing Bars", CRSI & WCRSI Recommended Practices.
7. ACI 439.5R, Comprehensive Guide for the Specification, Manufacture and Construction Use of Welded Wire Reinforcement.
8. ACI 304R, Guide for Measuring, Mixing, Transporting, and Placing Concrete.
9. ACI 305.1, Specification for Hot Weather Concreting.
10. ACI 306R, Guide to Cold Weather Concreting.
11. ACI Field Reference Manual, SP-15.

1.04 SUBMITTALS

A. Submit a mix design for each type of concrete mix required in accordance with ACI 301, Section 1.5.
   1. Acceptable methods of determining concrete proportions shall be in accordance with one of the following methods per ACI 301, Section 4:
      a. Establish based on previous field strength test data with standard deviation calculations.
      b. Establish based on trial mixtures with tested strength data relative to each mix design.

      In either case, provide accurate test data within allowable time periods indicated in ACI 301. Incorrect or missing data will cause for rejection of submittals.

B. Submit Placing Drawings for all reinforcing. Indicate strength, size, and details of all bar reinforcing, and style and specification of all welded wire fabric. Details must indicate clear cover used to determine chair heights.

C. Submit test data for aggregates proposed for use, indicating source and compliance with specification requirements.

D. Submit product literature for admixtures and curing compounds proposed for use.

E. Submit product literature on all proprietary materials including joint systems, sealers, and patching compounds.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cement: Portland Cement, ASTM C150, Type I or Type II, ASTM C1157, Type LH or GU, or ASTM C595 Type IL. All cement to be from the same mill.

B. Supplementary Cementitious Materials
   1. Fly Ash: ASTM C618, Type C or F
   2. Ground Granulated Blast-Furnace Slag, GGBF Slag: ASTM C989, Grade 100 or 120
   3. Silca Fume, Microsilica: ASTM C1240

C. Water: Potable.

D. Aggregates:
   1. Normal weight aggregates: conform to ASTM C33, (4.2.1.2).
   2. Coarse aggregate: Gradation #57.
   3. For architecturally exposed concrete, use a single source of uniform quality throughout the work.
   4. Use crushed limestone coarse aggregate for all slabs and exterior exposed concrete.

E. Admixtures, where required or permitted per ACI 301, Section 4:
   1. Water-Reducing: ASTM C494, Type A or D.
   2. Mid-Range Water-Reducing admixture: ASTM C494, Type A.

3. Air-entraining: ASTM C260 (4.2.1.4).
4. High-Range Water-Reducing admixture (Superplasticizer): ASTM C494, Type F or G.
5. Non-Chloride, Non-Corrosive accelerator: ASTM C494, Type C or E.
6. Fly Ash: ASTM C618, Type C or F.
7. Ground Granulated Blast-Furnace Slag, GGBF Slag: ASTM C989.
8. Calcium Chloride and admixtures containing more than 0.06% chloride ions are NOT permitted.
9. Use of admixtures other than those listed will be permitted only when approved prior to bid.

F. Reinforcing:
1. Deformed bars - Uncoated: ASTM A615 or A706. Minimum yield strength to be 60 ksi.
2. Welded Wire Fabric:
   a. Plain welded wire reinforcement: ASTM A1064. Provide in sheet form for all uses other than slabs-on-grade. Minimum yield strength is to be 65 ksi.
   b. Lap sheets a minimum distance of cross wire spacing plus two inches.
3. Smooth joint dowel bars: ASTM A36, plain steel bars, cut true to length with square ends.
4. Reinforcing support accessories:
   a. Provide reinforcement accessories, consisting of bar supports, spacers, hangers, chairs, ties, and similar items as required for spacing, assembling, and supporting reinforcement in place. Conform with CRSI RB4.1 and Manual of Standard Practice and the following requirements:
   b. For footings and slabs on grade, provide supports with precast concrete or mortar bases or plates or horizontal runners where wetted base materials will not support chair legs.
   c. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms or are in close proximity to finish surfaces, provide supports with legs which are galvanized, plastic-protected, or stainless steel.

G. Premolded expansion joint filler: ASTM D1751.

H. Curing and Sealing Compound (VOC Compliant, 350 g/l): Liquid type membrane-forming curing compound, clear styrene acrylate type complying with ASTM C1315, Type I, Class B, 25% solids content minimum. Moisture loss shall be not more than 0.40 kg/m^2 when applied at 300 ft^2/gal. Manufacturers' certification is required. Do not apply to surfaces that are to receive subsequent cementitious toppings, sealers, hardeners, ceramic tile resilient flooring, vinylbacked carpet, wood, terrazzo, epoxy or urethane overlays or adhesives, or other coating or finishing products. Subject to project requirements, provide one from the following manufacturers:
1. BASF Construction Chemicals.
2. Euclid Chemical Company.
3. W.R. Meadows

I. Curing Compound (Strippable): The compound shall conform to ASTM C309 and is to be used on slabs that are to receive subsequent applied finishes and where noted on the drawings. Install in strict accordance with the manufacturer's recommendations and supervision. Verify compound is compatible with the applied finish prior to placement. Subject to project requirements, provide one from the following manufacturers:

1. BASF Construction Chemicals.
2. Euclid Chemical Company.
3. W.R. Meadows

J. Grout under steel base plates and bearing plates: Non-shrinking, non-metallic, with minimum 28-day strength of 5,000 psi, when mixed to a fluid consistency. Subject to project requirements, provide one from the following manufacturers:
1. BASF Construction Chemicals.
2. Euclid Chemical Company.
3. Kaufman Company.

K. Vapor Retarder:
1. Conform to ASTM E1745 "Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs", Class A.
2. Vapor retarders are required under all slabs on grade which are to receive moisture-sensitive floor covering, and in humidity-controlled areas. Vapor retarders are not required under industrial slabs on grade nor under those in non-humidity-controlled areas.
3. Vapor retarder shall be installed in accordance with ASTM E1643 Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs. The vapor retarder/barrier shall be a minimum of 15 mils thick and placed directly on the granular fill, below the concrete floor slab. Lap joints a minimum of 6 inches and seal with manufacturer's recommended tape or adhesive.

L. Granular fill below slabs on grade: Provide as recommended in project specific soils report. If soils report is not provided for project, use 4" deep of compacted ODOT 304 or approved equivalent AASHTO dense graded base course.

M. Waterstops: Provide waterstops at all construction joints and other joints in all foundation walls below grade and where shown on the drawings. Size to suit joints. Provide either premolded polyvinylchloride or swellable type.
1. Premolded, flexible, polyvinylchloride, with center bulb. CRD C572
2. Rubber and Swellable Clay CRD C513

N. Structural Bonding Compound: Epoxy adhesive, 100% solids, two-component material suitable for use on dry or damp surface. Subject to project requirements, provide one from the following manufacturers:
1. Euclid Chemical Company.
2. Kaufman Company.
3. Sika Corporation.

O. Patching Compound, Epoxy Type: 100% solids, suitable for use on dry or damp surface. Subject to project requirements, provide one from the following manufacturers:
1. Euclid Chemical Company.
2. Sika Corporation.
3. W.R. Meadows

P. Patching Compound, Cementitious Type: Subject to project requirements, provide one from the following manufacturers:
1. Euclid Chemical Company.
2. Sika Corporation.

3. W.R. Meadows

Q. Curing sheets for wet curing – the following materials are approved:
1. Sisalcraft Sk-10 (C171).
2. Burlap
3. Filter Fabric (8-ounce minimum)
4. Visqueen plastic, 8 mils minimum.
5. Bur-lene curing blankets.

2.02 MIXES

A. The following mixes of concrete are required:

Mix Usage	f'_c at 28 days	Exposure Class	Maximum Water Cementitious Ratio	Air Content
Lean Concrete, & Mud Slabs	1,500 PSI	F0	---	---
Footings & Interior Column Piers	3,500 PSI	F1	0.55	optional
Interior Slabs on Grade	4,000 PSI	F0	0.45	optional
Perimeter Foundation Stem Walls, Foundation Walls, & Exterior Column Piers	4,500 PSI	F2, C1	0.45	5%-7%
Exterior Slabs on Grade and Exterior Concrete Not Otherwise Identified	4,500 PSI	F2, C1	0.45	5%-7%

Concrete Mix Notes:

1) Exposure class requirements are achieved through the F'c, w/cm, and air content requirements provided to ensure adequate durability conforms to Freeze/Thaw exposures (F) or Corrosive exposures (C).
2) For all slab mixes, provide a minimum cementitious content of 520 lbs.
3) Slump: Maximum 5" for all members. If a superplasticizer is used, initial slump to be 3", increased to 8" maximum after addition (at the job site) of the superplasticizer.
4) Fly ash is permitted in all mixes but shall not exceed 25% of cement weight indicated above and can be included in the water-to-cementitious ratio.
5) Ground granulated blast-furnace slag is permitted in all mixes but shall not exceed 35% of the cement weight indicated above and can be included in the water-to-cementitious ratio.
6) Silica fume (microsilica) is permitted in all mixes but shall not exceed 10% of the cement weight indicated above and can be included in the water-to-cementitious ratio.
7) Total supplemental cementitious material shall not exceed 35% of the total cement weight.
8) Mixes to be pumped are to be so identified on the mix design submittal. All pumped mixes are to have a mid-range or high-range water reducer.
9) Concrete for slabs on grade must include a mid-range or high-range plasticizer.
10) All admixtures (other than superplasticizer) are to be added at the batch plant. Superplasticizers, designed for addition to the mix at the plant, may be added at the batch plant with verification from the Engineer of Record and verification that the water-to-cement ratio has not been exceeded.
11) Maximum water-soluble chloride ion content shall not be more than the ACI limits set forth for defined corrosion classes.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

A. Verify that excavations are free of water and ice, are of the required dimensions, and have been approved by the Soils Engineer, prior to placing concrete.

B. Determine field conditions by actual measurement.

C. Notify Architect not less than 24 hours in advance of placing concrete. Place concrete only when Construction Manager is present, unless this requirement is specifically waived.

3.02 FORMWORK AND REINFORCING

A. All formwork shall follow the guidelines of ACI 347R resulting in final formed surfaces within the tolerances of ACI 117.

B. Footings may be cast against earth cuts when soil conditions permit.

C. Removal of forms and shoring:
   1. Remove no forms within 24 hours after placement.

D. Reinforcing:
   1. Welding of reinforcing is prohibited, except where shown.
   2. Use plastic-tipped or stainless-steel bar supports for surfaces exposed to view in finished structure.

3.03 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   1. Install all embeds shown on contract documents.
   2. Install sleeves for mechanical, electrical, and plumbing penetrations.

B. Aluminum conduit shall not be installed in concrete.

3.04 DELIVERY AND PLACEMENT

A. Preparation before placement:
   1. Standing water shall be removed from place of deposit before concrete is placed.
   2. Do not use additives or salts to remove ice. Non-chloride deicers may be used.
   3. In cold weather, comply with ACI 306R; maintain temperature of forms and reinforcing within a range of 55 - 90 degrees F.
   4. In hot weather, comply with ACI 305.1.

B. Delivery is to conform to ASTM C94.

1. Delivery tickets to contain the following, in addition to the information required by C94:
2. Reading of revolution counter at first addition of water.
3. Type and brand of cement and supplementary cementitious materials.
4. Cementitious content.
5. Total water content by producer.
6. Maximum size of aggregate.
7. Secure Architect's written approval if non-agitating type equipment is to be used for transportation.
8. ASTM C94 requires discharge within 1-1/2 hours or 300 revolutions; whichever comes first, after the introduction of water to cement and aggregates, or the introduction of cement to the aggregates. Architect may require an earlier discharge during hot weather, or when high-early strength cement is being used.

C. Water addition at the site will not be permitted, except when the approved mix design has been formulated to allow for on-site addition of water. Water may only be added by personnel authorized by the Architect/Engineer and Concrete Producer.

D. Conveying: Keep delivery carts and buggies on runways; do not allow them to bear on reinforcing or uncured concrete.

E. Placement.
1. Place within 6 feet of final position. Spreading with vibrators is prohibited.
2. In walls and columns, deposit concrete in uniform horizontal layers, with a maximum depth of 4 feet (18 inches for architectural concrete).
3. Maximum free fall without chutes or elephant trunks to be 5 feet (3 feet for architectural concrete).
4. Place concrete continuously to a designed joint such that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of cold joints or planes of weakness.
5. Concrete shall be consolidated per guidelines in ACI 309.2R.

F. Records: Keep a complete log of pours, including date, location, quantity, weather, and identification of test cylinders for each pour.

3.05 JOINTING

A. Interior slabs on grade:
1. Locate control (contraction) joints as shown on the Drawings. In the absence of information on Drawings, locate at openings, walls, columns, grid lines, and inside corners. The maximum spacing of contraction (control) joints, for reinforced and unreinforced slabs, is to be 6 times the square root of the slab thickness (i.e. for a 4-inch slab the maximum spacing is 12 feet). Cut joints ¼ times the slab thickness. The Soff-Cut Saw shall be used immediately after final finishing. A conventional saw shall be used as soon as possible without dislodging aggregate. Schedule slab pours and saw-cutting operations such that sawing is completed prior to onset of shrinkage cracking.
2. Provide isolation joints at columns (½ inch thick) and at walls (⅛ inch thick). Where isolation joint will be exposed to view, set top of joint filler below top of slab a distance equal to the filler thickness, to receive sealant. Where not exposed to view, set top of filler flush with top of slab.

B. Exterior slabs on grade: Locate joints as shown on Drawings. In the absence of information on Drawings, provide the following (for sidewalks only):
   1. Expansion joints: Full depth, with ½ inch joint filler, where slabs abut vertical surfaces at intersections of sidewalks, at abrupt changes in width, and at a spacing not exceeding 30 feet.
   2. Control joints: Tooled, 1 inch deep, 4'-0" to 6'-0" on center between expansion joints.

C. Foundation walls: Locate contraction joints at maximum spacings of 60'-0" on center, except as approved otherwise. Provide horizontal reinforcing separation, doweling of adjacent placements, and v-grooves each face.

3.06 FINISHES

A. Schedule of finishes on flatwork per ACI 301, section 5 is as follows:
   1. Typical interior floor areas to receive carpet, resilient floor covering, or to remain exposed - troweled finish.
   2. Interior floor areas to receive terrazzo, quarry tile, or ceramic tile - floated finish.
   3. Exterior slabs - broom finish.

B. Surfaces of floor slabs shall be finished to the following tolerances, per ACI 117:
   1. Minimum flatness of F(f) 30, and a minimum levelness of F(l) 20, are required for typical slabs on grade. Preceding values are average values to be obtained over a given area. Minimum local values (one-half bay) of F(f) 25 and F(l) 17 shall be obtained.

C. Determination of the flatness and levelness of a concrete slab shall be made on the day following placement of the first concrete pour. Tests shall be made in accordance with ASTM E115. After it is established that proper procedures are being utilized to obtain the desired results, flatness/levelness test shall be performed only as directed by the Owner.

D. Any bay not conforming to the above flatness and levelness requirements is subject to: repair, or removal; replacement; and retesting; at no expense to the Owner.

E. "F Numbers" shall be submitted to the Owner and Architect immediately after they are determined by the testing laboratory.

3.07 CURING AND PROTECTION

A. Curing:
   1. Interior slab areas that will receive non-moisture sensitive terrazzo, ceramic tile, quarry tile, or a liquid sealer/densifier, are to be moist-cured for a minimum of 7 days, without the use of a curing compound.
   2. Interior slab on grade areas which will receive moisture sensitive floor coverings are to be cured with plastic sheeting, conforming to ASTM C171, for 7 days. Edges and joints are to be sealed. Rewetting of the slab at any time during construction should be avoided.
   3. All other slab areas which will receive non-moisture sensitive floor coverings may be either moist-cured or receive an application of curing compound, except that when concrete above grade is placed in the open, and the air temperature exceeds 60 ºF, the concrete is to be moist-cured for the first 24 hours.

4. Whichever curing method is used, it is to commence immediately after placement. Do not allow curing to be delayed overnight.
5. Prevent excessive moisture loss from formed surfaces. If forms are removed before 7 days have elapsed, cure the formed surfaces by moist-curing or application of curing compound for the remainder of the curing period.

B. Protection:
1. When air temperature during placement is less than 40 ºF, or will be within 24 hours, temperature of concrete as placed is to be between 50 ºF and 90 ºF (55 ºF and 90 ºF for sections less than 12 inches thick) and a non-chloride accelerator shall be used. Maintain concrete temperature within these limits for the full curing period of 7 days.
2. When air temperature during placement is greater than 80 degrees, a water-reducing retarder shall be used. Maintain concrete temperature below 90 deg F 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.

3.08 CLEANING AND REPAIR

A. Repair any slabs that do not meet the finish requirements. The Architect will determine whether grinding, filling of cracks, or patching and leveling procedures are required.

B. For slabs that are dusting, or showing other signs of improper curing, any corrective measures attempted will be subject to prior approval of the Architect and will be performed at Contractor's expense. These may include additional applications of sealer/densifier, or grinding, or covering with specified repair topping.

C. Immediately prior to final acceptance, remove from all interior and exterior surfaces that are exposed to view, any stain-producing elements, such as pyrites, nail, wire, reinforcing steel, and form ties.

D. Remove all stains completely. Use of weak acids or patented cleaners is acceptable, but surface is to be completely neutralized after use.

E. All repairs shall conform to ACI 301, Section 5.3.7 except that the specified bonding compounds, cementitious, or epoxy repair materials must be used. Repair procedures must be submitted and reviewed by the Engineer of Record.

F. As-cast formed finishes shall be comply with the following:
1. Concrete surfaces not exposed to view (Surface Tolerance Class D per ACI 117)
   a. Patch voids larger than 1-1/2" wide or ½" deep.
   b. Remove projections larger than 1".
2. Concrete surfaces exposed to view (Surface Tolerance Class C per ACI 117)
   a. Patch voids larger than ¾" wide or ½" deep.
   b. Remove projections larger than ½".
   c. Patch tie holes.

3.09 ACCEPTANCE

A. Concrete work with serious honeycombing, form misalignment, or other deviation from Contract requirements is subject to rejection per ACI 301, Section 1.

B. When observations or tests indicate that the Contract requirements have not been met, the Contractor is to bear the costs of any additional testing and analysis to determine acceptability and also the cost of removal and replacement, if such is required per ACI 301, Section 1.

3.10 FIELD QUALITY CONTROL

A. Inspection and testing shall be in accordance with Special Inspections designated for this project as approved by the Building Official. Special Inspections must be documented with all corrective measures completed to satisfy compliance certificates as deemed necessary by the jurisdiction.

B. All tests and inspection shall be per ACI 301, Section 1.6

END OF SECTION

SECTION 03 35 11
CONCRETE FLOOR FINISHES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface treatments for concrete floors and slabs.

B. Liquid densifiers and hardeners.

C. Clear coatings.

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.

B. Section 03 30 00 - Cast-in-Place Concrete: Curing compounds that also function as sealers.

1.03 ADMINISTRATIVE REQUIREMENTS

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

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's published data on each finishing product, including information on compatibility of different products and limitations.

C. Maintenance Data: Provide data on maintenance and renewal of applied finishes.

1.05 DELIVERY, STORAGE, AND HANDLING

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

1.06 FIELD CONDITIONS

A. Do not finish floors until interior heating system is operational.

B. Maintain ambient temperature of 50 degrees F minimum.

PART 2 PRODUCTS

2.01 CONCRETE FLOOR FINISH APPLICATIONS

A. Liquid Densifier/Hardener
   1. Use at following locations: Where sealed concrete finish indicated on Drawings.

B. High Gloss Clear Sealer
   1. Use at following locations: Where sealed concrete finish indicated on Drawings.

C. Slip Resistant Coating: Finely-ground aggregates added to coatings.

2.02 DENSIFIERS AND HARDENERS

A. Liquid Densifier and Hardener: Penetrating chemical compound that reacts with concrete, filling the pores, hardening, and dustproofing.
   1. Composition: Lithium silicate.
   2. Products:
      a. Dayton Superior Corporation; Pentra-Hard Guard: www.daytonsuperior.com.
      b. Euclid Chemical Company; ULTRASIL LI+: www.euclidchemical.com/
      c. PROSOCO, Inc; Consolideck LS: www.prosoco.com/consolideck/
      d. Sika, Scofield Formula One Lithium Densifier MP: usa.sika.com.
      e. SpecChem, LLC; LithSeal SC: www.specchemllc.com
      f. W. R. Meadows, Inc; Liqui-Hard Ultra: www.wrmeadows.com.
      g. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 COATINGS

A. High Gloss Clear Coating: Transparent, nonyellowing, acrylic polymer-based coating.
   1. Composition: Water-based.
      a. Products:
         1) Dayton Superior Corporation; PENTRA-HARD Guard: www.daytonsuperior.com.
         2) Euclid Chemical Company: ULTRAGUARD: www.euclidchemical.com.
         3) PROSOCO, Inc; LSGuard: www.prosoco.com/consolideck.
         4) Sika, Scofield Formula One Guard-W: usa.sika.com.
         5) SpecChem, LLC; SpecGuard: www.specchemllc.com
         6) W. R. Meadows, Inc; BELLATRIX: www.wrmeadows.com.

B. Plastic Aggregate: Finely ground polymer for addition to coatings for slip resistance.
   1. Products:
      a. Dayton Superior Corporation; Grip Aid: www.daytonsuperior.com.
      b. Euclid Chemical Company; EUCO GRIP: www.euclidchemical.com.
      c. SpecChem, LLC; Surface Grip: www.specchemllc.com.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that floor surfaces are acceptable to receive the work of this section.

B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes.

3.02 GENERAL

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

3.03 DENSIFIERS AND HARDENERS

A. Surface Preparation:
   1. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.
   2. Verify that water vapor emission from concrete and relative humidity in concrete are within limits established by coating manufacturer.
   3. Remove any concrete laitance and patch or fix all cracks and damaged areas.
   4. New concrete should be properly cured a minimum of 7 days in accord with ACI 302 by one of the following methods: water, plastic sheeting, or reinforced paper.
   5. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove excess material.

B. Mixing: Mix thoroughly prior to each use.

C. Placement:
   1. Apply densifier to point of rejection (by spray, roller, brush or pouring), then scrub the product using a soft bristle broom or mechanical scrubber. Work in this manner until the product begins to thicken, rewet with water and work. Do not allow the product to dry, apply additional product if needed to keep wet while working. Thoroughly rinse and then squeegee or brush off excess material until dry.
   2. On porous or rough surfaces, a second application may be required.
      a. If a second coat is required, immediately apply it in a similar manner as the first coat. Do not allow the treated surfaces to dry between applications.

D. The use of a mechanical scrubber will increase the effectiveness of the application. The treated surface will develop a “polished” appearance over time.

3.04 COATING APPLICATION

A. Surface Preparation:
   1. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.
   2. Verify that water vapor emission from concrete and relative humidity in concrete are within limits established by coating manufacturer.
   3. Floors to be mechanically prepared (i.e.shotblast, sandblast) to result in a Concrete Surface Profile (CSP) of between an International Concrete Repair Institute i.e., shotblast, sandblast, to result in a Concrete Surface Profile (ICRI) CSP #1-2, or the texture of medium grit sandpaper to ensure proper adhesion.
   4. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove excess material.

B. Apply coatings in accordance with manufacturer's instructions, matching approved mock-ups for color, special effects, sealing and workmanship.

C. Mixing: Mix thoroughly prior to each use.

D. Placement:
   1. Apply in uniform, even applications.
   2. Surface and ambient temperature is recommended and relative humidity to be within manufacturers recommend ranges.
   3. Two coats are required
      a. First Coat: Pour the mixed material onto the floor to be coated. A squeegee can be used to uniformly spread the epoxy on the surface. Immediately back roll with a 1/4 - 3/8 inch phenolic core roller to even out the surface. Avoid over-rolling or over-working the material.
      b. Slip Resistant Surface
         1) Apply a base coat of Spec Cote WB to be applied and clean dry aggregate (silica sand) broadcast on the tacky base coat to the desired texture finish.
         2) After the base coat has cured, broom away any loose aggregate and apply a thin topcoat of Spec Cote WB to encapsulate and seal the aggregate.
      c. Second coat can be applied when the first coat is completely dry and tack free, but must be applied within 16 hours to achieve adequate adhesion and bond between coats to avoid
      d. Before second coat application check for the presence of imperfections such as epoxy blush, air bubbles etc. Correct imperfections prior to application.

END OF SECTION 03 35 11

GARMANN MILLER

Division 04

Masonry

SECTION 04 05 23
MASONRY ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Masonry Accessories

B. Flashings

1.02 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

B. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2015b.

C. ASTM A580/A580M - Standard Specification for Stainless Steel Wire; 2018.

D. ASTM C55 - Standard Specification for Concrete Building Brick; 2011.

E. ASTM C67/C67M - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile; 2018.

F. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2014.

G. ASTM C140/C140M - Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units; 2014.

H. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting two weeks before starting work of this section; require attendance by all relevant installers, architect and structural engineer.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for specified items.

1.05 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

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

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store accessories by means that will prevent mechanical damage and contamination by other materials.

B. Handle and store ceramic glazed masonry units and pre-faced concrete block units in protective cartons or trays. Do not remove from protective packaging until ready for installation.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.

B. Hot Weather Requirements: Comply with IMIAWC (HW).

PART 2 PRODUCTS

2.01 FLASHINGS

A. Stainless Steel Flashing - Self-Adhering: ASTM A240/A240M; 2 mil type 304 stainless steel sheet with butyl adhesive and a removable release liner.
   1. Manufacturers:
      a. York Flashings; York 304 SA: www.yorkflashings.com.
      b. Wire-Bond; Bond-N-Flash SA: www.wirebond.com.
      c. Homann & Barnard; Mighty-Flash-SA: www.h-b.com.
      d. Wall Guardian; Self Adhering Stainless Steel Flashing: www.stscoatings.com.
      e. Substitutions: See Section 01 60 00 - Product Requirements.

B. Transition Flashing
   1. Multipurpose, modified butyl, self-adhered flashing
   2. Thickness: 45 mils
   3. Basis of Design: DuPont DuraGard CM Transition Flashing
   4. Applications:
      a. Through-wall flashing
      b. Rough window openings
   5. Complies with ASTM E331, ASTM E2357, ASTM E283, ASTM E154, AAMA 711-20, ASTM D1970, ASTM E96

C. Single-Wythe Flashing: High-density polypropylene composition molded into a 5/8 inch thick flashing pan with 5/16 inch perimeter flanges with integral weep spout and insect guard, no visible drip edge.
   1. Manufacturers:
      a. Mortar Net Solutions: Blockflash
      b. Substitutions: See Section 01 60 00 - Product Requirements.

D. Flashing Termination Bar: Stainless Steel 1/8 inch thick x 1 inch wide with holes at 16 inches on center. Hole size is 5/16 inch (8mm) diameter
   1. Manufacturers:
      a. Advanced Building Products Inc: Stainless Steel Termination Bar
      b. Hohmann and Barnard Inc.: T1
      c. Heckmann Building Products: Termination Bar
      d. Masonry Reinforcing Corporation of America, Wire Bond: Termination Bar
      e. Substitutions: See Section 01 60 00 - Product Requirements

E. Flashing End Dams and Corners:
   1. Stainless Steel Flashing: ASTM A 666, Type 304, soft temper; 26 gauge thick; finish 2B to 2D.
   2. Solder joints to ensure seal.
   3. Application: At thru wall flashing end dam, inside corner and outside corner

F. Sheet Metal Drip Edge:
   1. Stainless Steel Flashing: ASTM A666/A666M, Type 304, soft temper; 26 gage, 0.0187 inch thick; finish 2B to 2D.
   2. Depth: Equal the masonry unit.
   3. Application: Where drip edge is required per recommendations of NCMA-Tek 19-4

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that related items provided under other sections are properly sized and located.

3.02 PREPARATION

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

B. Clean reinforcement of loose rust

C. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

END OF SECTION 04 05 23

GARMANN MILLER

Division 05

Metals

SECTION 05 12 00
STRUCTURAL STEEL

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provision of the Contract, including General and Supplementary Conditions and Division 01 Specifications, apply to this section.

1.02 DESCRIPTION

A. Work included: All labor and materials required to furnish and install structural steel work shown on the Drawings and required by these Specifications, including that shown on Mechanical or Electrical Drawings, or required in their Specification sections.

B. Related work specified elsewhere: The general provisions of the Contract apply to the work of this Section, as though reproduced herein. Carefully examine all other sections and all Drawings for related work.

C. Work furnished but not installed under other Sections: Anchor rods.

D. Work affected by others: Mechanical equipment support framing, equipment loads, framing around openings, and structure in any way related to mechanical requirements is shown for bidding purposes only. Responsibility for coordinating the work of this Section with these requirements is solely that of the Contractor. Contractor's review of shop drawings will be taken to indicate that this coordination has been completed.

1.03 QUALITY ASSURANCE

A. Reference Standards:
   1. By the American Institute of Steel Construction (AISC):
      a. Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.
      b. Specification for Structural Joints Using High-Strength Bolts.
      c. Code of Standard Practice for Steel Buildings and Bridges.
   2. By the American Welding Society (ANSI/AWS):
      a. Structural Welding Code-Steel (AWS D1.1)
      b. Symbols for Welding, Brazing, and Non-Destructive Testing (A2.4).

B. Fabricator's qualifications:
   1. Minimum five years' continuous experience in the fabrication of steel for projects of similar quality and scope.

C. Erector's qualifications: Minimum five years' continuous experience in similar steel erection.

D. Welders' qualifications: Personnel and procedures are to be qualified per the requirements of the American Welding Society, as given in ANSI/AWS D1.1.

1.04 SUBMITTALS

A. Certification of experience: Submit, on request only, written description of personnel, projects, and equipment which document the experience and qualifications required of the Fabricator, Erector, and Welder.

B. Shop Drawings: Provide dimensioned erection plans with appropriate sections and details including member piece details that include the following:
   1. Include all shop and erection details, including cuts, copes, cambers, connections, holes, threaded fastener types, sizes and lengths, washers, and weld types, sizes, and lengths.
   2. Include embedment layout drawings.
   3. Include material specifications and finishes.
   4. Indicate shop welds with symbols per ANSI/AWS A2.4

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Delivery:
   1. Members to be hot-dip galvanized shall retain compliance with ASTM A6 after the galvanizing process. Non-compliance will be cause for rejection.
   2. Deliver anchor rods and other items to be embedded in cast-in-place concrete or masonry prior to the start of that work. Provide setting drawings, templates, or instructions required for the installation of such items.

B. Storage:
   1. Store steel at the site above ground on platforms, skids, or other supports.
   2. Protect steel from corrosion.
   3. Store packaged materials in their original unbroken packages.

PART 2 PRODUCTS

2.01 MATERIALS

A. Structural steel Channels, Angles, plates, bars, etc.:
   1. Fy = 36 ksi, ASTM A36.

B. Structural steel tubing:
   1. Square and Rectangular HSS: Fy = 50 ksi, ASTM A500, Grade C.

C. Anchor Rods: Provide heavy washers for anchor rods.
   1. Threaded and nutted: ASTM F1554, Grade 36

D. High-Strength Bolts: ASTM A325 of A490.

E. Post-Installed Anchors:
   1. Install post-installed anchors in accordance with the Manufacturer's installation instructions.

F. Welding Electrodes: Conform to the requirements of ANSI/AWS D1.1, using Series E70 electrodes, appropriate for the materials being welded.

G. Galvanizing Repair Paint: High zinc-dust-content paint for re-galvanizing field welds and repairs containing not less than 93 percent zing dust by weight: SSPC Paint 20.

2.02 FABRICATION

A. Conform to applicable provisions of the reference standards listed in Part 1 of this Section, as modified herein.

B. Finishing: Ends of members in direct contact bearing, such as columns at their bases and splices, are to be "finished", as defined in the Code of Standard Practice.

C. Bearing and base plates: Column base plates are to be shop attached.

D. Holes: Drill or punch holes in members as required for passage of conduit and piping, and attachment of joists, nailers, etc. burning such holes is not permitted without prior approval of the Architect. If opening is not shown on structural Drawings, obtain prior approval.

E. Cleaning:
1. Remove oil, dirt, loose mill scale, or other material that would impair welding.

F. Galvanizing: Where required, galvanizing is to conform to ASTM A123 and A153. Except for bolts, nuts, and anchors, all galvanizing is to be done after fabrication.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

A. Prior to beginning work of this Section, verify that the installed work of other trades is complete and correct to the extent necessary for the proper execution of the work of this Section. This includes locations of anchor rods, bearing plates, bearing areas, and finished elevations of concrete and concrete masonry.

B. In the event of discrepancies, immediately notify the Architect. Do not proceed with work affected by the discrepancies until they have been resolved.

3.02 ERECTION

A. Conform to the applicable provisions of the reference standards listed in Part 1 of this Section, as modified herein.

B. The structure is designed to be self-supporting and stable after the building is fully completed. It is solely the Contractor's responsibility to determine erection procedure and sequence; and to ensure the stability of the building and its components and parts, and of the adequacy of temporary or incomplete connections during erection. This includes the addition of whatever temporary bracing, guys, or tie-downs that might be necessary. Such material is not shown on the Drawings. If applied, they shall be removed as conditions permit, and shall remain the Contractor's property.

C. Safety: It is the Contractor's responsibility to follow all applicable safety codes and regulations governing this work.

D. Clean bearing surfaces and other surfaces in permanent contact with each other prior to assembly.

E. Splices are permitted only where indicated.

F. Tolerances: Per AISC Code of Standard Practice.

G. Field corrections of fabrication errors by gas cutting is not permitted in major members without prior approval of the Architect.

H. Welds that are exposed to view in the finished structure are to be ground smooth and flush with adjacent surfaces.

I. Touch-up painting: After erection, touch-up field connections and abrasions in the shop coat with same paint used for shop coat. Do not paint welds until they have been cleaned in accordance with AWS D1.1.

3.03 FIELD QUALITY CONTROL

A. Inspection and testing shall be in accordance with Special Inspections designated for this project as approved by the Building Official. Special Inspections must be documented with all corrective measures completed to satisfy compliance certificates as deemed necessary by the Jurisdiction.

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated steel items including:
   1. Miscellaneous framing and supports

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.

1.03 REFERENCE STANDARDS

A. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus. 2019

B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

C. 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; 2022.

D. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2022).

E. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).

F. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.

G. SSPC-SP 2 - Hand Tool Cleaning; 2018.

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.

C. Samples
   1. Submit samples as requested by the Architect during the course of construction.

1.05 QUALITY ASSURANCE

A. The work of this section shall be coordinated with the work of other Sections.
   1. Verify the dimensions and work of other trades adjoining items of this Section before fabrication and installation.

B. Furnish to the pertinent trades items included in this Section that are built into the work of other Sections.

C. Welding shall be performed by qualified welders and shall conform to the applicable AWS welding code.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver items to be incorporated into the work of other trades in sufficient time to be checked prior to installation

B. Repair items which have become damaged to the satisfaction of the Architect prior to incorporating them into the work. Replace damaged items if repair cannot be done to the satisfaction of the Architect.

1.07 PROJECT SITE REQUIREMENTS

A. Field measurements shall be taken at the job site, prior to fabrication of items, to verify or supplement indicated dimensions and to ensure proper fitting of all items.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Steel Angles, Channels, and S Shapes: ASTM A 36/A 36M - ASTM 992 (FY = 50ksi)

B. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.

C. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

D. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

E. 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.
   1. Properly mark and match mark materials for field assembly
   2. Use connections that maintain structural values of joined pieces

B. Fabricate items with joints tightly fitted and secured.
   1. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise shown.
   2. Form bent-metal corners to smallest radius possible without causing grain separation of otherwise impairing work.

C. Continuously seal joined members by continuous welds.

D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

F. Furnish components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

G. Cut, reinforce, drill and tap miscellaneous metal work as required to receive finish hardware, screws, and similar items.

2.03 FABRICATED ITEMS

A. Miscellaneous Framing and Supports
   1. Provide steel framing and supports that are not part of the structural steel framework as necessary to complete the Work.
   2. Fabricate miscellaneous units to sizes, shapes, profiles indicated and necessary to receive adjacent work or work to be retained by framing and supports. Fabricate from structural steel shapes, plates and steel bars of welded construction. Cut, drill, and tap units to receive hardware, hangers, supports, attachments and similar items

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 galvanized 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.
   3. Exception: Galvanized items to be embedded in exterior walls or surfaces

B. Prepare surfaces to be primed in accordance with SSPC-SP2.

C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

D. Prime Painting: One coat.

E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.

F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.05 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 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. Furnish 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, abrasionsand surfaces not shop primed or galvanized , except surfaces to be in contact with concrete.

END OF SECTION 05 50 00

GARMANN MILLER

Division 06

Woods, Plastics and Composites

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Structural dimension lumber framing.

B. Non-structural dimension lumber framing.

C. Rough opening framing for doors, windows, and roof openings.

D. Sheathing.

E. Roofing nailers.

F. Preservative treated wood materials.

G. Miscellaneous framing and sheathing.

H. Communications and electrical room mounting boards.

I. Concealed wood blocking, nailers, and supports.

J. Miscellaneous wood nailers, furring, and grounds.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Setting anchors in concrete.

B. Section 05 12 00 - Structural Steel Framing: Prefabricated beams and columns for support of wood framing.

C. Section 06 17 53 - Shop-Fabricated Wood Trusses.

D. Section 07 25 00 - Weather Barriers: Air barrier over sheathing.

E. Section 07 25 00 - Weather Barriers: Water-resistive barrier over sheathing.

F. Section 07 6100 - Sheet Metal Roofing

G. Section 07 62 00 - Sheet Metal Flashing and Trim

H. Section 07 72 00 - Roof Accessories: Prefabricated roof curbs.

I. Section 09 21 16 - Gypsum Board Assemblies: Gypsum-based sheathing.

1.03 REFERENCE STANDARDS

A. ANSI A208.1 - American National Standard for Particleboard; 2016.

B. AFPA WCD No.1 - Manual for Wood Frame Construction; American Forest and Paper Association; 2001.

C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

D. AWPA U1 - Use Category System: User Specification for Treated Wood; 2012.

E. PS 1 - Structural Plywood; 2009.

F. PS 20 - American Softwood Lumber Standard; 2010.

G. SPIB (GR) - Grading Rules; 2014.

H. WCLIB (GR) - Standard Grading Rules for West Coast Lumber No. 17; 2004, and supplements.

I. WWPA G-5 - Western Lumber Grading Rules; 2011.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide technical data on wood preservative materials and application instructions.

1.05 DELIVERY, STORAGE, AND HANDLING

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

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
   1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
   2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

B. Lumber fabricated from old growth timber is not permitted.

C. Provide sustainably harvested wood; see Section 01 60 00 - Product Requirements for requirements.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Sizes: Nominal sizes as indicated on drawings, S4S.

B. Moisture Content: S-dry or moisture content less than 19 percent..

C. Stud Framing (2 by 2 through 2 by 6):
   1. Species: Spruce, Pine, Fir.
   2. Grade: No. 1 / No. 2.

D. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
   1. Lumber: S4S, No. 2 or Standard Grade.
   2. Boards: Standard or No. 3.

2.03 CONSTRUCTION PANELS

A. Roof Sheathing: APA PRP-108, APA Rated Sheathing, Exterior Exposure Class 1, and as follows:
   1. Grade: APA Rated Sheathing.
   2. Bond Classification: Exposure 1.
   3. Performance Category: 19/32 PERF CAT.
   4. Span Rating: 40/20.
   5. Edges: Square.
   6. Trademark: Furnish construction panels factory-marked with a certification mark evidencing compliance with grade requirements

B. Wall Sheathing: APA PRP-108, APA Rated Sheathing, Exterior Exposure Class 1, and as follows:
   1. Thickness: As noted on drawings and as required to complte the work.
   2. Trademark: Furnish construction panels factory-marked with a certification mark evidencing compliance with grade requirements

C. Other Applications:
   1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
   2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.

3. Other Locations: PS 1, C-D Plugged or better.

2.04 ACCESSORIES

A. Fasteners and Anchors:
   1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
   2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
   3. Anchors: Toggle bolt type for anchorage to hollow masonry.

B. Sill Gasket on Top of Foundation Wall: 1/4 inch thick, plate width, closed cell plastic foam from continuous rolls.

2.05 FACTORY WOOD TREATMENT

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

B. Preservative Treatment:
   1. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
      a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
      b. Treat lumber in contact with roofing, flashing, or waterproofing.
      c. Treat lumber in contact with masonry or concrete.
      d. Treat lumber less than 18 inches above grade.
   2. Preservative Pressure Treatment of Plywood Above Grade: AWPA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative.
      a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
      b. Treat plywood in contact with roofing, flashing, or waterproofing.
      c. Treat plywood in contact with masonry or concrete.

PART 3 EXECUTION

3.01 PREPARATION

A. Where wood framing bears on cementitious foundations, install full width sill flashing continuous over top of foundation, lap ends of flashing minimum of 4 inches and seal.

B. Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.

C. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.

C. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

E. Provide the following specific non-structural framing and blocking:
   1. Cabinets and shelf supports.
   2. Wall brackets.
   3. Handrails.
   4. Grab bars.
   5. Towel and bath accessories.
   6. Wall-mounted door stops.
   7. Chalkboards and marker boards.
   8. Wall paneling and trim.
   9. Joints of rigid wall coverings that occur between studs.

3.04 ROOF-RELATED CARPENTRY

A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

B. Provide wood curb at all roof openings except where prefabricated curbs are specified and where specifically indicated otherwise. Form corners by alternating lapping side members.

3.05 INSTALLATION OF CONSTRUCTION PANELS

A. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
   1. At long edges use sheathing clips where joints occur between roof framing members.
   2. Nail panels to framing; staples are not permitted.

B. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.
   1. Place water-resistive barrier horizontally over wall sheathing, weather lapping edges and ends.

3.06 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.

B. Allow preservative to dry prior to erecting members.

3.07 TOLERANCES

A. Framing Members: 1/4 inch from true position, maximum.

B. Surface Flatness of Floor: 1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

C. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.08 CLEANING

A. Waste Disposal: Comply with the requirements of Section 01 74 19 - Construction Waste Management and Disposal.
   1. Comply with applicable regulations.

2. Do not burn scrap on project site.
3. Do not burn scraps that have been pressure treated.
4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.

B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION 06 10 00

SECTION 06 17 53
SHOP-FABRICATED WOOD TRUSSES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications, apply to this section.

1.02 DESCRIPTION

A. Work included: All labor and materials required to furnish and install wood trusses, connectors, bridging, bracing, and accessories as shown on the Drawings and required by these specifications.

B. Related work specified elsewhere: The general provisions of the Contract apply to the work of this Section, as though reproduced herein. Carefully examine all other Sections and all Drawings for related work.

1.03 QUALITY ASSURANCE

A. Reference standards:
   1. By the National Forest Products Association (NFPA):
      a. National Design and Specification for Stress-Grade Lumber and Its Fastenings.
      b. National Design Specification for Wood Construction.
   2. By American Wood Protection Association (AWPA)
      a. AWPA Book of Standards
   3. Reference Standards by the Truss Plate Institute:
      a. Design Specifications for Light Metal Plate Connected Wood Trusses.
      b. Quality Control Manual
      c. Bracing Wood Trusses Manual.
      d. Handling and Erecting Wood Trusses Manual.

B. Manufacturer's qualifications: regularly engaged in the design and manufacture of wood trusses for a minimum of 5 years.
   1. Pre-engineered metal truss manufacturer must adhere to the Special Inspection requirements for fabricated items.

1.04 SUBMITTALS

A. Shop Drawings:
   1. Indicate design and fabrication data.
   2. Indicated metal connectors, gauge of plates, nominal lumber size, and location of trusses.
   3. Indicate lumber specifications, pitch, span, spacing, species, size, stress grades, and dimensions of each member.

4. Design loads including:
    a. Top chord live load (for roof trusses, this shall be the controlling case of Live, Rain, or Snow load).
    b. Top chord dead load.
    c. Bottom chord live load.
    d. Bottom chord dead load.
    e. Additional loads and locations.
    f. Environmental load design criteria (wind speed, snow, seismic, and all applicable factors as required to calculate the truss loads).
    g. Other lateral loads including drag strut forces.
5. Adjustments to wood member and metal connector plate design values for conditions of use.
6. Indicate design loads, allowable stress increases, and maximum axial compression and tension forces in the truss members.
7. Indicate any camber to be fabricated within the trusses.
8. Calculated span to deflection ratio and/or maximum vertical and horizontal deflection for live and for live plus dead and KCR (creep factor) as applicable.
    a. Roof trusses shall be designed to meet the following deflection criteria when the total design loads are applied:
        i. L/180 when not supporting a ceiling.
        ii. L/240 when supporting a suspended ceiling.
        iii. L/360 when supporting a finished ceiling directly applied to the bottom chord, with or without metal furring channels.
9. Indicate the locations, sizes, and connections of all permanent bracing required to prevent the buckling of individual truss web and chord members.
10. Provide all truss to truss connections and provide manufacturer's standard published literature which indicates allowable capacities.
11. Provide truss field assembly requirements, if any.
12. Provide an erection plan which indicates the truss layout, identification marks, hanger designations, and location of each type of truss provided.
13. Indicate truss to truss connection hangers and provide manufacturer's standard published literature which indicates allowable capacities.
14. These drawings shall be sealed by a Professional Engineer registered in the state where the project is located.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Store fabricated trusses and sub-assemblies to ensure proper drainage and ventilation. Protect from damage, exposure to weather, or standing water.

B. Schedule delivery of trusses to minimize job site storage. If storage is required on the site, place trusses on blocking off the ground and in upright position. Cover with waterproof membrane.

PART 2 PRODUCTS

2.01 MATERIALS

A. Lumber:

1. Lumber used shall be identified by grade mark of lumber inspection bureau or agency approved by the American lumber standards committee, and shall be the size, species, and grade as shown on the Truss Design Drawings, or equivalent as approved by the Truss Designer.
2. Lumber shall be kiln dried and moisture content of lumber shall not e more than 15% or less than 7% at the time of fabrication.
3. Adjustment of value for duration of load or conditions of use shall be in accordance with ANSI/TPI 1.

B. Metal Connector Plates:
1. Connector plates shall be deformed plate type, 20 gauge minimum steel, ASTM A446, Grade A, and galvanized ASTM A663, Coating G60.
2. Hangers and connectors in contact with pressure-treated lumber are to be Batch/Post Hot Dipped Galvanized per ASTM A123 with a minimum G185 coating or Stainless Steel with chemical composition conforming to AISI 303/304 or AISI 316.

C. Pressure Treated Lumber Fasteners:
1. Fasteners which includes nails, anchor rods, bolts, wedge anchors, sleeve anchors, etc. that are in contact with pressure treated lumber are to be Hot Dipped Galvanized per ASTM A153 with a minimum G185 coating or stainless steel with chemical composition conforming to AISI 303/304 or AISI 316.

2.02 DESIGN CRITERIA

A. Design loading: refer to Contract Documents.

B. During entire construction period, distribute concentrated loads adequately so that carrying capacity of any one truss or other component is not exceeded.

C. Design the sizes and connections of all permanent bracing required to prevent buckling of truss members is the responsibility of the Truss Supplier and is to be included within the shop drawing submittal.

2.03 FABRICATION

A. Cut truss members accurately to length, angle, and true to line to ensure tight joints for finished truss.

B. Fabricate truss members in special jigs with members tightly clamped in place until connector plates have been installed.

C. All joints shall be designed as set forth in the TPI standards. Open joints which depend on the stiffness of the metal connector plate to transmit stresses and improperly fitted joints are not permitted.

D. Lumber defects, such as wane and knots, occurring in the connector plate area must not affect more than 10% of required plate area or number of effective teeth required for each truss member. Apply connector plates to both faces of truss at each joint, making firm, even contact. Cut wood members accurately. Fabricate with wood members in good contact with all trusses uniform. Field connections of truss subassemblies, where

necessary, shall be in accordance with details shown on reviewed truss-engineering drawings.

E. Build camber into the trusses, as required for dead load deflections, by properly positioning the members in the fabricating jig.

F. Where field connections of the truss subassemblies are necessary, special nail-on splice plates are acceptable, providing the plate sizes and positions are shown on the truss-engineering design as approved by a Professional Engineer.

G. Multi-ply trusses or girders shall be properly attached together (by nailing, screwing, or bolting) to ensure the trusses are able to perform according to their design as stipulated by the Truss Designer. Follow all requirements provided on the Truss Design Drawings. Whenever possible, connect multi-ply trusses together prior to erection/installation.

H. Provide framing anchors as shown on the engineering design drawings.

I. Stamp each truss with the name and address of the Truss Fabricator.

PART 3 EXECUTION

3.01 HANDLING, INSTALLATION, AND BRACING

A. Trusses shall be handled during manufacturing, delivery, and by the Contractor at the job site so as not to be subjected to excessive bending.

B. Trusses shall be unloaded in a manner so as to minimize lateral strain. Trusses shall be protected from damage that might result from on-site activities and environmental conditions. Trusses shall be handled in such a way as to prevent toppling when banding is removed.

C. Contractor shall be responsible for the handling, installation, and temporary restraint/bracing of the trusses in a good workmanlike manner and in accordance with the recommendation set forth in SBCA/TPI's Building Component Safety Information (BCSI): Guide to Good Practice for Handling, Installing, Restraining & Bracing of Metal Plate Connected Wood Trusses.

D. Apparent damage to trusses, if any, shall be reported to the Truss Manufacturer prior to erection. Repair as required.

E. Trusses shall be set and secured level and plumb, and in correct location. Each truss shall be held in correct alignment until specific permanent restraint and bracing is installed.

F. Cutting and altering of trusses is not permitted. If any truss should become broken, damaged, or altered, written concurrence and approval by a Registered Design Professional is required.

G. Concentrated loads shall not be placed on top of trusses until all specified restraint and bracing has been installed and structural sheathing is permanently nailed in place.

Specifically avoid stacking full bundles of construction materials or other concentrated loads on top of trusses.

H. The truss submittal package and any supplementary information provided by the Truss Manufacturer shall be provided by the Contractor to the individual or organization responsible for the installation of the trusses.

I. Trusses shall be permanently restrained and braced in a manner consistent with good Building practices as outlined in BCSI and in accordance with the requirements of the Construction Documents. Trusses shall furthermore be anchored or restrained to prevent out-of-plane movement to keep all truss members from simultaneously buckling together in the same direction. Such permanent latera l restrain shall be accomplished by: (a) anchorage to solid end walls; (b) permanent diagonal bracing in the plane of the web members; or (c) other suitable means.

J. Install permanent braces on members as required and noted in the shop drawings to prevent buckling of the members.

3.02 FIELD QUALITY CONTROL

A. Inspection and testing shall be in accordance with Special Inspections designated for this project as approved by the Building Official. Special Inspections must be documented with all corrective measures completed to satisfy compliance certificates as deemed necessary by the Jurisdiction.

END OF SECTION

GARMANN MILLER

Division 07

Thermal and Moisture Protection

SECTION 07 21 13
BOARD INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Board insulation at foundation perimeter and under floor slabs.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete

B. Section 07 21 26 - Blown Insulation: Blown-in, gravity-held fibrous insulation.

C. Section 07 21 29 - Sprayed Insulation: Sprayed-on, adhered fibrous insulation.

1.03 REFERENCE STANDARDS

A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.

B. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2023.

C. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

E. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.

F. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C; 2019a.

G. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2023).

H. ASTM E2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies; 2018.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

1.05 FIELD CONDITIONS

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

PART 2 PRODUCTS

2.01 APPLICATIONS

A. Insulation Under Concrete Slabs: Extruded polystyrene (XPS) board.

B. Insulation at Perimeter of Foundation: Extruded polystyrene (XPS) board.

2.02 FOAM BOARD INSULATION MATERIALS

A. Extruded Polystyrene (XPS) Board Insulation: Complies with ASTM C578 with either natural skin or cut cell surfaces.
   1. Application: Perimeter foundation insulation below slab.

2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
4. Type and Thermal Resistance, R-value: Type IV, 5.0 (0.88) per 1 inch thickness at 75 degrees F mean temperature.
5. Board Size: 24 x 96 inch.
6. Board Thickness: 3 inches.
7. Board Edges: Square.
8. Thermal Resistance: R-value of 5.0 per 1 inch at 75 degrees F mean temperature.
9. Compressive Resistance: 25 psi.
10. Water Absorption, Maximum: 0.3 percent, by volume.
11. Manufacturers:
    a. DuPont: Styrofoam Brand Square Edge XPS; www.dupont.com.
    b. Kingspan Insulation LLC: GreenGuard XPS Type IV, 25 psi; www.kingspan.com.
    c. Owens Corning Corporation: FOAMULAR 250 Extruded Polystyrene (XPS) Insulation; www.ocbuildingspec.com.
    d. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 ACCESSORIES

A. Provide all accessories that are approved per manufacturers installation instructions.

B. Adhesive: Provide insulation manufacturer's recommended adhesive.
   1. Product: The Dow Chemical Company GREAT STUFF PRO™ Gaps & Cracks single component insulating foam sealant where necessary

C. Joint Sealants
   1. LiquidArmor LT(low temp application)
      a. Fluid Applied with Trowel
      b. Installed during low temperature applications
      c. Used to create seamless barriers at rough openings of windows and doors as well as insulation joints.
      d. Can be used in temps as low as -20 degrees F
      e. Will withstand rain within 15 minutes of installation, however do not apply over wet surfaces.
      f. Complies with ASTM E331 and ASTM E2357.
      g. Shall be applied per manufacturers' recommendations and instructions
   2. LiquidArmor CM - (warm spray application)
      a. Can be sprayed between 40 degrees and 120 degrees F
      b. Read and follow all manufacturers's instructions
      c. Spray with a max of 3,300 PSI
      d. Apply minimum of four inches wide
      e. Apply at a minimum of 50 wet mills

D. Penetration Filler: Provide insulated sheathing manufacturer's recommended polyurethane foam for sealing penetrations of insulated sheathing.
   1. Products:
      a. The Dow Chemical Company "GREAT STUFF PRO™ Gaps & Cracks" single component polyurethane insulating foam sealant.
      b. The Dow Chemical Company "GREAT STUFF PRO™ Window & Door" single component polyurethane low-pressure foam sealant.

E. Gap Air Infiltration Filler: Two Component, Quick Cure Polyurethane Foam
   1. NFPA 286 Approval for Exposed use to the interior of the building without the need for a 15-min thermal barrier.
   2. ASTM E-84 Class A

3. Product: The Dow Chemical Company FROTH-PAK™ Foam Insulation two component, quick-cure polyurethane foam

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. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER

A. Apply adhesive to back of boards:
   1. Three continuous beads per board length.

B. Install boards vertically on foundation perimeter.
   1. Place boards to maximize adhesive contact.
   2. 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 BOARD INSTALLATION UNDER CONCRETE SLABS

A. Place insulation under slabs on grade after base for slab has been compacted.

B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.

3.04 PROTECTION

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

END OF SECTION 07 21 13

SECTION 07 21 16
BLANKET INSULATION

PART 1GENERAL

1.01 SUMMARY OF WORK

A. Section includes acoustic batt insulation.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry

B. Section 07 92 00 - Joint Sealants

C. Section 09 21 16 - Gypsum Board Assemblies

1.03 REFERENCE STANDARDS

A. ASTM C167 - Standard Test Methods for Thickness and Density of Blanket or Batt Thermal Insulations; 2018 Edition.

B. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2009a.

C. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.

D. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).

E. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014 (Reapproved 2019).

F. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.

G. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2018).

H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

I. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2023.

J. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C; 2019a.

K. ASTM E413 - Classification for Rating Sound Insulation; 2022.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate work of this Section with work of other trades for proper time and sequence to avoid construction delays.

1.05 SUBMITTALS

A. See Section 01 30 00-Administrative Requirements, for submittal procedures.

B. Product Data: Submit product data including manufacturer's literature for insulation materials and accessories, indicating compliance with specified requirements and material characteristics.

PART 2PRODUCTS

2.01 MANUFACTURERS

A. At Contractor's option, provide either glass fiber or mineral fiber thermal or acoustic batt insulation where acoustic batt insulation is indicated.

B. Mineral Wool Sound Attenuation Insulation:
   1. RockWool; Safe n Sound.
   2. Johns Manville; MinWool SAFB
   3. Owens Corning Fiberglass Corporation; Thermafiber SAFB
   4. Substitutions: See Section 01 60 00 - Product Requirements.

C. Fiberglass Sound Attenuation Insulation:
   1. CertainTeed/Saint Gobain; Noise Reducer Sound Attenuation Batts; www.certainteed.com
   2. Johns Manville: Cavity-SHIELD Fiberglass Insulation; www.johnsmanville.com
   3. Owens Corning Fiberglass Corporation; Sound Attenuation Batt Insulation (SAB) Fiberglass Insulation; www.owenscorning.com
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 DESCRIPTION

A. Non-combustible, lightweight, semi-rigid mineral fiber batt insulation to, ASTM C665, Type 1, that provides fire resistance to ASTM E136 and sound control to ASTM C423.

2.03 INSULATION TYPES AND PERFORMANCE CRITERIA

A. Acoustical and fire batt insulation for walls and floors to ASTM C665, Type 1 and ASTM C553.
   1. Fire performance:
      a. Non-combustibility: To ASTM E136 .
      b. Surface Burning Characteristics: To ASTM E84.
         1) Flame spread: 0.
         2) Smoke developed: 0.
      c. Acoustical Performance:
         1) Airborne sound transmission loss: To ASTM E90.
         2) Rating sound insulation: To ASTM E413.
         3) Sound absorption coefficients: To ASTM C423 .
      d. Thermal resistance: To ASTM C518.
      e. Corrosive resistance: To ASTM C665, Corrosive to steel - Pass.
      f. Stainless steel stress corrosion: To ASTM C795.
      g. Density: To ASTM C612 , 2.5 lb/ft3.
      h. Recycled Content: 16 percent minimum

2.04 MATERIALS

A. Non-combustible, lightweight, mineral fiber batt insulation to ASTM C665, Type 1, that provides fire resistance to ASTM E136 and a sound control to ASTM E90 and ASTM C423 .
   1. Size: 16 x 48 inches, or size to fit in designed wall as shown on drawings.
   2. Thickness: 3.5 inches, or thickness as shown on drawings.

2.05 ACCESSORIES

A. Mechanical fasteners in accordance with insulation manufacturer's written recommendations.

B. Acoustical sealant in accordance.

C. Firestopping materials.

2.06 SOURCE QUALITY CONTROL

A. Ensure insulation components and accessories are supplied or approved in writing by single manufacturer.

PART 3EXECUTION

3.01 INSTALLERS

A. Use only installers with minimum of 5 years experience with the work similar to work of this section.

3.02 EXAMINATION

A. Verification of Conditions: Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for insulation installation in accordance with manufacturer's written recommendations.
   1. Visually inspect substrate in presence of Consultant.
   2. Ensure surfaces are free of snow, ice, frost, grease and other deleterious materials.
   3. Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.
   4. Start of insulation installation indicates installer's acceptance of substrate installation conditions.

3.03 INSTALLATION

A. Install insulation in accordance with manufacturer's written recommendations and guidelines.

B. Install insulation to maintain continuity of thermal protection to building elements and spaces.

C. Do not compress insulation to fit into spaces.

D. Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.

E. Keep insulation minimum 3 inches from heat emitting devices such as recessed light fixtures, and minimum 2 inches from sidewalls of chimneys and vents.

F. Seal joints with acoustical joint sealant.

G. Do not enclose insulation until before inspection and receipt of Consultant's written approval.

3.04 FIELD QUALITY CONTROL

A. Field Inspection: Coordinate field inspection in accordance with Section 01 43 00 - Quality Assurance.

3.05 CLEANING

A. Progress Cleaning: Perform cleanup as work progresses.
   1. Leave work area clean at end of each day.

B. Final Cleaning: Upon completion, remove surplus materials, rubbish, tools, and equipment.

3.06 PROTECTION

A. Store the material to protect against weathering and physical damage, including humidity.

B. Protect installed products and accessories from damage during construction.

C. Repair damage to adjacent materials caused by insulation installation.

END OF SECTION 07 21 16

SECTION 07 21 26
BLOWN INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Ceiling and Attic: Blown insulation pneumatically placed into joist spaces through access holes.

1.02 RELATED REQUIREMENTS

A. Section 07 21 13 - Board Insulation.

1.03 REFERENCE STANDARDS

A. ASTM C739 - Standard Specification for Cellulosic Fiber (Wood-Base) Loose-Fill Thermal Insulation; 2011.

B. ASTM C1015 - Standard Practice for Installation of Cellulosic and Mineral Fiber Loose-Fill Thermal Insulation; 2006 (Reapproved 2011).

1.04 SYSTEM DESCRIPTION

A. Materials of This Section: Provide continuity of thermal barrier at building enclosure elements .

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and limitations.

C. Certificates: Certify that products of this section meet or exceed specified requirements.

1.06 PROJECT CONDITIONS

A. Coordinate the work with Section 07 21 00 for placement of insulation materials.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Blown Insulation:
   1. Energy Control Cellulose; ECI II: www.energycontrol1.com
   2. GreenFiber; Sanctuary: www.greenfiber.com.
   3. International Cellulose Corp; Celbar Loosefill: www.spray-on.com.
   4. Energy Control Insulation: www.energycontrolcellulose.com
   5. Advanced Fiber Technology: www.advanced-fiber.com.

2.02 MATERIALS

A. Applications: Provide blown insulation in attic and ceiling as indicated on drawings.

B. Blown Insulation: ASTM C739, cellulosic fiber type, nodulated for pour and bulk for pneumatic placement.
   1. Chemically treated for fire resistance
   2. Installed Thickness: As indicated on drawings.

C. Ventilation Baffles (stops): Formed plastic, metal, or cardboard.

2.03 ACCESSORIES

A. Ventilation Baffles (stops): Formed plastic, metal, or cardboard.
   1. Roof Joist/Truss Spacing: 24 inch on center, nominal. or as indicated on the drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate and adjacent materials are dry and ready to receive insulation.

B. Verify that light fixtures have thermal cut-out device to restrict over-heating in soffit or ceiling spaces.

C. Verify spaces are unobstructed to allow for proper placement of insulation.

3.02 INSTALLATION

A. Install insulation and ventilation baffle in accordance with ASTM C1015 and manufacturer's instructions.

B. Place insulation pneumatically to completely fill stud, joist, and rafter spaces.

C. Place insulation against baffles, and do not impede natural attic ventilation to soffit.

D. Place against and behind mechanical and electrical services within the plane of insulation.

E. Completely fill intended spaces leaving no gaps or voids.

F. Repair and reseal insulation access ports, and refinish to match adjacent work.

3.03 CLEANING

A. Remove loose insulation residue.

3.04 SCHEDULES

A. Attic Spaces: Place insulation between ceiling joists to achieve an R value of 19.

END OF SECTION 07 21 26

SECTION 07 21 29
SPRAYED INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cellulosic insulation At junctions of dissimilar wall and roof materials..

B. Protective overcoat.

1.02 REFERENCE STANDARDS

A. ASTM C739 - Standard Specification for Cellulosic Fiber (Wood-Base) Loose-Fill Thermal Insulation; 2011.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

C. ITS (DIR) - Directory of Listed Products; current edition.

D. UL (DIR) - Online Certifications Directory; Current Edition.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on materials, describing insulation properties.

C. Certificates: Certify that products of this section meet or exceed specified requirements.

D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

E. Installer's Qualification Statement.

1.04 QUALITY ASSURANCE

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

B. Products Specified by Flammability Criteria: Listed and classified by ITS (DIR), UL (DIR), or authorities having jurisdiction (AHJ).

1.05 FIELD CONDITIONS

A. Do not install insulation, sealer when ambient and surface temperatures are lower than 50 degrees F.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Cellulosic Fiber Sprayed Insulation:
   1. GreenFiber: www.greenfiber.com/#sle.
   2. International Cellulose Corp: www.spray-on.com/#sle.
   3. ThermoCon, Inc: www.thermocon.com/#sle.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS

A. Cellulosic Fiber Insulation: ASTM C739; treated cellulosic fiber, white color.
   1. Thermal Resistance (R-value): 3.9, at 1 inch thick when tested in accordance with ASTM C177 at 75 degrees F temperature
   2. Density: 2 lb/cu ft, when tested in accordance with ASTM D1622/D1622M.
   3. Moisture Absorption: Maximum 15 percent by weight.
   4. Flame Spread / Smoke Developed Index: 0-25 / 0-450, Class A, when tested in accordance with ASTM E84.

5. Combustibility: Passing ASTM E136.

B. Provide blown insulation in accordance with requirements of Section 01 61 16 - VOC CONTENT RESTRICTIONS.

2.03 ACCESSORIES

A. Primer: As required by insulation manufacturer.

B. Surface Sealer: Clear, latex based for placement over insulation.

C. Protective Overcoat: Cementitious type, spray applied; flame spread / smoke developed index of 0-25 / 0-450, Class A, when tested in accordance with ASTM E84.

D. Roof Ventilation Baffles: Prefabricated ventilation channels for placement under roof sheathing with baffles to prevent wind-washing.
   1. Material: Polyvinyl chloride (PVC).
   2. Roof Joist/Truss Spacing: 24 inch on center, nominal or as shown on drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are clean, dry, and free of matter that may inhibit adhesion.

B. Verify other work on and within spaces to be insulated is complete prior to application.

3.02 PREPARATION

A. Mask and protect adjacent surfaces from overspray or damage.

B. Install insulation stops between rafters at wall/sloped roof construction to prevent insulation from covering soffit vents or from limiting air circulation from soffit to attic space.

3.03 INSTALLATION

A. Install sprayed insulation in accordance with manufacturer's instructions.

B. Install sprayed insulation to a uniform monolithic density without voids.

C. Install to achieve a thermal resistance R-value of 19.

D. Apply overcoat to a uniform thickness.
   1. Apply overcoat monolithically and without voids; fully cover sprayed insulation.

3.04 PROTECTION

A. Do not permit subsequent construction work to disturb applied sprayed insulation.

END OF SECTION 07 21 29

SECTION 07 25 00
WEATHER BARRIERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air Barriers: Materials that form a system to stop passage of air through exterior walls, joints between exterior walls and roof, and joints around frames of openings in exterior walls.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Water-resistive barrier under exterior cladding.

1.03 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

B. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.

C. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2023.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. ABAA Field Quality Control Submittals: Submit third-party reports of testing and inspection required by ABAA QAP.

C. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.

D. ABAA Installer Qualification: Submit documentation of current contractor accreditation and current installer certification; keep copies of each contractor accreditation and installer certification on site during and after installation, and present on-site documentation upon request.

1.05 QUALITY ASSURANCE

A. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP); www.airbarrier.org/#sle:
   1. Installer Qualification: Use accredited contractor, certified installers, evaluated materials, and third-party field quality control audit.
   2. Manufacturer Qualification: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture, and use secondary materials approved in writing by primary material manufacturer.

B. Air Barrier Association of America (ABAA) Evaluated Materials Program (EAP); www.airbarrier.org/#sle: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture, and use secondary materials approved in writing by primary material manufacturer.

1.06 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

PART 2 PRODUCTS

2.01 WEATHER BARRIER ASSEMBLIES

A. Air Barrier:

1. On outside surface of sheathing of exterior walls use air barrier sheet, mechanically fastened type.

2.02 AIR BARRIER MATERIALS (WATER VAPOR PERMEABLE AND WATER-RESISTIVE)

A. Air Barrier Sheet, Mechanically Fastened:
   1. Air Permeance: 0.004 cfm/sq ft, maximum, when tested in accordance with ASTM E2178.
   2. Water Vapor Permeance: 5 perms, minimum, when tested in accordance with ASTM E96/E96M Procedure A (Desiccant Method) at 73.4 degrees F.
   3. Ultraviolet (UV) and Weathering Resistance: Approved in writing by manufacturer for up to 180 days of weather exposure.
   4. Ultraviolet and Weathering Resistance: Approved in writing by manufacturer for minimum of 4 months weather exposure.
   5. Surface Burning Characteristics: Flame spread index of 25 or less, and smoke developed index of 50 or less, when tested in accordance with ASTM E84.
   6. Seam and Perimeter Tape: Polyethylene self adhering type, mesh reinforced, 2 inches wide, compatible with sheet material; unless otherwise specified.
   7. Manufacturers:
      a. DuPont de Nemours, Inc; Tyvek Commercial Wrap with FlexWrap NF, StraightFlash, StraightFlash VF, Tyvek Wrap Caps, and Tyvek Tape: www.dupont.com/#sle.
      b. Fortifiber Building Systems Group; WeatherSmart: www.fortifiber.com/#sle.
      c. Kingspan Insulation LLC; GreenGuard C2000 Building Wrap: www.trustgreenguard.com.
      d. VaproShield, LLC; WrapShield: www.vaproshield.com.
      e. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and conditions are ready to accept the work of this section.

3.02 PREPARATION

A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

3.03 INSTALLATION

A. Install materials in accordance with manufacturer's instructions.

B. Water-Resistive Barriers: Install continuous barrier over surfaces indicated, with sheets lapped to shed water but with seams not sealed.

C. Air Barriers: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.

D. Apply sealants and adhesives within recommended application temperature ranges. Consult manufacturer if temperature is out of this range.

E. Mechanically Fastened Sheets - On Exterior:
   1. Install sheets shingle-fashion to shed water, with seams generally horizontal.
   2. Overlap seams as recommended by manufacturer but at least 6 inches.
   3. Overlap at outside and inside corners as recommended by manufacturer but at least 12 inches.
   4. Attach to framed construction with fasteners extending through sheathing into framing. Space fasteners at 12 to 18 inches on center along each framing member supporting sheathing.

5. For applications specified to be air tight, seal seams, laps, penetrations, tears, and cuts with self-adhesive tape; use only large-headed, gasketed fasteners recommended by the manufacturer.
6. Install air barrier and vapor retarder underneath the jamb flashings.
7. Install head flashings under weather barrier.
8. At openings to be filled with frames having nailing flanges, wrap excess sheet into opening; at head, seal sheet over flange and flashing.

F. Openings and Penetrations in Exterior Weather Barriers:
1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches onto weather barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
2. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with sealing tape at least 4 inches wide; do not seal sill flange.
3. At openings to be filled with non-flanged frames, seal weather barrier to each side of opening framing, using flashing at least 9 inches wide, covering entire depth of framing.
4. At head of openings, install flashing under weather barrier extending at least 2 inches beyond face of jambs; seal weather barrier to flashing.
5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
6. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface.

3.04 PROTECTION

A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION 07 25 00

SECTION 07 61 00
SHEET METAL ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Complete preformed, roof system, including all materials, associated flashings, trim, closures, fasteners, framing, supports, sealants and underlayment required.

B. Counterflashings.

C. Underlayment

D. Eave Protection

E. Integral fascias.

F. Sealants for joints within sheet metal fabrications.

G. Soffits

1.02 RELATED REQUIREMENTS

A. Section 07 72 00 - Roof Accessories: Manufactured accessories.

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.

B. ASTM B32 - Standard Specification for Solder Metal; 2020.

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

D. ASTM E 1646 - Standard Specification for Water Infiltration.

E. ASTM E 1680 - Standard Specification for Air Infiltration

F. AISC Catagory MB Certification

G. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene two weeks before starting work of this section.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Engineered Drawings: Manufacturer of the roofing system, shall provide engineer stamped drawings certifying that the roof system is designed specifically for this project and will meet all State of Ohio Building Codes. Engineer shall be certified in the State of Ohio.

C. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Manufacturer's Field Reports: Indicate procedures followed, ambient temperatures, humidity, wind velocity during application, and supplementary instructions given.

F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

G. Product Data: Provide data on metal types, finishes, characteristics .
   1. Flashing materials
   2. Insulation
   3. Fasteners
   4. Pre-manufactured pipe flashing

5. Accessories

H. Installation Samples: Submit two samples illustrating metal roofing mounted on plywood backing illustrating typical seam.

I. Color Samples: Submit two samples illustrating metal finish color.

1.06 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) requirements and standard details, except as otherwise noted.

B. Manufacturer's Qualifications: Roof system manufacturer has been engaged in the fabrication of metal roof systems for at least ten years.
   1. The Manufacturer shall be a member of the Metal Building Manufacturer's Association (MBNA).
   2. The American Institute of Steel Construction (AISC) currently certifies the Manufacturer for Category MB.
   3. The Manufacturer maintains a certified installer program for its products and maintains an up to date authorized roofing contractor list.
   4. The Manufacturer has a written warranty covering durability, color and weather tightness of its roof system.
   5. Manufacturer shall produce the metal roof panels on fixed equipment operated by the manufacturer. Portable roll forming shall not be permitted except for special applications and shall be licensed and operated by the Manufacturer in a permanent manufacturing facility.
   6. Manufacturing facilities shall be currently under inspection by Underwriters Laboratory personal to verify compliance that the products fabricated are in accordance with the specifications of the products which were originally tested
   7. Manufacturer's Field Services: Manufactures Technical Representative Inspection: Minimum of three visits to the jobsite to inspect and monitor the installation of the metal roof system. After each inspection provide the installer with a detailed written report communicating issues and progress of the roof inspection. All inspections must be performed by a technical field representative. A copy of the report shall be forwarded to the Architect for information purposes.
      a. Should the roofing system not be approved by the manufacturer's technician, correcting the defective work shall be done by the contractor until the roofing system satisfactorily meets all the specifications and manufacturer's requirements.

C. Installer Qualifications: Company specializing in performing sheet metal roof installations with minimum 10 years of experience on projects of similar size and scope.
   1. Roofing Contractor shall be certified by the Manufacturer to install Manufacturer's roof system.
   2. Roofing Contractor shall follow the Manufacturer's installation details without exception unless written authorization from the manufacturer and architect are provided on an installation detail revision.
   3. Roofing Contractor shall have no viable claims pending regarding negligent acts or defective workmanship on previously performed or current projects.
   4. Roofing Contractor shall have not filed for protection from creditors under any state or federal insolvency or debtor relief status or codes.
   5. Roofing Contractor shall execute 100% of the roof system installation, utilizing full time employees of the Roofing Contractor. Second and third tier sub-contractors for the installation work in this section are not permitted.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver roof system components to the project site in Manufacturer's unopened original containers.

B. Protect roof system components during shipment, storage, handling and erection from mechanical abuse, stains, discoloration and corrosion.

C. Provide strippable plastic film on all painted surfaces between contact areas to prevent abrasion during shipping, storage, and handling.

D. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Store materials off the ground, under protective cover. Slope metal sheets to ensure drainage.

E. Prevent contact with materials that could cause discoloration or staining.

F. Damaged materials will be rejected and removed from the site.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents

C. Standard Manufacturer Roof Warranty: Provide a written warranty, with no monetary limitation, signed by roofing manufacturer agreeing to promptly repair leaks resulting from defects in materials or workmanship for the following warranty period:
   1. Warranty Period: 20 Years from the date of Substantial Completion

D. Weathertightness Warranty: Provide manufacturer's written weathertightness warranty for a minimum of 20 years against leaks in roof panel arising out of or caused by ordinary wear and tear under normal weather and atmospheric conditions. Warranty shall be signed by both the roofing system manufacturer and the roofing system contractor.

E. Finish Warranty: Furnish panel manufacturer's written warranty for twenty (20) years covering the finish of exposed coated metal surfaces including but not limited to roof panels, counterflashings, gutters, downspouts, fascias and trim flashings against blistering, peeling, cracking, flaking, checking, chipping, rusting, and chalking and color change during the warranty period.

F. Roofing Contractor Warranty: The roofing contractor will guarantee, from the date of Substantial Completion, at his cost and expense make or cause to make such repairs to the roof resulting from faults or defects in material or workmanship as necessary to maintain the roof in a watertight condition. Guarantee shall include, but is not limited, roof panels, flashing, roof insulation, fasteners, valleys, fascia, gutters, downspouts, trim flashings and roof joints. (Copy of the Warranty is included at the end of this Section.)
   1. Guarantee shall include, but is not limited, roof membrane, flashing, roof insulation, fasteners, walkways, and roof expansion joints.
   2. Warranty Period: 2 Years from the date of Substantial Completion
   3. Repairs required, either permanent or temporary, to the roofing or roof flashing under this guarantee shall be made within 3 days after notice of the need for repair. Should the contractor fail to make such repairs within the time period, the Owner may have the repairs made and the cost paid by the Contractor.
   4. Copy of the warranty is include at the end of this section.

PART 2 PRODUCTS

2.01 GENERAL

A. Product Source:

1. Single source responsibility for panel materials: Metal roof panels, wall panels, soffit panels and related metal components from a single manufacturer.

2.02 ROOF SYSTEM

A. Basis of Design:
   1. DMI; Span-Lock SL2016: www.dmimetals.com

B. Other Acceptable Manufacturers:
   1. AEP Span; Span-Lok hp: www.aepspan.com
   2. Berridge; Double-Lock Zee-Lock Panel: www.berridge.com
   3. Centria; SDP 200: www.centria.com
   4. Elevate; UNA-CLAD UC-6: www.holcimelevate.com
   5. PAC-CLAD; Tite-Loc: www.pac-clad.com

C. Sheet Material: 22 gauge (.027"), 50 ksi steel sheet Galvalume Aluminum-Zinc Alloy Coated Steel Grade C meeting ASTM A792
   1. Prepainted by the coil coating process to comply with ASTM A755
   2. Panel continuous length without seam except where noted on the drawings.
   3. Finish: 2-coat fluoropolymer, 70 percent PDVF resin.
   4. Color: Selected from metal roof systems standard offering.

2.03 SOFFIT SYSTEM

A. Basis of Design:
   1. DMI; Vented Soffit VS-0512: www.dmimetals.com

B. Other Acceptable Manufacturers:
   1. AEP Span: www.aepspan.com
   2. Berridg: www.berridge.com
   3. Centria: www.centria.com
   4. Elevate: www.holcimelevate.com
   5. McElroy Metal: www.mcelroymetal.com
   6. PAC-CLAD: www.pac-clad.com.

C. Soffit panel to be nominal 12 inches wide perforated to all own 7.5% free air with V groove in the middle, conceal fastener leg with concealed fasteners

D. Sheet Materials: Soffit and related soffit flashing and trim metal
   1. Aluminum Sheet: ASTM B 209 (ASTM B 290M) 0.032 inch thick
   2. Panel continuous length.
   3. Texture: Smooth
   4. Finish: Premium fluorocarbon coating - Kynar 500 or Hylar 5000
   5. Color: Selected from metal roof systems standard offering.

2.04 ACCESSORIES

A. General: Provide trim/flashing, fascias, ridge, valley, closures, gutters, gutter hangers and other related required items to provide a complete system

B. Clip: One piece floating clip with 3 1/2" x 6" x 18 ga. bearing plates screwed into metal deck at 36 inches on center of per roof manufacturer's requirements.

C. Fasteners:
   1. Use long life fasteners for all interior and exterior applications
   2. Provide fasteners with a factory applied coating in a color to match metal roof system.
   3. Provide neoprene washers under heads of exposed fasteners.

D. Gutter:

1. Gutter size as indicated on drawings with 18 gauge gutter strap/spacer located 32 on center or less.
2. Gutter shall be full length or 20' long multiple lengths.
3. Provide expansion joints with cover plates at maximum every 50 foot of gutter.
4. Gutters shall be 20 gauge same color as roof panel and same finish.
5. Gutter Bracket: Width 2 inches wide by 3/16 inch thick

E. Downspouts:
1. Downspouts shall be full length or 8 foot long multiple lengths.
2. Downspouts shall be 20 gauge or heavier with finish matching roof.
    a. Downspouts shall be 6 inches by 4 inches
3. Structural Steel downspouts shall be 6 " x 4" x 3/16" thick with finish matching roof panel.
4. Brackets shall be spaced no more than 8 feet apart.
    a. Brackets to be same gauge or thickness a downspout
    b. Brackets to be U shaped with flanges.

F. Gutter Diverters:
1. Formed in sections not less than 3 feet in length..
2. Diverters shall be the same gauge as the gutters and same finish.

G. Fascia:
1. Formed to size and configuration as indicated on drawings.
2. Fascia shall be 20 gauge or heavier and same finish as roof panel.

H. Vapor Barrier:
1. ASTM C 1136-06
2. Maximum permeance rating of 0.13 perm.
3. Manufacturers:
    a. Griffolyn Type-65; Reef Industries, Houston, Texas
    b. DURA-SKRIM 6WW; Raven Industries, Sioux Falls, South Dakota
    c. WMP-VR; Lamtec Corporation, Mount Bethel, Pennsylvania

I. Roof Jacks, Crickets and Flashings: Provide roof jacks, crickets and flashings for all roof penetrations.
1. Curbs shall be constructed using minimum .080, 3003H14 aluminum, or heavier as required to support the load of the equipment, with fully mitered and heli-arc welded corners, integral base plates, with water diverter cricket.
2. Minimum height of Curb shall be 12" above finished roof.
3. Curbs shall be constructed to match slope of roof and provide a level top surface for mounting of equipment.
4. Curb flange shall be constructed to match configuration of roof panel. Side flange shall extend to the next natural seam in the roof panels and conform to seam configurations.
5. Color: Surfaces exposed to view are to match the color of the roof panels
6. Manufacturers:
    a. LM Curbs, Longview TX
    b. ThyBar, Addiston IL
    c. RPS Accessories, Bensenville Il.
    d. Substitutions: See Section 01 6000 - Products Requirements

J. Vented Soffit Trim:
1. Color: Surfaces exposed to view to match the color of the soffit.

K. Pipe flashing: Provide EPDM rubber flashings for vent penetrations.

L. Soffit Framing:

1. Framing System Components: Meeting requirements of ASTM C 645-08; C-channel, roll-formed from hot dipped galvanized steel; complying with ASTM A 1003 and ASTM A653 G40 or equivalent corrosion resistant coating.
    a. Studs: C shaped with flat or formed webs.
    b. Furring: Hat-shaped sections, minimum depth of 7/8 inch.

M. Fasteners: Galvanized steel, with soft neoprene washers.

N. Protective Backing Paint: Zinc molybdate alkyd.

O. Sealant to be Concealed in Completed Work: Non-curing butyl sealant.

P. Sealant to be Exposed in Completed Work: {rs#1} elastomeric sealant, 100 percent silicone with minimum movement capability of plus/minus 25 percent and recommended by manufacturer for substrates to be sealed; clear.

Q. Underlayment (Eave Protection Sheet): Rubberized asphalt bonded to sheet polyethylene, 40 mil total thickness, with strippable treated release paper.
1. Thermal Stability: Stable after testing at 240 deg F; ASTM D 1970.
2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.
3. Manufacturer:
    a. Certainteed; Grace Vycor Ice & Water Shield
    b. Protecto Wrap, Safe Seal 6640
    c. Dimensional Metal Inc, Dynaclad Ultra HT
    d. Substitutions: See Section 01 6000 - Products Requirements

R. Solder: {rs#1}; Sn50 (50/50) type.

2.05 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Fabricate cleats of same material as sheet, thickness to match roofing sheet, and interlockable with sheet.

C. Fabricate starter strips, interlockable with sheet.

D. Form pieces in longest practical lengths.

E. Hem exposed edges on underside 1/2 inch; miter and seam corners.

F. Form material with standing seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

G. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

H. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS:

A. Install roofing and flashing in accordance with approved shop drawings and manufacturer's product data, within specified tolerances.

B. Isolate dissimilar metals, masonry and concrete from metal roof system with bituminous coating.

C. Anchorage shall allow for thermal expansion and contraction without stress or elongation of panels, clips or anchors.

D. Coordinate flashing and sheet metal work to provide watertight conditions at roof terminations. Fabricate and install in accordance with standards set forth in the SMACNA Manual using continuous cleats at all exposed edges.

3.02 EXAMINATION

A. Inspect roof deck to verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to drains.

B. Verify deck is dry and free of snow or ice.

C. Verify correct placement of wood nailers and insulation positioning between nailers.

D. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, reglets are in place, and nailing strips located.

E. Verify roofing termination and base flashings are in place, sealed, and secure.

3.03 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Install surface mounted reglets true to lines and levels; seal top of reglets with sealant.

C. Back paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 15 mil.

D. Place eave edge and gable edge metal flashings tight with fascia boards. Weather lap joints 2 inches and seal with plastic cement. Secure flange with nails spaced 16 inches OC.

3.04 INSTALLATION - ROOFING

A. Install Vapor Retarder
   1. At acoustical metal deck, install acoustical insulation in roof deck flutes.
   2. Loosely lay vapor retarder over entire roof area extending to roof edges and to adjacent walls
   3. Side and end laps of each sheet a minimum of 6 inches
   4. Seal laps with continuous strip of tape recommended by the vapor retarder manufacturer.
   5. Seal at penetrations and at roof edges with manufacturer recommended butyl tape or sealant
   6. Vapor retarder shall be positively sealed at all edges, penetrations and wall utilizing manufacturers' vapor retarder accessories

B. Install Roof Insulation
   1. Install in single layer laid perpendicular to slope
   2. Install second layer lapping all joints a minimum of 6 inches.
   3. At all valley and ridge locations miter edges.

C. Apply underlayment over entire roof area.
   1. Apply in single layer laid perpendicular to slope; weather lap edges 4 inches

D. Install metal roof system in accordance to manufacturer's instructions and shop drawings.
   1. Install metal roof system so that it is weather tight, without waves, warps, buckles, fastening stresses or distortion, allowing for expansion and contraction.
   2. Provide concealed anchors at all panel attachment locations
   3. Install panels plumb, level and straight with seams and parallel, conforming to design indicated.

E. Flash around roof mounted equipment. This will become part of the roofing warranty

F. Install pipe flashing at all pipe penetrations.

G. Cleat and seam all joints.

H. Use plastic cement for joints between metal and bitumen and for joints between metal and felts.

I. Provide gutters, downspouts, and fascias.

3.05 INSTALLATION - FLASHINGS

A. Install flashings, including laps, splices, joints, bonding, adhesion, and attachment, as required by roof panel manufacturer's recommendations and details.

B. Comply with SMACNA (ASMM) details.

C. Insert flashings into reglets to form tight fit.
   1. Seal flashings into reglets with sealant.

D. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted.

E. Cleat and seam all joints.

F. Apply plastic cement compound between metal flashings and felt flashings.

G. Fit flashings tight in place, and make corners square, surfaces true and straight in planes, and lines accurate to profiles.

H. Seal metal joints watertight.

3.06 INSTALLATION - SOFFIT

A. Inspect soffit framing to verify the framing is smooth, free of waves and projections.

B. Verify soffit openings, lights, louvers and other recessed equipment are in place.

C. Install starter, edge strips and molds around perimeter before starting installation.

D. Start panel installation at one end and continue to the other end of soffit.

E. Push panel into adjacent panel and fasten through the flange at 24 inches on center (maximum)

F. Panels to be installed perpendicular to the exterior building wall

G. Align panel joints at intersections.

3.07 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for field quality control and inspection.

B. Inspection: Roofing manufacturer's technical representative and roofing contractor shall conduct all required inspections. Submit all required drawings, details, and completed questionnaires to the roofing manufacturer before obtaining the specified warranty. After an authorized Technical Representative has inspected the roof for determining acceptability for warranty issuance, any deficiencies on the final inspection report shall be corrected by the contractor/applicator and made ready for reinspection within five (5) working days.

C. Warranty: Upon receipt of required materials, certifying inspection, and acceptance of the roofing system by the roofing manufacturer, the warranty shall be duly executed and issued to the Owner. Date of Warranty will be the date of Substantial Completion.

3.08 PROTECTION

A. Do not permit traffic over unprotected roof surface.

END OF SECTION 07 61 00

SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings, counterflashings, and soffit and related trims.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Wood nailers for sheet metal work.

B. Section 07 61 00 - Sheet Metal Roofing.

C. Section 07 71 00 - Roof Specialties: Manufactured copings, flashings, and expansion joint covers.

D. Section 07 71 23 - Manufactured Gutters, Downspouts and Boots.

E. Section 07 92 00 - Joint Sealants: Sealing non-lap joints between sheet metal fabrications and adjacent construction.

1.03 REFERENCE STANDARDS

A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

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 B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

D. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.

E. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

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. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

1.06 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 5 years of documented experience.

1.07 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.

1.08 WARRANTY

A. Provide a 20 year warranty for manufacturer approved 70 percent Kynar colors for the painted finish covering color fade, chalk, and film integrity.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Sheet Metal Flashing and Trim Manufacturers:
   1. Fairview Architectural LLC: www.fairview-na.com/#sle.
   2. OMG Roofing Products: www.omgroofing.com/#sle.
   3. Petersen Aluminum Corporation: www.pac-clad.com/#sle.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PREFABRICATED REGLETS AND COUNTERFLASHING

A. Manufacturer:
   1. Metal Era, Waukesha, Wisconsin:
   2. Acceptable Manufacturers:
      a. MM Systems Company, Tucker, Georgia
      b. W.P. Hickman, Asheville, North Carolina
      c. Architectural Products Co
      d. Substitutions: See Section 01 6000 - Product Requirements

B. Product; Two Piece Counterflashing Reglet version
   1. Material: 0.050 Aluminum
   2. Finish: Kynar 500, fluoropolymer coating
   3. Height: 5 5/8 inches with 3 inch factory endlaps
   4. Accessories: Factory mitered and sealed corners.

2.03 SOFFIT MATERIAL

A. Dimensional Metal Inc, 58 Kelma Drive, Reynoldsburg, Ohio 43068
   1. Soffit: FP1012 Vented-1 High Bead and FP1012 Non-Vented-1 High Bead

B. Centria
   1. Soffit: IW-14A Vented and Un-Vented

C. AEP Span:
   1. Soffit: Prestige-Vented and Un-Vented.

D. Peterson Pac-Clad
   1. Soffit: Pac 750 Soffit series Vented and Un-Vented

E. Merchant & Evans Inc.
   1. Soffit: Flush Lock series Vented and Un-Vented

F. Substitutions: No substitutions permitted without express written approval.

2.04 SOFFIT SYSTEM

A. Soffit panel to be nominal 12 inches wide perforated to all own 7.5% free air with V groove in the middle, conceal fastener leg with concealed fasteners

B. Sheet Materials: Soffit and related soffit flashing and trim metal
   1. Aluminum Sheet: ASTM B 209 (ASTM B 290M) 0.032 inch thic
   2. Panel continuous length.
   3. Texture: Smooth
   4. Finish: Premium fluorocarbon coating - Kynar 500 or Hylar 5000

2.05 ACCESSORIES

A. Pre-Finished Aluminum: ASTM B 209 (ASTM B 209M); 0.050 inch thick; plain finish shop pre coated with fluoropolymer coating of color as selected.
   1. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system; color as scheduled.

B. General: Provide trim/flashing, fascias, ridge, valley, closures, gutters, gutter hangers and other related required items to provide a complete system

C. Fasteners: Same metal as flashing/sheet metal or other noncorrosive metal as recommended by sheet manufacturer. Match finish of exposed fasteners the same as the material being fastened.

D. Epoxy Seam Sealer: Two (2) part noncorrosive metal seam cementing compound for exterior and interior nonmoving joints.

E. Metal Accessories: Provide sheet metal flashings, clips, straps, anchoring devices and similar accessory units as required for installation of work, matching or compatible with material being installed.

F. Soffit Framing
   1. Framing System Components: Meeting requirements of ASTM C 645-08; C-channel, roll-formed from hot dipped galvanized steel; complying with ASTM A 1003 and ASTM A653 G40 or equivalent corrosion resistant coating.
   2. Studs: C shaped with flat or formed webs[<>].
   3. Furring: Hat-shaped sections, minimum depth of 7/8 inch or as noted on drawings.

G. Vented soffit trim
   1. General: Provide trim/flashing, fascias, ridge, valley, closures, gutters, gutter hangers and other related required items to provide a complete system
   2. Color: Surfaces exposed to view to match the color of the soffit.

2.06 SHEET MATERIALS

A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage, (0.0239 inch) thick base metal.

B. Aluminum: ASTM B209 (ASTM B209M); 20 gage, (0.032 inch) thick; anodized finish of color as selected.

C. Pre-Finished Aluminum: ASTM B209 (ASTM B209M); 20 gage, (0.032 inch) thick; plain finish shop pre-coated with fluoropolymer coating.
   1. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system.

2.07 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Form pieces in longest possible lengths.

C. Hem exposed edges on underside 1/2 inch; miter and seam corners.

D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

PART 3 EXECUTION

3.01 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.

3.02 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Install surface mounted reglets true to lines and levels, and seal top of reglets with sealant.

C. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION

A. Comply with manufacturers installation instructions, manufacturers recommendations and SMACNA 'Architectural Sheet Metal Manual'

B. Install in accordance with manufacturer's installation instructions.

C. Install work with provisions for thermal expansion of flashings, gravel stops, fascia, copings, reglets, and other items exposed for more than 20 feet of continuous length. Maintain as watertight installation at expansion seams.

D. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..

E. Apply plastic cement compound between metal flashings and felt flashings.

F. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

G. Seal metal joints watertight.

3.04 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

3.05 FIELD QUALITY CONTROL

A. See Section 01 43 00 - Quality Assurance, for field inspection requirements.

END OF SECTION 07 62 00

SECTION 07 71 00
ROOF SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manufactured roof specialties, including copings, fascias, and vents.

1.02 RELATED REQUIREMENTS

A. Section 07 61 00 - Sheet Metal Roofing

B. Section 07 62 00 - Sheet Metal Flashing and Trim

1.03 REFERENCE STANDARDS

A. ANSI/SPRI/FM 4435/ES-1 - Test Standard for Edge Systems Used with Low Slope Roofing Systems; 2017.

B. NRCA (RM) - The NRCA Roofing Manual; 2017.

C. SPRI ES-1 - Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems; 2011.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on shape of components, materials and finishes, anchor types and locations.

C. Shop Drawings: Indicate configuration and dimension of components, adjacent construction, required clearances and tolerances, and other affected work.

D. Samples: Submit two samples, illustrating component shape, finish, and color.

E. Manufacturer's Installation Instructions: Indicate special procedures, fasteners, supporting members, and perimeter conditions requiring special attention.

PART 2 PRODUCTS

2.01 PREFABRICATED FASCIA (ROOF EDGE)

A. Manufacturer:
   1. Metal Era, Waukesha, Wisconsin:
   2. Acceptable Manufacturers:
      a. MM Systems Company, Tucker, Georgia
      b. W.P. Hickman, Asheville, North Carolina
      c. Substitutions: See Section 01 6000 - Product Requirements

B. Anchor-Tite: Decorative metal fascia with continuous extruded aluminum bar. The system shall be watertight with no exposed fasteners. Model shall be: ABF-80. The rise above the nailer 2".
   1. Extruded bar shall lock membrane, prevent wind pullback.
   2. Injection molded EPDM splices to allow thermal expansion of extruded aluminum anchor bar.
   3. Fascia shall freely thermal cycle on extruded bar, preventing periodic maintenance.

C. Material: 24 gauge galvanized steel.

D. Finish: Kynar 500, fluoropolymer coating
   1. Color to be selected by the Architect from manufacturer's standards

E. Fascia: standard 12'-0" (3.65 m) lengths.

F. Extruded bar: Shall be continuous 6063-T6 alloy aluminum at 12'-0" (3.65 m) standard lengths. All bar miters are welded.

G. Fasteners: # 9 x 2" stainless steel fasteners provided with drivers. No exposed fasteners permitted.

H. Accessories:
   1. Miters, downspout scuppers, spillout scuppers shall be fabricated by manufacturer.
   2. Welded base assembly shall be used to maintain watertight integrity.
   3. Provide matching brick wall cap, downspout, extenders, or other special fabrications as detailed.

2.02 COMPONENTS

A. Roof Edge Flashings: Factory fabricated to sizes required; mitered, welded corners; concealed fasteners.
   1. Configuration: Fascia, and edge securement for roof membrane.
   2. Pull-Off Resistance: Tested in accordance with ANSI/SPRI/FM 4435/ES-1 using test methods RE-1 and RE-2 to positive and negative design wind pressure as defined by applicable local building code.
   3. Material: Formed steel sheet, galvanized, 22 gage, 0,03 inch thick, minimum.
   4. Finish: 70 percent polyvinylidene fluoride.
   5. Color: To be selected by Architect from manufacturer's standard range.

B. Copings: Factory fabricated to sizes required; mitered, welded corners; concealed fasteners.
   1. Configuration: Concealed continuous hold down cleat at both legs; internal splice piece at joints of same material, thickness and finish as cap; concealed stainless steel fasteners.
   2. Pull-Off Resistance: Tested in accordance with ANSI/SPRI/FM 4435/ES-1 using test method RE-3 to positive and negative design wind pressure as defined by applicable local building code.
   3. Material: Formed steel sheet, galvanized, 22 gage, 0,03 inch thick, minimum.
   4. Finish: 70 percent polyvinylidene fluoride.
   5. Color: To be selected by Architect from manufacturer's standard range.

2.03 ACCESSORIES

A. Sealant for Joints in Linear Components: As recommended by component manufacturer.

B. Adhesive for Anchoring to Roof Membrane: Compatible with roof membrane and approved by roof membrane manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that deck, curbs, roof membrane, base flashing, and other items affecting work of this Section are in place and positioned correctly.

3.02 INSTALLATION

A. Install components in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.

B. Coordinate installation of components of this section with installation of roofing membrane and base flashings.

C. Coordinate installation of sealants and roofing cement with work of this section to ensure water tightness.

END OF SECTION 07 71 00

SECTION 07 71 23
MANUFACTURED GUTTERS, DOWNSPOUTS AND BOOTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pre-finished galvanized steel and Pre-finished aluminum gutters and downspouts.

B. PVC downspout boots

1.02 RELATED REQUIREMENTS

A. Section 07 61 00 - Sheet Metal Roofing.

B. Section 07 62 00 - Sheet Metal Flashing and Trim.

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.

B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

C. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.

D. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Comply with SMACNA (ASMM) for sizing components for rainfall intensity determined by a storm occurrence of 1 in 5 years.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate locations, configurations, jointing methods, fastening methods, locations, and installation details.

C. Product Data: Provide data on prefabricated components.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope to drain.

B. Prevent contact with materials that could cause discoloration, staining, or damage.

1.07 PROJECT CONDITIONS

A. Coordinate the work with downspout discharge pipe inlet.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Gutters and Downspouts:
   1. Metal Era
   2. Dimensional Metal Inc, 58 Kelma Drive, Reynoldsburg, Ohio 43068
   3. Centria www.centria.com
   4. Peterson Pac-Clad
   5. Exceptional Metals
   6. ATAS International, Inc
   7. MM Systems Company, Tucker, Georgia
   8. W.P. Hickman, Asheville, North Carolina
   9. Architectural Products Co

10. Cheney Flashing Company: www.cheneyflashing.com
11. SAF Perimeter Systems, a division of Southern Aluminum Finishing Company, Inc: www.saf.com/persys
12. W.P. Hickman Company; Wind Resistant Gutter: www.wph.com.
13. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS

A. Pre-Finished Galvanized Steel Sheet: ASTM A653/A653M, with G90/Z275 zinc coating; minimum .07 inch thick base metal.
   1. Finish: Shop pre-coated with PVDF (polyvinylidene fluoride) coating.
   2. Color: As indicated.

B. Pre-Finished Aluminum Sheet: ASTM B209 (ASTM B209M); 0.032 inch thick.
   1. Finish: Plain, shop pre-coated with PVDF (polyvinylidene fluoride) coating.
   2. Color: As indicated.

2.03 COMPONENTS

A. Gutters: SMACNA rectangular style profile.
   1. Seal-Tite Industrial Gutter:
      a. Shape: As shown on the drawings.
      b. Heavy gauge gutter straps securely support gutter, water, snow, and ice.
   2. Gauge: 22 ga steel
   3. Gutter length: Standard length: minimum of 12 feet
   4. Gutter size: 5" x 4 1/2" or as noted on the drawings.
   5. Finishes: Kynar 500 from manufacturer's standard colors.

B. Downspouts: SMACNA Rectangular profile. Locations as indicated on the drawings.
   1. Box Standard downspouts:
      a. Size: 6 x 4 inch or as shown on the drawings.
      b. Gauge: 22 ga
      c. Length: As long as possible with one sheet.
      d. Location: Typical everywhere unless otherwise noted as Structural.
      e. Finishes: Kynar 500 from manufacturer's standard colors.

C. Connectors: Furnish required connector pieces for PVC (polyvinyl chloride) components.

D. Anchors and Supports: Profiled to suit gutters and downspouts.
   1. Anchoring Devices: In accordance with CDA requirements.
   2. Gutter Supports: Brackets.
   3. Downspout Supports: Brackets.

E. Fasteners: Galvanized steel , with soft neoprene washers.

2.04 ACCESSORIES

A. Corners, end caps, expansion joints shall be fabricated by manufacturer. Factory fabricated, mitered corners shall have 17 1/2 inch nominal leg lengths.

B. Provide matching ledge caps, downspouts, etc.

C. Downspout Boots: PVC
   1. Manufacturers:
      a. Downspoutboots.com, a division of J. R. Hoe & Sons
      b. www.downspoutboots.com
      c. Substitutions: See Section 01 60 00 - Product Requirements.
   2. Configuration; N-Series - Ninety Downspout Boot
   3. Color: To be selected by Architect from manufacturer's standard range.

2.05 FABRICATION

A. Form gutters and downspouts of profiles and size indicated.

B. Fabricate with required connection pieces.

C. Form sections square, true, and accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.

D. Hem exposed edges of metal.

E. Fabricate gutter and downspout accessories; seal watertight.

2.06 FINISHES

A. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system; color as indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that surfaces are ready to receive work.

3.02 PREPARATION

A. Paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION

A. Install gutters, downspouts, and accessories in accordance with manufacturer's instructions.

B. Slope gutters 1/8 inch per foot or as required for project.

C. Provide elbows in the downspout to ensure that the offset to building veneer is no greater than 3 inches on average. Review lengths and elbows with Architect prior to installation.

D. Connect downspouts to downspout boots at approximately 4 inches above grade. Grout connection watertight.

E. Field paint pvc downspout boot to match downspout color.

F. Field paint exposed storm pipe

END OF SECTION 07 71 23

SECTION 07 92 00
JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Provide labor, materials and equipment necessary to complete sealant work, both interior and exterior of the Project.

B. Nonsag gunnable joint sealants.

C. Self-leveling pourable joint sealants.

D. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

A. Section 07 25 00 - Weather Barriers: Sealants required in conjunction with air barriers and vapor retarders.

B. Section 08 71 00 - Door Hardware: Setting exterior door thresholds in sealant.

C. Section 09 21 16 - Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.

D. Section 23 31 00 - HVAC Ducts and Casings: Duct sealants.

1.03 REFERENCE STANDARDS

A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2006 (Reapproved 2011).

B. ASTM C834 - Standard Specification for Latex Sealants; 2017 (Reapproved 2023).

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

D. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).

E. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2022.

F. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2015 (Reapproved 2021).

G. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2022).

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with other sections referencing this section.

1.05 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, service temperature range, 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.

C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

D. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.

E. Sustainable Design Documentation: For sealants and primers, submit VOC content and emissions documentation as specified in Section 01 61 16.

1.06 QUALITY ASSURANCE

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

B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.

1.07 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F.

B. Maintain this minimum temperature during and 24 hours after installation of sealants.

C. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective work within a two (2) 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 JOINT SEALANT APPLICATIONS

A. Scope:
   1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
      a. Wall expansion and control joints.
      b. Joints between door, window, and other frames and adjacent construction.
      c. Joints between different exposed materials.
      d. Openings below ledge angles in masonry.
      e. Joints and intersections in concrete paving.
      f. Joints and intersections between dissimilar materials that do not fit together with a hairline joint.
      g. Intersections of equipment that do not fit together or against adjoining material with a hairline joint.
      h. Other joints indicated below.
   2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
      a. Joints between door, window, and other frames and adjacent construction.
      b. Joints and intersections between dissimilar materials that do not fit together with a hariline joint.
      c. Intersections of equipment that do not fit together or against adjoining material with a hairline joint.
      d. Other joints indicated below.
   3. Do not seal the following types of joints.
      a. Intentional weepholes in masonry.
      b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
      c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.

d. Joints where installation of sealant is specified in another section.
e. Joints between suspended panel ceilings/grid and walls.

B. General Project Recomendations
1. Type 1 - Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.
2. Type 2 - Lap Joints in Sheet Metal Fabrications: Butyl rubber, non-curing.
3. Type 4 - Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.
4. Type 5 - Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.
5. Type 6 - In Sound-Rated Assemblies: Acrylic emulsion latex sealant.

C. Interior Wet Areas: Bathrooms, restrooms, and food service areas; fixtures in wet areas include plumbing fixtures, food service equipment, countertops, cabinets, and other similar items.

2.02 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.

B. Single source responsibility for joint sealant materials: Obtain joint sealant materials from a single manufacturer.

C. Compatibility: Provide joint sealant, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and experience.

2.03 NONSAG JOINT SEALANTS

A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus and minus 50 percent, minimum.
2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
4. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
5. Color: To be selected by Architect from manufacturer's standard range.
6. Service Temperature Range: Minus 20 to 180 degrees F.
7. Applications: Use for:
a. Metal to metal joint.
b. Glass to glass joints.
c. Sheet metal flashing, coping, preformed metal caps, fascia, extenders trim and panels.
d. Glass to metal joints.
e. Concrete to concrete, including precast panels
8. Manufacturers:
a. Dow Chemical Company; DOWSIL 795 Silicone Building Sealant: www.dow.com.
b. Pecora Corporation; Pecora 864 NST (Non-Staining Technology): www.pecora.com.
c. Sika Corporation; Sikasil WS-290: www.usa-sika.com.
d. Tremco, Inc.; Product Spectrum 2: www.tremcosealants.com.
e. Substitutions: See Section 01 60 00 - Product Requirements.

B. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
1. Color: White or as selected by Architect
2. Applications: Use for:
a. Around countertops, backsplashes and other wet interior locations.

3. Manufacturers:
    a. Dow Chemical Company; DOWSIL 791 Silicone Weatherproofing Sealant: www.dow.com.
    b. Pecora Corporation; Pecora 898 NST (Non-Staining Technology): www.pecora.com.
    c. Sika Corporation; Sikasil GP: www.usa-sika.com.
    d. Tremco, Inc; Tremsil 200: www.tremcosealants.com.
    e. Substitutions: See Section 01 60 00 - Product Requirements.

C. 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 50 percent, minimum.
2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
3. Color: To be selected by Architect from manufacturer's standard range.
4. Service Temperature Range: Minus 40 to 180 degrees F.
5. Applications: Use for:
    a. Control, expansion, and soft joints in masonry.
    b. Joints between concrete and other materials.
    c. Joints between metal frames and other materials.
    d. Other exterior joints for which no other sealant is indicated.
6. Manufacturers:
    a. Pecora Corporation; DynaTrol II: www.pecora.com.
    b. Sika Corporation; Sikaflex-1a: www.usa-sika.com.
    c. Sika Corporation; Sikaflex-2c NS: www.usa-sika.com.
    d. Tremco Commercial Sealants & Waterproofing; Dymonic 100: www.tremcosealants.com.
    e. W. R. Meadows, Inc; POURTHANE NS: www.wrmeadows.com.
    f. Substitutions: See Section 01 60 00 - Product Requirements.

D. 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 Architect from manufacturer's standard range.
2. Grade: ASTM C834; Grade Minus 18 Degrees C (0 Degrees F).
3. Applications: Use for:
    a. Interior wall and ceiling control joints.
    b. Joints between door and window frames and wall surfaces.
    c. Other interior joints for which no other type of sealant is indicated.
4. Manufacturers:
    a. Everkem Diversified Products, Inc; EcoTex 25: www.everkemproducts.com.
    b. Pecora Corporation; AC-20 +Silicone: www.pecora.com.
    c. Sherwin-Williams Company; 950A Siliconized Acrylic Latex Caulk: www.sherwin-williams.com.
    d. Tremco Commercial Sealants & Waterproofing; Tremflex 834: www.tremcosealants.com.
    e. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 SELF-LEVELING SEALANTS

A. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multi-component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
1. Movement Capability: Plus and minus 50 percent, minimum.
2. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.
3. Color: To be selected by Architect from manufacturer's standard range.

4. Service Temperature Range: Minus 40 to 180 degrees F.
5. Applications: Use for:
   a. Joints in sidewalks and vehicular paving.
6. Manufacturers:
   a. Pecora Corporation; Dynatrol II-SL: www.pecora.com.
   b. The QUIKRETE Companies; QUIKRETE® Polyurethane Self-Leveling Sealant: www.quikrete.com.
   c. Sika Corporation; Sikaflex-1c SL: www.usa-sika.com.
   d. W. R. Meadows, Inc; POURTHANE SL: www.wrmeadows.com.
   e. Substitutions: See Section 01 60 00 - Product Requirements.

B. Semi-Rigid Self-Leveling Polyurea Joint Filler: Two-component, 100 percent solids; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
1. Durometer Hardness, Type A: 75, minimum, after seven days when tested in accordance with ASTM D2240.
2. Color: Concrete gray.
3. Joint Width, Minimum: 1/8 inch.
4. Joint Width, Maximum: 3/4 inch.
5. Joint Depth: Provide product suitable for joints from 1/8 inch to 1 inch in depth excluding space for backer rod.
6. Application: Use for
   a. Joint filler for concrete slab saw cuts and narrow cracks.
7. Manufacturers:
   a. Adhesives Technology Corporation; Crackbond JF-311: www.atcepoxy.com.
   b. ARDEX Engineered Cements; ARDEX ArdiSeal: www.ardexamericas.com.
   c. Nox-Crete; DynaFlex JF-85: www.nox-crete.com.
   d. Sika Corporation - Sika Loadflex - Load Bearing Semi Rigid Polyurea Joint Filler; www.sika-usa.com.
   e. Substitutions: See Section 01 60 00 - Product Requirements.

2.05 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.

E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

E. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in inconspicuous area to verify that it does not stain or discolor slab.

3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. 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 CLEANING

A. Clean adjacent soiled surfaces.

3.05 PROTECTION

A. Protect sealants until cured.

END OF SECTION 07 92 00

GARMANN MILLER

Division 08

Openings

SECTION 07 42 13.13
FORMED METAL WALL PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manufactured metal panels for exterior wall panels, interior liner panels, with related flashings and accessory components.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Wall panel substrate.

B. Section 07 25 00 - Weather Barriers: Weather barrier under wall panels.

C. Section 07 92 00 - Joint Sealants: Sealing joints between metal wall panel system and adjacent construction.

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.

B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

C. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate dimensions, layout, joints, construction details, and methods of anchorage.

C. Shop Drawing: Sub framing system: Indicate dimensions, layout, construction details, method of anchorage

D. Samples: Submit two samples of wall panel and soffit panel, 12 inch by 12 inch in size illustrating finish color, sheen, and texture.

E. Manufacturer's Qualification Statement.

1.05 QUALITY ASSURANCE

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

B. Manufacturer's Qualifications: Wall system manufacturer has been engaged in the fabrication of metal wall systems for at least ten years.

1. The Manufacturer shall be a member of the Metal Building Manufacturer's Association (MBNA).
2. The American Institute of Steel Construction (AISC) currently certifies the Manufacturer for Category MB.
3. The Manufacturer maintains a certified installer program for its products and maintains an up to date authorized roofing contractor list.
4. The Manufacturer has a written warranty covering durability, color and weather tightness of its roof system.
5. Manufacturer shall produce the metal panels on fixed equipment operated by the manufacturer.

C. Installer Qualifications: Company specializing in performing sheet metal installations with minimum 5 years of experience on projects of similar size and scope.

1. Contractor shall follow the Manufacturer's installation details without exception unless written authorization from the manufacturer and architect are provided on an installation detail revision.

1.06 PRE-INSTALLATION MEETING

A. Convene two weeks before staring work of this section.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver system components to the project site in Manufacturer's unopened original containers.

B. Protect system components during shipment, storage, handling and erection from mechanical abuse, stains, discoloration and corrosion.

C. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.

D. Store prefinished material off the ground and protected from weather; prevent twisting, bending, or abrasion; provide ventilation; slope metal sheets to ensure proper drainage.

E. Prevent contact with materials that may cause discoloration or staining of products.

F. Damaged materials will be rejected and removed from the site.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents

C. Standard Manufacturer Warranty: Provide a written warranty, with monetary limitation, signed by manufacturer agreeing to promptly repair leaks resulting from defects in materials or workmanship for the following warranty period:
   1. Warranty Period: 20 Years from the date of Substantial Completion

D. Finish Warranty: Furnish panel manufacturer's written warranty for twenty (20) years covering the finish of exposed coated metal surfaces against blistering, peeling, cracking, flaking, checking, chipping, rusting, and chalking and color change during the warranty period.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: HWP Panel, manufactured by Dimensional Metals.
   1. Product: HWP Wall Panel, vertical installation.

B. Other Acceptable Manufacturers:
   1. Architectural Metal Systems, Alpharetta Ga
   2. Berridge Manufacturing, Houston Tx
   3. Centria.
   4. McElroy Metal, Inc. Bossier City La
   5. MBCI.
   6. Petersen, Pac-Clad

2.02 MANUFACTURED METAL PANELS

A. Wall Panel System: Factory fabricated prefinished metal panel system, site assembled.
   1. Provide exterior wall panels.
   2. Design and size components to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of wall.
   3. Design Pressure: In accordance with applicable codes.
   4. Maximum Allowable Deflection of Panel: L/180 for length(L) of span.

5. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.
6. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
7. Fabrication: Formed true to shape, accurate in size, square, and free from distortion or defects; pieces of longest practical lengths.
8. Corners: Factory-fabricated in one continuous piece with minimum 2 inch returns.

B. Horizontal Wall Panel (HWPA16):
1. Profile: Vertical; style as indicated.
   a. 12 inch wide panel, 1 inch deep
2. Side Seams: Double-interlocked, tight-fitting, sealed with continuous gaskets.
3. Material: Precoated steel sheet, 24 gage, .0276 inch minimum thickness.
4. Panel Width: 16 inches.
5. Colors: As selected by Architect from manufacturer's standard line.

C. Interior Liner Panels:
1. Basis of Design: Interior Liner Panel, manufactured by Metal Exteriors
   a. Perforated Ceiling Panel
2. Profile: Vertical; style as indicated.
3. Side Seams: Interlocking, sealed with continuous bead of sealant.
4. Material: Precoated steel sheet, 18 gage, 0.0478 inch minimum thickness.
5. Panel Width: 36 inch.
6. Color: As selected by Architect from manufacturer's standard line.

D. Internal and External Corners: Same material, thickness, and finish as exterior sheets; profile to suit system; shop cut and factory mitered to required angles.

E. Expansion Joints: Same material, thickness and finish as exterior sheets; manufacturer's standard brake formed type, of profile to suit system.

F. Trim: Same material, thickness and finish as exterior sheets; brake formed to required profiles.

G. Anchors: Stainless steel.

2.03 MATERIALS

A. Precoated Steel Sheet: Hot-dipped galvanized steel sheet, ASTM A653/A653M, Structural Steel (SS) or Forming Steel (FS), with G90/Z275 coating; continuous coil-coated on exposed surfaces with specified finish coating and on panel back with specified panel back coating.

B. Precoated Aluminum Sheet: ASTM B209 (ASTM B209M), 3105 alloy, O temper, smooth surface texture; continuous-coil-coated on exposed surfaces with specified finish coating and on panel back with specified panel back coating.

2.04 ACCESSORIES

A. Gaskets: Manufacturer's standard type suitable for use with system, permanently resilient; ultraviolet and ozone resistant.

B. Sealants:
1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
2. Concealed Sealant: Non-curing butyl sealant or tape sealant.

C. Fasteners: Manufacturer's standard type to suit application; with soft neoprene washers, steel, hot dip galvanized. Fastener cap same color as exterior panel.
1. Metal-to-Metal Fasteners: Self-drilling, self-tapping screws.

D. Field Touch-up Paint: As recommended by panel manufacturer.

2.05 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Form pieces in longest practicable lengths.

C. Fabricate corners in one continuous piece with minimum 18 inch returns.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that building framing members are ready to receive panels.

B. Verify that weather barrier has been installed over substrate completely and correctly.

3.02 PREPARATION

A. Install sub framing perpendicular to panel length, securely fastened to substrates and shimmed and leveled to uniform plane. Space at intervals indicated.
   1. Install in accordance to manufacturers recommendations.
   2. Thermal Spacer Installation: Clip thermal spacer to girt and fasten girt directly to substrate.
   3. Installation sequence for spacers, sub-framing, and insulation
      a. Pre-punch or pre-drill holes in Z-girts and tracks to accommodate fasteners.
      b. Position Z-girts directly over thermal spacer before installation of fasteners.
      c. Completely install spacers, screws and sub-framing, prior to installing insulation.
      d. Friction fit insulation in place.

3.03 INSTALLATION

A. Install panels on walls in accordance with manufacturer's instructions.

B. Protect surfaces in contact with cementitious materials and dissimilar metals with bituminous paint. Allow to dry prior to installation.

C. Fasten panels to structural supports; aligned, level, and plumb.

D. Locate joints over supports.

E. Provide expansion and control joints where indicated by manufacturer.

F. Use concealed fasteners unless otherwise approved by Architect.

G. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.

3.04 CLEANING

A. Remove site cuttings from finish surfaces.

B. Remove protective material from wall panel surfaces.

C. Clean and wash prefinished surfaces with mild soap and water; rinse with clean water.

END OF SECTION 07 42 13.13

SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-fire-rated hollow metal doors and frames.

B. 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 09 91 23 - Interior Painting: Field painting.

D. Division 26 - Electrical

E. Division 27 - Communications

F. Division 28 - Electronic Safety

1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.

C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.

D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.

E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 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, Solution Hardened, and Bake Hardenable; 2015.

G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2014.

H. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014.

I. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

J. DHI A115 Series - Specifications for Steel Doors and Frame Preparation for Hardware; Door and Hardware Institute; 2000 (ANSI/DHI A115 Series).

K. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.

L. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.

M. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.

N. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2006.

O. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.

P. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2013.

1.04 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.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

1.05 QUALITY ASSURANCE

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

B. Maintain at project site copies of reference standards relating to installation of products specified.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

1.07 PROJECT CONDITIONS

A. Coordinate the work with door opening construction, door frame and door hardware installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hollow Metal Doors and Frames:
   1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com
   2. Curries, an Assa Abloy Group company: www.assaabloydss.com
   3. Mesker, dormakaba Group: www.meskeropeningsgroup.com
   4. Republic Doors, an Allegion brand: www.republicdoor.com.
   5. MPI Custom Steel Doors and Frames: www.metalproductsinc.com
   6. Steelcraft, an Allegion brand: www.allegion.com
   7. 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; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
   2. Accessibility: Comply with ICC A117.1 and ADA Standards.
   3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
      a. Steel top cap on exterior doors.
   4. Door Edge Profile: Manufacturers standard for application indicated.
   5. Typical Door Face Sheets: Flush.
   6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturers standard.
   7. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

a. Prepare doors and frames to receive mortised and concealed door hardware, including cutouts, reinforcing, drilling, and tapping, in accordance with final door hardware and templates provided by hardware supplier. Comply with ANSI A115 Specifications for door and frame preparation".

8. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.

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. Interior Doors, Non-Fire Rated:
1. Grade: ANSI A250.8 Level 3, physical performance Level A, Model 2, seamless Epoxy filled edge (Extra Heavy Duty, 16 gauge).
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 gage, 0.053 inch, minimum.
e. Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M.
2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
3. Door Thickness: 1-3/4 inch, nominal.

2.04 HOLLOW METAL FRAMES

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

B. General:
1. Comply with the requirements of grade specified for corresponding door, except:
a. Frames for interior openings: ANSI A250.8 Level 3 Doors: 16 gage frames.
b. Frames for exterior openings: ANSI A250.8 Level 3 Doors: 16 gage frames.

C. Exterior Door Frames: Full profile/continuously welded type.
1. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A60/ZF180 coating.
2. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.
3. Frame Finish: Factory primed and field finished.
4. Weatherstripping: Separate, see Section 08 71 00.

D. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
1. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.

E. Frames Wider than 48 inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

2.05 FINISHES

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

B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

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.

D. Closed-cell polyurethane spray foam insulation:
   1. Foam Sealant: A one-component, minimal expanding, low pressure-build, flexible polyurethane foam formulated to seal the air gap around door frame and the rough opening. The foam is to expand and generate an effective seal, and will not distort or bow door frames.
   2. Foam insulation required in exterior applications between all door head, and jamb.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

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

3.03 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

B. Coordinate frame anchor placement with wall construction.

C. Foam insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

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.

G. Install magnetic hold open devices on doors supplied by Division 28.

H. Touch up damaged factory finishes.

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 measured with straight edge, corner to corner.

3.05 ADJUSTING AND CLEANING

A. Adjust for smooth and balanced door movement.

B. Test sound control doors for force to close, latch, and unlatch; adjust as necessary in compliance with requirements.

C. Clean and restore soiled surfaces. Remove scraps and debris and leave site in a clean condition.

END OF SECTION 08 11 13

SECTION 08 16 14
FIBERGLASS DOORS

PART 1GENERAL

1.01 SECTION INCLUDES

A. Fiberglass reinforced polyester (FRP) flush doors with aluminum frames.

1.02 RELATED REQUIREMENTS

A. Section 07 92 00 - Joint Sealants

B. Section 08 7100 - Door Hardware.

C. Section 09 9000 - Painting and Coatings

D. Division 26 - Electrical

E. Division 27 - Communications

F. Division 28 - Electronic Safety

1.03 REFERENCES

A. AAMA 1503-98 - Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.

B. ANSI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings.

C. ASTM B 117 - Operating Salt Spray (Fog) Apparatus.

D. ASTM B 209 - Aluminum and Aluminum-Alloy Sheet and Plate.

E. ASTM B 221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

F. ASTM D 256 - Determining the Pendulum Impact Resistance of Notched Specimens of Plastics.

G. ASTM D 543 - Evaluating the Resistance of Plastics to Chemical Reagents.

H. ASTM D 570 - Water Absorption of Plastics.

I. ASTM D 638 - Tensile Properties of Plastics.

J. ASTM D 790 - Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

K. ASTM D 1308 - Effect of Household Chemicals on Clear and Pigmented Organic Finishes.

L. ASTM D 1621 - Compressive Properties of Rigid Cellular Plastics.

M. ASTM D 1623 - Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.

N. ASTM D 2126 - Response of Rigid Cellular Plastics to Thermal and Humid Aging.

O. ASTM D 2583 - Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.

P. ASTM D 3029 – Impact Resistance of Flat Rigid Plastic Specimens by Means of a Falling Weight.

Q. ASTM D 6670-01 - Standard Practice for Full-Scale Chamber Determination of Volatile Organic Emissions from Indoor Materials/Products.

R. ASTM E 84 - Surface Burning Characteristics of Building Materials.

S. ASTM E 90 - Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.

T. ASTM E 283 - Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

U. ASTM E 330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

V. ASTM E 331 - Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

W. ASTM F 476 - Security of Swinging Door Assemblies.

X. SFBC PA 201 - Impact Test Procedures.

Y. SFBC PA 203 - Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.

Z. SFBC 3603.2 (b)(5) - Forced Entry Resistance Test.

1.04 PERFORMANCE REQUIREMENTS

A. General: Provide door assemblies that have been designed and fabricated to comply with specified performance requirements, as demonstrated by testing manufacturer's corresponding standard systems.

B. Air Infiltration: For a single door 3'-0" x 7'-0", test specimen shall be tested in accordance with ASTM E 283 at pressure differential of 6.24 psf. Door shall not exceed 0.90 cfm per linear foot of perimeter crack.

C. Water Resistance: For a single door 3'-0" x 7'-0", test specimen shall be tested in accordance with ASTM E 331 at pressure differential of 7.50 psf. Door shall not have water leakage.

D. Swinging Door Cycle Test, Doors and Frames, ANSI A250.4: Minimum of 25,000,000 cycles.

E. Swinging Security Door Assembly, Doors and Frames, ASTM F 476: Grade 40.

F. Thermal Transmission, Exterior Doors, U-Value, AAMA 1503-98: Maximum of 0.29 BTU/hr x sf x degrees F. Minimum of 55 CRF value.

G. Surface Burning Characteristics, FRP Doors and Panels, ASTM E 84:
   1. Flame Spread: Maximum of 200, Class C.
   2. Smoke Developed: Maximum of 450, Class C.

H. Surface Burning Characteristics, Class A Option On Interior Faces of FRP Exterior Panels and Both Faces of FRP Interior Panels, ASTM E 84:
   1. Flame Spread: Maximum of 25.
   2. Smoke Developed: Maximum of 450.

I. Impact Strength, FRP Doors and Panels, Nominal Value, ASTM D 256: 15.0 foot-pounds per inch of notch.

J. Tensile Strength, FRP Doors and Panels, Nominal Value, ASTM D 638: 14,000 psi.

K. Flexural Strength, FRP Doors and Panels, Nominal Value, ASTM D 790: 21,000 psi.

L. Water Absorption, FRP Doors and Panels, Nominal Value, ASTM D 570: 0.20 percent after 24 hours.

M. Indentation Hardness, FRP Doors and Panels, Nominal Value, ASTM D 2583: 55.

N. Gardner Impact Strength, FRP Doors and Panels, Nominal Value, ASTM D 3029: 120 in-lb.

O. Abrasion Resistance, Face Sheet, Taber Abrasion Test, 25 Cycles at 1,000 Gram Weight with CS-17 Wheel: Maximum of 0.029 average weight loss percentage.

P. Stain Resistance, ASTM D 1308: Face sheet unaffected after exposure to red cabbage, tea, and tomato acid. Stain removed easily with mild abrasive or FRP cleaner when exposed to crayon and crankcase oil.

Q. Chemical Resistance, ASTM D 543. Excellent rating.
   1. Acetic acid, Concentrated.
   2. Ammonium Hydroxide, Concentrated.

3. Citric Acid, 10%.
4. Formaldehyde.
5. Hydrochloric Acid, 10%
6. Sodium hypochlorite, 4 to 6 percent solution.

R. Compressive Strength, Foam Core, Nominal Value, ASTM D 1621: 79.9 psi.

S. Compressive Modulus, Foam Core, Nominal Value, ASTM D 1621: 370 psi.

T. Tensile Adhesion, Foam Core, Nominal Value, ASTM D 1623: 45.3 psi.

U. Thermal and Humid Aging, Foam Core, Nominal Value, 158 Degrees F and 100 Percent Humidity for 14 Days, ASTM D 2126: Minus 5.14 percent volume change.

1.05 SUBMITTALS

A. Comply with Section 01 3000 - Administrative Requirements.

B. Product Data: Submit manufacturer's product data, including description of materials, components, fabrication, finishes, and installation.

C. Shop Drawings: Submit manufacturer's shop drawings, including elevations, sections, and details, indicating dimensions, tolerances, materials, fabrication, doors, panels, framing, hardware schedule, and finish.

D. Samples:
1. Door: Submit manufacturer's sample of door showing face sheets, core, framing, and finish.
2. Color: Submit manufacturer's samples of standard colors of doors and frames.
3. Test Reports: Submit certified test reports from qualified independent testing agency indicating doors comply with specified performance requirements.
4. Maintenance Manual: Submit manufacturer's maintenance and cleaning instructions for doors, including maintenance and operating instructions for hardware.
5. Warranty: Submit manufacturer's standard warranty.

1.06 QUALITY ASSURANCE

A. Manufacturer's Qualifications:
1. Continuously engaged in manufacturing of doors of similar type to that specified, with a minimum of 5 years successful experience.
2. Door and frame components from same manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying opening door mark and manufacturer.

B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions.

C. Handling: Protect materials and finish from damage during handling and installation.

1.08 COORDINATION

A. Contractor shall be responsible for coordinating and obtaining necessary information from Hardware and Frame manufacturers to provide door supplier with approved hardware and frame schedules with templates.

1.09 WARRANTY

A. Warrant doors, frames, and factory hardware against failure in materials and workmanship, including excessive deflection, faulty operation, defects in hardware installation, and deterioration of finish or construction in excess of normal weathering.

B. Warranty Period: Ten years starting on date of substantial completion.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Special-Lite, Inc., Decatur, Michigan 49045 www.special-lite.com.
   1. Product: Series SL-17 with Speclite fiberglass reinforced polyester (FRP) face sheets..
   2. Acceptable Manufacturers.
      a. Assa Abloy, Ceco Door Fiberglass Reinforced Polyster Door (FRP)
      b. Vale FRP Doors, Collingsale, PA: www.valedoors.com
      c. Commercial Door Systems, Mensalem PA: www.commercialdoorsystems.com
      d. Kawneer
      e. Substitutions: See Section 01 6000 - Product Requirements

2.02 FIBERGLASS FLUSH DOORS

A. Door Opening Size: As indicated on the Drawings.

B. Construction:
   1. Door Thickness: 1-3/4 inches.
   2. Stiles and Rails: Aluminum Alloy 6063-T5, minimum of 2-5/16-inch depth.
   3. Corners: Mitered.
   4. Provide joinery of 3/8-inch diameter full-width tie rods through extruded splines top and bottom as standard tubular shaped stiles and rails reinforced to accept hardware as specified.
   5. Securing Internal Door Extrusions: 3/16-inch angle blocks and locking hex nuts for joinery.
   6. Furnish extruded stiles and rails with integral reglets to accept face sheets. Lock face sheets into place to permit flush appearance.
   7. Extrude top and bottom rail legs for interlocking continuous weather bar.
   8. Bottom of Door: Install bottom weather bar with nylon brush weatherstripping into extruded interlocking edge of bottom rail.

C. Face Sheet:
   1. Material: SpecLite3 FRP, 0.120-inch thickness, finish color throughout. Abuse-resistant engineered surface.
      a. Standard face sheets shall be manufactured using a corrosion resistant resin system with light stabilizing additives. The resin shall be reinforced with fiberglass, 40% by weight.
   2. Texture: Pebble.
   3. Color: As selected by Architect from manufacturers standard color line including premium.

D. Core:
   1. Material: Poured-in-place polyurethane foam.
   2. Density: Minimum of 5 pounds per cubic foot.
   3. R-Value: Minimum of 9.

E. Cutouts:
   1. Manufacture doors with cutouts for required vision lites, louvers, and panels.
   2. Factory install vision lites, louvers, and panels.

F. Hardware:
   1. Hardware Preparation: To be fabricated at factory according to hardware templates provided.
   2. Hardware Installation: To factory install all applicable and supplied hardware to doors and frames.
   3. Hardware Reinforcement: To provide necessary reinforcement for proper longevity and hardware function; ASTM B 209 and/or ASTM 308.

2.03 MATERIALS

A. Aluminum Members:
   1. Extrusions: ASTM B 221.
   2. Sheet and Plate: ASTM B 209.
   3. Components: Door and frame components from same manufacturer.
   4. Fasteners:
      a. Material: Aluminum, 18-8 stainless steel, or other noncorrosive metal.
      b. Compatibility: Compatible with items to be fastened.
      c. Exposed Fasteners: Screws with finish matching items to be fastened.

2.04 FABRICATION

A. Sizes and Profiles: Required sizes for door and frame units, and profile requirements shall be as indicated on the Drawings.

B. Coordination of Fabrication: Field measure before fabrication and show recorded measurements on shop drawings.

C. Assembly:
   1. Complete cutting, fitting, forming, drilling, and grinding of metal before assembly.
   2. Remove burrs from cut edges.

D. Welding: Welding of doors or frames is not acceptable.

E. Fit:
   1. Maintain continuity of line and accurate relation of planes and angles.
   2. Secure attachments and support at mechanical joints with hairline fit at contacting members.

2.05 ALUMINUM FINISHES

A. Anodized Finish: Class I finish, 0.7 mils thick.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas to receive doors. Notify Architect of conditions that would adversely affect installation or subsequent use.

B. Do not proceed with installation until unsatisfactory conditions are corrected.

3.02 PREPARATION

A. Ensure openings to receive frames are plumb, level, square, and in tolerance.

3.03 INSTALLATION

A. Install doors in accordance with manufacturer's instructions.

B. Install doors plumb, level, square, true to line, and without warp or rack.

C. Anchor frames securely in place.

D. Separate aluminum from other metal surfaces with bituminous coatings.

E. Install exterior doors to be weathertight in closed position.

3.04 ADJUSTING

A. Adjust doors, hinges, and locksets for smooth operation without binding.

3.05 CLEANING

A. Clean doors promptly after installation in accordance with manufacturer's instructions.

B. Do not use harsh cleaning materials or methods that would damage finish.

3.06 PROTECTION

A. Protect installed doors to ensure that doors will be without damage or deterioration at time of substantial completion.

END OF SECTION 08 16 14

SECTION 08 31 00
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall access door and frame units.

1.02 RELATED REQUIREMENTS

A. Section 09 91 23 - Interior Painting: Field paint finish.

1.03 REFERENCE STANDARDS

A. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2015.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

C. Shop Drawings: Indicate exact position of each access door and/or panel unit.

D. Manufacturer's Installation Instructions: Indicate installation requirements.

1.05 QUALITY ASSURANCE

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

1.06 PROJECT CONDITIONS

A. Coordinate the work with other work requiring access doors.

PART 2 PRODUCTS

2.01 ACCESS DOORS AND PANELS ASSEMBLIES

A. Wall-Mounted Units:
   1. Location: As indicated on drawings.
   2. Material: Steel, hot-dipped zinc or zinc-aluminum-alloy coated.
   3. Size: 24 inch by 24 inch.
   4. Wall Mounting Criteria: Provide surface-mounted face frame and door surface flush with frame surface.
   5. Masonry Mounting Criteria: Provide surface-mounted frame with door surface flush with frame surface.

2.02 WALL-MOUNTED UNITS

A. Manufacturers:
   1. Basis of Design: ACUDOR Products Inc: www.acudor.com.
      a. Wall Units: MS-7000 Series
   2. Other Acceptable Manufacturers:
      a. Cendrex, Inc: www.cendrex.com.
      b. Karp Associates, Inc: www.karpinc.com.
      c. Milcor, Inc: www.milcorinc.com.
      d. Nystrom, Inc: www.nystrom.com.
   3. Substitutions: See Section 01 60 00 - Product Requirements.

B. Wall-Mounted Units: Factory fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
   1. Style: Exposed frame with door surface flush with frame surface.
   2. Heavy Duty Frames: 14 gage, 0.0747 inch, minimum thickness.
   3. Heavy Duty Single Steel Sheet Door Panels: 14 gage, 0.0747 inch, minimum thickness.
   4. Hardware:
      a. Hinges for Non-Fire-Rated Units: Continuous piano hinge.
      b. Handle: Fixed.
      c. Latch/Lock: Cylinder lock-operated cam latch, two keys for each unit.
         1) Key all access doors alike.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that rough openings are correctly sized and located.

B. Begin installation only after substrates have been properly prepared, and if the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Install frames plumb and level in openings, and secure units rigidly in place.

C. Position units to provide convenient access to concealed equipment when necessary.

END OF SECTION 08 31 00

SECTION 08 33 23
OVERHEAD COILING DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Overhead coiling doors, operating hardware, non-fire-rated and exterior; manually operated.

1.02 RELATED REQUIREMENTS

A. Section 08 71 00 - Door Hardware: Cylinder cores and keys.

B. Section 09 91 13 - Exterior Painting: Field paint finish.

C. Section 09 91 23 - Interior Painting: Field paint finish.

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.

B. ITS (DIR) - Directory of Listed Products; current edition.

C. UL (DIR) - Online Certifications Directory; Current Edition.

D. UL (EAUED) - Electrical Appliance and Utilization Equipment Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide general construction, electrical equipment, and component connections and details.

C. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.

D. Samples: Submit two slats, height of slat x 6 inch in size illustrating shape, color and finish texture.

E. Manufacturer's Installation Instructions: Indicate installation sequence and procedures, adjustment and alignment procedures.

F. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.

1.05 QUALITY ASSURANCE

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

1.06 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire rated openings.

B. Provide products listed and labeled by UL as suitable for the purpose specified and indicated.

C. Provide certificate of compliance from authority having jurisdiction indicating approval of fire rated units and operating hardware assembly.

D. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction as suitable for purpose specified.

1.07 WARRANTY

A. Standard Warranty: Two years from date of owner acceptance against defects in material and workmanship.

1.08

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Overhead Coiling Doors:
   1. Basis of Design:
      a. Clopay Building Products
   2. Other Acceptable Manufacturers:
      a. Alpine Overhead Doors, Inc: www.alpinedoors.com.
      b. Cornell Iron Works, Inc: www.cornelliron.com.
      c. Overhead Door Company
      d. The Cookson Company: www.cooksondoor.com.
      e. Wayne-Dalton, a Division of Overhead Door Corporation: www.wayne-dalton.com.
      f. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 OVERHEAD COILING INSULATED SERVICE DOORS

A. Product:
   1. Model: 'T' Series Thermal Door
   2. Mounting: Interior face mounted on prepared opening

B. Exterior Coiling Doors: Steel slat curtain.
   1. Capable of withstanding positive and negative wind loads of 20 psf, without undue deflection or damage to components.
   2. Sandwich slat construction with insulated core of foamed-in-place polyurethane insulation; minimum R-value of 8.1.
   3. Nominal Slat Size: 2-5/8 inches high and 7/8 inches thick x required length.
   4. Slat Material: ASTM A 653/A 653M galvanized steel; with a G90 galvanized coating
   5. Slat Gauge:
      a. Outside face not less than 22 gauge
      b. Inside face not less than 22 gauge
      c. Finish: Factory painted, color as selected.
   6. Bottom Bar: Two (2) 2" x 2" x 1/8 " structural steel angles
   7. Guide, Angles: galvanized steel.
      a. Finish: Factory painted, color to match slats.
   8. Hood Enclosure: Manufacturer's standard; primed steel.
      a. Material 24 gauge galvanized steel
      b. Finish: Factory painted, color to match slats.
   9. Operation
      a. Manual hand chain lift operation.
   10. Mounting: Within framed opening.
   11. Locking:
      a. Locking Devices: Slide bolt on inside.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that opening sizes, tolerances and conditions are acceptable.

3.02 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Install enclosure and perimeter trim.

3.03 TOLERANCES

A. Maintain dimensional tolerances and alignment with adjacent work.

B. Maximum Variation From Plumb: 1/16 inch.

C. Maximum Variation From Level: 1/16 inch.

D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

3.04 ADJUSTING

A. Adjust operating assemblies for smooth and noiseless operation.

3.05 CLEANING

A. Clean installed components.

B. Remove labels and visible markings.

END OF SECTION 08 33 23

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".
2. Division 08 Section "Fire-Rated Steel Framed Entrances".

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 3 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. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

F. 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.

G. 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

H. 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 MATERIALS

A. Hardware shall not have any visible manufacturer names on exposed materials, except cylinders, when the door is in a closed position.

2.2 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.
b. Provide single acting spring hinges of the type and style as specified.
c. Provide double acting spring hinges of the type and style as specified.

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.

2.3 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. Manufacturers:.

a. Hager Companies (HA).
b. Pemko (PE).
c. dormakaba BEST (ST).

2.4 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: Provide products conforming to ANSI/BHMA A156.3 and A156.16, Grade 1.

1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
5. Manufacturers:

a. Burns Manufacturing (BU).

b. Rockwood (RO).
c. Trimco (TC).

B. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets. 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.
3. Manufacturers:

a. Burns Manufacturing (BU).
b. Rockwood (RO).
c. Trimco (TC).

2.5 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. Match Existing, Field Verify.

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. 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.

D. 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).

E. Construction Keying: Provide construction master keyed cylinders.

F. 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.

2.6 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 (YA) - 8800FL Series.
b. dormakaba BEST (BE) - 45H Series.
c. Schlage (SC) - L9000 Series.

2.7 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.

2.8 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 (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy

body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Heavy duty surface mounted door closers shall have a 30-year warranty.

2. Manufacturers:

   a. ASSA ABLOY ACCENTRA (YA) - 4400 Series.
   b. Corbin Russwin Hardware (RU) - DC6000 Series.
   c. LCN Closers (LC) - 4040 Series.
   d. Norton Rixson (NO) - 7500 Series.

2.9 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. Rockwood (RO).
   c. Trimco (TC).

2.10 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).

2.11 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.

2.12 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.

D. Sublimation Finishes: Where specified, provide scratch resistant sublimation finishes that use heat and pressure to transfer high-quality, durable patterns and colors onto powder coated surfaces creating realistic finishes like wood and marble.

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. 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.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

E. 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 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. RO - Rockwood
4. YA - ASSA ABLOY ACCENTRA
5. OT - Other

Hardware Sets

Set: 1.0

Doors: A104b
Description: Exterior - Storeroom Function x Closer

1 Continuous Hinge	CFM_HD1 x Length Required		PE
1 Storeroom Lock	AUR 8805FL LC	626	YA
1 Mortise Cylinder	Match Existing Key System	626	OT
1 Closer	PR4400	689	YA
1 Wall Stop	402	US26D	RO
1 Perimeter Gasketing	303APK TKSP		PE
1 Rain Guard	346C x Width of Frame Head		PE
1 Sweep	345APK TKSP		PE
1 Threshold	2009APK		PE

Set: 2.0

Doors: A101c
Description: Exterior - Storeroom Function x Closer w/ Hold-Open

1 Continuous Hinge	CFM_HD1 x Length Required		PE
1 Storeroom Lock	AUR 8805FL LC	626	YA
1 Mortise Cylinder	Match Existing Key System	626	OT
1 Closer w/ Hold-Open	4410	689	YA
1 Wall Stop	402	US26D	RO
1 Perimeter Gasketing	303APK TKSP		PE
1 Rain Guard	346C x Width of Frame Head		PE
1 Sweep	345APK TKSP		PE
1 Threshold	1715AK MSES25SS		PE

Set: 3.0

Doors: A108a
Description: Exterior - Classroom Function x Closer w/ Stop & Hold-Open

1 Continuous Hinge	CFM_HD1 x Length Required		PE
1 Classroom Lock	AUR 8808FL LC	626	YA
1 Mortise Cylinder	Match Existing Key System	626	OT
1 Closer w/ Stop & Hold-Open	4430T	689	YA
1 Perimeter Gasketing	303APK TKSP		PE
1 Rain Guard	346C x Width of Frame Head		PE
1 Sweep	345APK TKSP		PE
1 Threshold	1715AK MSES25SS		PE

Notes: Template door closer for maximum 110 degree of door swing.

Set: 4.0

Doors: A105

Description: Exterior - Classroom Function Pair x Closers w/ Stop & Hold-Open

2 Continuous Hinge	CFM_HD1 x Length Required		PE
1 Dust Proof Strike	570	US26D	RO
1 Flush Bolt	555 / 557 (As Required)	US26D	RO
1 Classroom Lock	AUR 8808FL LC	626	YA
1 Mortise Cylinder	Match Existing Key System	626	OT
2 Closer w/ Stop & Hold-Open	4430T	689	YA
1 Metal Edge Astragal	by Door Manufacturer		PE
1 Perimeter Gasketing	303APK TKSP		PE
1 Rain Guard	346C x Width of Frame Head		PE
2 Sweep	345APK TKSP		PE
1 Threshold	1715AK MSES25SS		PE

Set: 5.0

Doors: A103

Description: Exterior - Lockable Privacy Function x Closer w/ Stop & Hold-Open

1 Continuous Hinge	CFM_HD1 x Length Required		PE
1 Dormitory Lock w/ Indicator	AUR 8822FL LC V21	626	YA
1 Mortise Cylinder	Match Existing Key System	626	OT
1 Closer w/ Stop & Hold-Open	4430T	689	YA
1 Perimeter Gasketing	303APK TKSP		PE
1 Rain Guard	346C x Width of Frame Head		PE
1 Sweep	345APK TKSP		PE

1 Threshold	1715AK MSES25SS		PE

Set: 6.0

Doors: A102, A104
Description: Exterior - Lockable Push / Pull Function x Closer w/ Hold-Open

1 Continuous Hinge	CFM_HD1 x Length Required		PE
1 Mortise Deadlock	357 LC	626	YA
1 Mortise Cylinder	Match Existing Key System	626	OT
1 Pull Plate	BF 111x70B	US32D	RO
1 Push Plate	70F	US32D	RO
1 Closer w/ Hold-Open	4410	689	YA
1 Wall Stop	402	US26D	RO
1 Rain Guard	346C x Width of Frame Head		PE
1 Sweep	345APK TKSP		PE
1 Threshold	1715AK MSES25SS		PE

Notes: Adjust door closer hold-open function for maximum degree of door swing.

Set: 7.0

Doors: A102b, A107
Description: Storeroom Function

3 Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1 Storeroom Lock	AUR 8805FL LC	626	YA
1 Mortise Cylinder	Match Existing Key System	626	OT
1 Wall Stop	409	US32D	RO
3 Silencer	608		RO

Set: 8.0

Doors: A106
Description: Classroom Function

3 Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1 Classroom Lock	AUR 8808FL LC	626	YA
1 Mortise Cylinder	Match Existing Key System	626	OT
1 Wall Stop	409	US32D	RO
3 Silencer	608		RO

Set: 9.0

Doors: A101a, A101b, A108b, A108c, A108d
Description: Miscellaneous Doors

1 Mortise Cylinder	Match Existing Key System	626	OT
1 Balance of Hardware	by Overhead Door Mfr.		OT

Notes: Verify cylinder requirements with overhead door manufacturer.

END OF SECTION 087100

GARMANN MILLER

Division 09

Finishes

SECTION 08 36 13
SECTIONAL DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Overhead sectional doors, manually operated.

B. Operating hardware and supports.

1.02 RELATED REQUIREMENTS

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

B. Section 06 10 00 - Rough Carpentry: Rough wood framing for door opening.

C. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.

D. Section 08 71 00 - Door Hardware: Lock cylinders.

E. Section 09 91 13 - Exterior Painting: Finish painting.

F. Section 09 91 23 - Interior Painting: Finish painting.

G. Division 26: Electrical

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.

B. 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).

C. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.

D. DASMA 102 - American National Standard Specifications for Sectional Doors; 2018.

E. ITS (DIR) - Directory of Listed Products; current edition.

F. UL (DIR) - Online Certifications Directory; Current Edition.

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. Maintenance Data: Include data for motor and transmission, shaft and gearing, lubrication frequency, spare part sources.

E. 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 documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience.

C. Comply with applicable code for motor and motor control requirements.

D. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction, as suitable for purpose specified.

1.06 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for warranty requirements.

B. Correct defective Work within a two year period after Date of Substantial Completion.

C. Finish Warranty: Provide manufacturer's finish warranty against rust though for 10 years after the Date of Substantial Completion.

D. Delamination Warranty: Provide manufacturer's delamination warranty for 10 years after the Date of Substantial Completion.

E. Warranty: Include coverage for electric motor and transmission.

F. Provide two year manufacturer warranty for electric operating equipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Clopay Building Products Company, Inc; Product 3720: www.clopaycommercial.com.

B. Other Acceptable Manufacturers:
   1. Haas Door: haasdoor.com
   2. C.H.I. Overhead Doors: www.chiohd.com.
   3. Fimbel Architectural Door Specialties: www.fimbelads.com.
   4. Overhead Door Company
   5. Wayne-Dalton, a Division of Overhead Door Corporation: www.wayne-dalton.com.
   6. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 STEEL DOORS

A. Steel Doors: Flush steel, insulated; standard lift operating style with track and hardware; complying with DASMA 102, Commercial application.
   1. Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.
   2. Thermal Performance: Minimum R-value of 17
   3. Door Nominal Thickness: 2 inches thick.
   4. Air Leakage Rate: Less than 0.40 cfm/sf when tested in accordance with ASTM E283 at test pressure difference of 1.57 psf.
   5. Exterior Finish: Factory finished with polyester baked enamel; color as selected from manufacturers standard line.
   6. Interior Finish: Factory finished with polyester baked enamel; color as selected from manufacturers standard line.
   7. Manual Operation: Pull rope.

B. Door Construction:
   1. Panels: Foamed in place Polyurethane core construction between exterior and interior steel skins.
   2. Steel Skins: Formed from roll formed commercial quality steel sheet, hot-dip galvanized per ASTM A 924/A 924M and ASTM A 653/A 653M, pre-painted with primer and baked-on polyester topcoat; sections formed to create weather tight tongue-in-groove meeting joint.
      a. Steel Skin Thickness: Minimum 27 gauge 0.016 inch (0.40 mm) exterior; minimum 27 gauge 0.016 inch (0.40 mm) interior.
      b. End Stiles: Galvanized steel end stiles, engineered for easy hardware attachment through pre-punched holes. Minimum 18 gauge, 0.045 inch (1.14 mm) thick for single end hinge style and 16 gauge .056 inch (1.42 mm) minimum for double end hinge style.

c. Finish: Stucco embossed texture with shallow U ribbed pattern.

3. Reinforcing: Galvanized and primed steel reinforcement located under each hinge location, pre-punched for hinge attachment.
4. Handle: High impact polymer step plate/lift handle on bottom panel section.

2.03 COMPONENTS

A. Track: Rolled galvanized steel, 0.090 inch minimum thickness; 2 inch wide, continuous one piece per side; galvanized steel mounting brackets 1/4 inch 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.
1. Ten-ball steel roller to be full-floating ball bearing in case hardened steel cases and mounted to fit the taper of the track.

C. Lift Mechanism: Torsion spring on cross head shaft, with braided galvanized steel lifting cables.
1. For Manual Operation: Requiring maximum exertion of 25 lbs force to open.

D. Spring Counterbalance: Torsion spring counterbalance mechanism sized to weight of the door, with a helically wound, oil tempered torsion spring mounted on a steel shaft; cable drum of die cast aluminum with high strength galvanized aircraft cable with minimum 7 to 1 safety factor.
1. High Cycle Spring: 25,000 cycles.

E. Sill Weatherstripping: Resilient hollow rubber strip, one piece; fitted to bottom of door panel, full length contact.

F. Jamb Weatherstripping: Roll formed steel section full height of jamb, fitted with resilient weatherstripping, placed in moderate contact with door panels.

G. Head Weatherstripping: EPDM rubber seal, one piece full length.

H. Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.

I. Lock: Inside side mounted, adjustable keeper, spring activated latch bar with feature to retain in locked or retracted position; interior handle.

2.04 MATERIALS

A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G40/Z120 coating, stucco embossed surface.

B. Aluminum Extrusions: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

C. Insulation: Foamed-in-place polyurethane, bonded to facing.
1. R-value of 18.4.

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.

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. Photo eyes shall be located 6 inches above finished floor elevation.

F. Photo eyes shall be wired to reverse the door upon the light beam being disrupted.

G. Install perimeter trim.

3.04 ADJUSTING

A. Adjust door assembly for smooth operation and full contact with weatherstripping.

3.05 CLEANING

A. Clean doors and frames and glazing.

B. Remove temporary labels and visible markings.

3.06 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 08 36 13

SECTION 09 21 16
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Performance criteria for gypsum board assemblies.

B. Gypsum wallboard.

C. Joint treatment and accessories.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.

B. Section 07 21 16 - Blanket Insulation: Acoustical Insulation.

C. Section 07 92 00 - Joint Sealants: Sealing acoustical gaps.

D. Section 09 91 23 - Interior Painting: Field painting.

1.03 REFERENCE STANDARDS

A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2017.

B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.

C. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.

D. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.

E. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.

F. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2023.

G. ASTM E413 - Classification for Rating Sound Insulation; 2022.

H. GA-216 - Application and Finishing of Gypsum Panel Products; 2016, with Errata.

I. GA-600 - Fire Resistance Design Manual; 2015.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. See Section 01 6116 VOC Content Restrictions, for VOC submittal procedures

C. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.

D. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.

E. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

1.05 QUALITY ASSURANCE

A. Perform in accordance with ASTM C840. Comply with requirements of GA-600 for fire-rated assemblies.

B. Refer to "Recommended Specification on Levels of Gypsum Board Finish" as published by the Gypsum Association (and AWCI/CISCA/PDCA) for finish levels required.

C. Recommended deflection limit for gypsum board assemblies is L/240.
   1. Tile finishes applied to cementitious backer units will require deflection limits of L/360 or less.

1.06 PROJECT CONDITIONS

A. Environmental Conditions, General: Establish and maintain environmental conditions for applying and finishing gypsum board with ASTM C 840 requirements or gypsum board manufacturer's recommendations, whichever is more stringent.

B. Room Temperatures: For nonadhesive attachment of gypsum board to framing, maintain not less than 40 deg F. For adhesive attachment and finishing of gypsum board, maintain not less than 50 deg F for 48 hours before application and continuously after until dry. Do not exceed 95 deg F when using temporary heat sources.

C. Ventilation: Ventilate building spaces as required to dry joint treatment materials.

D. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

E. If the application of gypsum board and gypsum shaft wall liner starts prior to the building being made weather-tight, the gypsum wallboard and/ or shaft wall liner specified shall be changed to glass-mat interior gypsum board and/ or glass mat gypsum shaft wall liner

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.
   1. See PART 3 for finishing requirements.

B. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with the following characteristics:
   1. Acoustic Attenuation: STC of 50-54 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

2.02 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
   1. American Gypsum Company: www.americangypsum.com.
   2. CertainTeed Corporation: www.certainteed.com.
   3. Georgia-Pacific Gypsum: www.gpgypsum.com.
   4. National Gypsum Company: www.nationalgypsum.com.
   5. PABCO Gypsum: www.pabcogypsum.com.
   6. USG Corporation: www.usg.com.
   7. Substitutions: See Section 01 60 00 - Product Requirements.

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
   2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
      a. Mold resistant board is required at all locations.
   3. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
   4. Thickness:
      a. Vertical Surfaces: 5/8 inch.
      b. Ceilings: 5/8 inch.
      c. Edges: Tapered
      d. Multi-Layer Assemblies: Thicknesses as indicated on drawings.
   5. Mold Resistant Paper Faced Products:
      a. American Gypsum Company; M-Bloc Type X.
      b. CertainTeed Corporation; M2Tech 5/8" Type X Moisture & Mold Resistant Drywall.
      c. Georgia-Pacific Gypsum; ToughRock Fireguard X Mold-Guard.
      d. National Gypsum Company; Gold Bond XP Fire-Shield Gypsum Board.

e. PABCO Gypsum; Mold Curb Plus Type X.
f. USG Corporation; USG Sheetrock Brand Mold Tough Panels Firecode X.

C. Abuse Resistant Wallboard:
1. Application: High-traffic areas indicated.
2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
3. Thickness: 5/8 inch.
4. Edges: Tapered.
5. Paper-Faced Products:
a. American Gypsum Company; M-Bloc AR Type X.
b. CertainTeed Corporation; Extreme Abuse Resistant Drywall with M2Tech.
c. Georgia-Pacific Gypsum; ToughRock Fireguard X Mold Guard Abuse-Resistant.
d. National Gypsum Company; Gold Bond Hi-Abuse XP Gypsum Board.
e. PABCO Gypsum; Abuse Curb Type X.
f. USG; USG Sheetrock Brand Mold Tough AR Firecode X Panels.
g. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 GYPSUM WALLBOARD ACCESSORIES

A. Acoustic Insulation: ASTM C665; friction fit type, unfaced.
1. Refer to Section 07 21 16.

B. Reveal Moldings:
1. Manufacturer: Fry Reglet Corporation, Alpharetta, GA
a. Products: A.7 and A.1
2. Acceptable Manufacturers
a. Gordon Inc, Shreveport, LA
b. Substitutions: See Section 01 60 00 - Product Requirements.

C. Corner Beads: Zinc alloy. Products shall be similar to the following:
1. Marino-Ware; Product CB Corner Bead: www.marinoware.com.
2. Phillips Manufacturing Co; Product Everlast Corner Bead: www.phillipsmfg.com.
3. 103 Deluxe Bead by Clark Dietrich Building Systems
4. Substitutions: See Section 01 60 00 - Product Requirements.

D. Edge Trim: L bead, as defined in ASTM C840. Products shall be similar to the following:
1. Marino-Ware; Product L Trim: www.marinoware.com.
2. Phillips Manufacturing Co; Product L-200 Trim: www.phillipsmfg.com.
3. Clark Dietrich Building Systems; Product Metal Trim M20B
4. Substitutions: See Section 01 60 00 - Product Requirements.

E. Expansion and Control Joints: Galvanized steel one piece with V-shaped slot and removable strip covering opening. Products shall be similar to the following:
1. Phillips Manufacturing Co; Product 093 Expansion Joint: www.phillipsmfg.com.
2. Clark Dietrich Building Systems; Product 093 Control Joining
3. Alabama Metal Industries Corporation (AMICO); Product No. 093 Drywall Control Joint
4. Substitutions: See Section 01 60 00 - Product Requirements.

F. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
1. Paper Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
2. Ready-mixed vinyl-based joint compound.
3. Chemical hardening type compound.

G. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 ACOUSTIC ACCESSORIES INSTALLATION

A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
   1. Place one bead continuously on substrate before installation of perimeter framing members.
   2. Place continuous bead at perimeter of each layer of gypsum board.
   3. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

3.03 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as follows:
   1. Provide framing immediately on both sides of joint and back with 2 inches of gypsum board strips to maintain fire resistance rating.
   2. Attach to framing with screws.
   3. Use longest practical lengths.
   4. Not more than 30 feet apart on walls and ceilings over 50 feet long.
   5. Partition, furring or column fireproofing abuts a structural element (except floor) or dissimilar wall or ceiling.
   6. Ceiling abuts a structural element, dissimilar wall or partition or other vertical penetration.
   7. Construction changes within the plane of the partition or ceiling.
   8. Wings of L, U, and T shaped ceiling area are joined.

B. Corner Beads: Install at external corners, using longest practical lengths.
   1. Attach to framing with screws.

C. Edge Trim (Casing Bead): Install at locations where gypsum board abuts dissimilar materials and as indicated.

3.04 JOINT TREATMENT

A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, embed and finish with setting type joint compound.

B. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.

C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch.
   2. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile.
   3. Taping, filling and sanding is not required at base layer of double layer applications.

3.05 TOLERANCES

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

3.06 FINISH LEVEL SCHEDULE

A. Level 1: Above finished ceilings concealed from view.
   1. All joints and interior angles shall have tape set in joint compound. Surface is to be free of excess joint compound. Tool marks and ridges acceptable.

B. Level 2: Utility areas and areas behind cabinetry.
   1. All joints and interior angles shall have tape embedded in joint compound and wiped with a joint knife leaving a thin coating of joint compound over all joints and interior angles. Fastener heads and accessories shall be covered with a coat of joint compound. Surfaces shall be be free of excess joint compound. Tool marks and ridges acceptable. Joint compound applied over the body of the tape at the time of tape embedment shall be considered a separate coat of joint compound.

C. Level 3: Walls scheduled to receive textured wall finish.
   1. All joints and interior angles shall have tape embedded in joint compound and one additional coat of joint compound applied over all joints and interior angles. Fasteners heads and accessories shall be covered with two separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges.

D. Level 4: Walls and ceilings scheduled to receive flat or eggshell paint finish of wall coverings.
   1. All joints and interior angles shall have tape embedded in joint compound and two additional coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fasteners heads and accessories shall be covered with three separate coats of joint compound. The surface shall be smooth and free of tool marks and ridges.

E. Level 5: Walls and ceilings scheduled to receive semi-gloss or gloss paint finish or in areas where severe or critical lighting conditions occur.
   1. All joints and interior angles shall have tape embedded in joint compound and two additional coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fasteners heads and accessories shall be covered with three separate coats of joint compound. A thin coat (skim coat) of joint compound or a material manufactured especially for this purpose, shall be applied to the entire surface. The surface shall be smooth and free of tool marks and ridges.
      a. Skim Coat: a thin coat of joint compound or a material manufactured especially for this purpose, applied over the entire surface to fill imperfections in the joint work. smooth the pater texture, and provide a uniform surface. Excess compound is immediately sheared off, leaving a film of skim coating compound completely covering the paper.

END OF SECTION 09 21 16

SECTION 09 65 13
RESILIENT BASE & ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDE

A. Resilient Wall Base

B. Adhesives

1.02 RELATED REQUIREMENTS

A. Section 03 35 11 - Concrete Finishes

B. Section 09 67 23 - Urethane Resinous Flooring

1.03 REFERENCED DOCUMENTS

A. ASTM F 1861 Standard Specification for Resilient Wall base

B. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials

C. ASTM F 386 Standard Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces

D. ASTM E 648 Standard Test Method for Critical Radiant Flux of Flooring systems Using a Radiant Energy Source.

E. ASTM E 662 Test Method for Specific Density of Smoke Generated by Solid Materials.

F. ASTM F 925 Standard Test Method for Resistance to Chemicals of Resilient Flooring.

G. ASTM F 137 Standard Test Method for Flexibility of Resilient Flooring Materials with Cylindrical Mandrel Apparatus

H. ASTM F 1515 Standard Test Method for Measuring Light Stability of Resilient Vinyl Flooring by Color Change

I. National Fire Protection Association (NFPA): NFPA 255, Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source

J. National Fire Protection Association (NFPA) 258 Test Method for Specific Density of Smoke Generated by Solid Materials.

K. California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65).

L. The Collaborative for High Performance Schools (CHPS)

1.04 SUBMITTALS

A. Product Data: Submit product data, including manufacturer's specification summary sheet for specified products

B. Shop Drawings: Submit shop drawings showing layout, finish colors, patterns and textures.

C. Samples: Submit selection and verification samples for finishes, colors, and textures.

D. Quality Assurance Submittals: Submit the following:
   1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
   2. Manufacturer's Instructions: Manufacturer's installation and maintenance instructions.

E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installing work similar to that required for this project.

B. Regulatory Requirements
   1. Fire Performance characteristics: Provide resilient sheet vinyl floor covering with the following fire performance characteristics as determined by testing products in accordance with ASTM method (and) NFPA method) indicated below by a certified testing laboratory or another testing and inspecting agency acceptable to authorities having jurisdiction.
      a. ASTM E 648 (NFPA 253), Critical Radiant Flux of Floor Covering Systems: Class 1, > 1.0 W/cm2
      b. ASTM E 662 (NFPA 258), Specific Optical Density of Smoke Generated by Solid Materials: Passes, <450
      c. ASTM E 84 (NFPA 255), Surface Building Characteristics of Building Materials: Class C

C. Single-Source Responsibility: Obtain resilient wall base and manufacturer's recommended adhesive from a single supplier.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Storage and Protection: Store materials protected from exposure to harmful weather conditions and acclimated to site conditions at temperature and humidity conditions recommended by manufacturer.

C. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Manufacturer's standard warranty to repair or replace installation that fails in material and workmanship.
   1. Warranty Period: 3 years form the date of Substantial Completion

PART 2 PRODUCTS

2.01 REFER TO "FINISH MATERIAL SCHEDULE" ON SHEET A9.1 FOR MANUFACTURER INFORMATION AND MATERIAL SELECTIONS. ALSO REFERENCE OTHER A9 SERIES DRAWINGS (FINISH PLANS) FOR ADDITIONAL INFORMATION, LOCATIONS AND EXTENT OF MATERIALS.

2.02 MANUFACTURER:

A. Roppe Corporation: www.roppe.com

B. Acceptable Manufacturers:
   1. Burke Flooring: www.burkemercer.com.
   2. Johnsonite, a Tarkett Company: www.johnsonite.com.
   3. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 RESILIENT WALL BASE

A. Minimum Requirements:
   1. Thickness tolerance: Complies with ASTM F-386
   2. Flexibility: Complies with ASTM F-137
   3. Resistance to Heat Aging: Complies with ASTM F-1515
   4. Resistance to Detergents: Complies with ASTM F-925

5. Resistance to Alkalis: No fading or softening
6. Dimensional Stability: Complies with ASTM F 1861
7. Squareness: 90 degrees +/- 0.5 degrees

B. Product:
1. Refer to A9, Material Finish Schedule for product information and details.(RB)
2. Roppe Pinnacle Rubber Base
a. a. Complies with ASTM F-1861 Type TS (Thermoset Vulcanized Rubber), Group 1 (Solid)
b. Contains 10% natural rubber
c. Thickness: 1/8" (3.175 mm) nominal
d. Color as selected by Architect from manufacturer's standard colors.
e. Profile:
1) Standard toe (cove) for resilient installations
f. Nominal Height: 4" and 6"
g. Lengths: rolls (coil)
h. Corners
1) Formed by installer on site

2.04 ACCESSORIES

A. Primers, Adhesives, and Seaming Materials: Waterproof; types recommended by flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions are acceptable for installing product in accordance with manufacturer's instructions.

B. Material Inspection: In accordance with manufacturer's installing requirements, visually inspect materials prior to installing. Material with visual defects shall not be installed.

3.02 PREPARATION

A. Prepare substrate in accordance with manufacturer's instructions.

B. Prepare manufacturer's recommended substrates to be smooth, rigid, flat, level, permanently dry, clean and free of foreign materials such as paint, dust, grease, oils, solvent, old adhesive residue, vinyl wall coverings, non-porous surfaces and all other contaminants that may interfere with adhesive bond.

3.03 INSTALLATION

A. Starting installation constitutes acceptance of conditions.

B. Install in accordance with manufacturer's instructions.

C. Spread only enough adhesive to permit installation of materials before initial set.

D. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

E. Miter internal corners. At external corners, 'V' cut back of base strip to 2/3 of its thickness and fold.

F. Install base on solid backing. Bond tightly to wall and floor surfaces.

G. Install base on casework base. Bond tightly to casework and floor.

H. Scribe and fit to door frames and other interruptions.

I. Trowel marks and other imperfections showing through installed base shall be reason to, remove base, sand out trowel marks, remove or correct imperfections and reinstall base.

3.04 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Repair or replace damaged installed products.

C. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance.

D. Remove construction debris from project site and legally dispose of debris.

END OF SECTION 09 65 13

SECTION 09 67 23
URETHANE RESINOUS FLOORING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Resinous flooring system as shown on the drawings and in schedules.

B. Integral cove base accessories

1.03 RELATED SECTIONS INCLUDE THE FOLLOWING:

A. Section 03 30 00 - Cast-in-Place Concrete

1.04 SYSTEM DESCRIPTION

A. The work shall consist of preparation of the substrate, the furnishing and application of a cementitious urethane based self-leveling seamless flooring system with flintshot quartz aggregate broadcast and urethane topcoat.

B. The system shall have the color and texture as specified by the owner. It shall be applied to the prepared area(s) as defined in the plans strictly in accordance with the Manufacturer's recommendations.

C. Cove base (if required) to be applied where noted on plans and per manufacturers standard details unless otherwise noted

1.05 SUBMITTALS

A. Product Data: Latest edition of Manufacturer's literature including performance data and installation procedures.

B. Manufacturer's Material Safety Data Sheet (MSDS) for each product being used.

C. Samples: A 6 inch square sample of the proposed system. Color, texture, and thickness shall be representative of overall appearance of finished system.

1.06 QUALITY ASSURANCE

A. The Manufacturer shall have a minimum of 5 years experience in the production, sales, and technical support of cementitious urethane, polyurethane industrial flooring and related materials.
   1. The Applicator shall have been approved by the flooring system manufacturer in all phases of minimum 10 installations with material in a kitchen application setting.
   2. Surface preparation and application of the product specified. In addition, the applicator should have performed at
      a. No requests for substitutions shall be considered that would change the generic type of the specified system

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping
   1. All components of the system shall be delivered to the site in the Manufacturer's packaging, clearly identified with the product type and batch number.

1.08 STORAGE AND PROTECTION

A. The Applicator shall be provided with a dry storage area for all components. The area shall be between 60 F and 85 F, dry, out of direct sunlight and in accordance with the Manufacturer's recommendations and relevant health and safety regulations.

B. Copies of Material Safety Data Sheets (MSDS) for all components shall be kept on site for review by the Engineer or other personnel.

C. Waste Disposal
   1. The Applicator shall be provided with adequate disposal facilities for non-hazardous waste generated during installation of the system.

1.09 PROJECT CONDITIONS

A. Site Requirements
   1. Application may proceed while air, material and substrate temperatures are between 55 F and 85 F providing the substrate temperature is above the dew point. Outside of this range, the Manufacturer shall be consulted.
   2. The relative humidity in the specific location of the application shall be less than 85 % and the surface temperature shall be at least 5 F above the dew point.
   3. The Applicator shall be supplied with adequate lighting equal to the final lighting level during the preparation and installation of the system.

B. Conditions of new concrete to be coated with cementitious urethane material.
   1. Concrete shall be moisture cured for a minimum of 7 days and have fully cured a minimum of 14 days in accordance with ACI-308 prior to the application of the coating system pending moisture tests.
   2. Concrete shall have a flat rubbed finish, float or light steel trowel finish (a hard steel trowel finish is neither necessary or desirable).
   3. Sealers and curing agents should not to be used.
   4. Concrete surfaces on grade shall have been constructed with a vapor barrier to protect against the effects of vapor transmission and possible delamination of the system.

C. Safety Requirements
   1. The Owner shall be responsible for the removal of foodstuffs from the work area.
   2. Non-related personnel in the work area shall be kept to a minimum.

1.10 WARRANTY

A. Manufacturer warrants that material shipped to buyers at the time of shipment substantially free from material defects and will perform substantially to manufacturers published literature if used in accordance with the latest prescribed procedures and prior to the expiration date.

B. Manufacturers liability with respect to this warranty is strictly limited to the value of the material purchase.

PART 2 – PRODUCTS

2.01 REFER TO "FINISH MATERIAL SCHEDULE" ON SHEET A9.1 FOR MANUFACTURER INFORMATION AND MATERIAL SELECTIONS. ALSO REFERENCE OTHER A9 SERIES DRAWINGS (FINISH PLANS) FOR ADDITIONAL INFORMATION, LOCATIONS AND EXTENT OF MATERIALS.

2.02 FLOORING

A. Basis of Design: As indicated on drawings

B. Approved Manufacturers
   1. Dur-A-Flex, Inc, www.duraflex.com
   2. Key Resin, www.keyresin.com
   3. Stonhard, www.stonhard.com
   4. Sherwin Williams, www.sherwinwilliams.com

5. Laticrete, SPARTACOTE, www.laticrete.com
6. The Concrete Protector, www.theconcreteprotector.com
7. Manufacturer of Approved System shall be single source and made in the USA.

2.03 PRODUCT REQUIREMENTS

A. DUR-A-FLEX, DUR-A-CHIP (RES1)
1. Primer, Dur-A-Glaze WB
   a. VOC 2 g/L
   b. Elongations, ASTM D-2370 9%
   c. Impact Resistance, MF D-2794 >160
   d. Hardness, ASTM D-3363 3H
   e. Abrasion Resistance , ASTM D-4060
      1) CS17 Wheel (100g load) 1000 cycles 30 mg loss
   f. Adhesion, ASTM D-4541 550 psi (concrete failure)
   g. Coefficient of Friction, ASTM D-2047 >0.6
   h. 60 Gloss, ASTM D-523 85+
2. Broadcast Coat Dur-A-Glaze #4 Resin
   a. Percent Reactive, 100 %
   b. VOC <4 g/L
   c. Water Absorption, ASTM D 570 0.04%
   d. Tensile Strength, ASTM D 638 4000psi
   e. Coefficient of thermal expansion
      1) ASTM D 696, 2 x 10-5 in/in/F
   f. Flammability ASTM D-635 Self-Extinguishing
   g. Flame Spread/ NFPA 101 ASTM E-84 Class A
3. Decorative Flakes
   a. Reference FINISH MATERIAL SCHEDULE on sheet A9.0 for basis of design and color intent.
      1) RES1: Hybrid size flake blend, TORGINOL Terrazzo & Stone Flake
4. Topcoat Armor Top
   a. VOC 0 g/L
   b. 60 Degree Gloss ASTM D523 75+/-5
   c. Mixed Viscosity, (Brookfield 25oC) 500 cps
   d. Tensile strength, ASTM D 638 7,000 psi
   e. Abrasion Resistance, ASTM D4060 Satin
      1) CS 17 wheel (1,000 g load) 1,000 cycles
      2) 4 - 8 mg loss with grit
      3) 10 - 12 mg loss without grit
   f. Pot life @ 70o F 50% RH 2 hours
   g. Dry properties, 70oF, 50% R.H. 8 hours tack free, 12 hours Dry
      1) 60oF, 30% RH 12 hours tack free, 18 hours Dry
         (a) 80oF, 70%RH 4 hours tack free, 6 hours Dry
   h. Flash Point PMCC 186oF
   i. Full Chemical resistance 7 days

2.04 ACCESSORIES

A. Waterproofing membrane: for concrete slabs exhibiting moisture vapor emission rates of >3 lbs over 1000 sq ft in 24 hours or 75 percent relative humidity tested by ASTM F02170

B. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer.

C. Joint Filler Material: two-part, 100% solids flexible epoxy with aliphatic amines

D. In instances of severe cracking use sheet membrane prior to flooring installation

E. Exposed Edge Trim/Transitions: Refer to Finish Material Schedule and typical details A9.1.

F. Cap for Integral Cove Base:
   1. Provide square metal cap approved by flooring manufacturer.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas and conditions, with Applicator present, for compliance with requirements for maximum moisture content, installation tolerances and other conditions affecting flooring performance.
   1. Verify that substrates and conditions are satisfactory for flooring installation and comply with requirements specified.

3.02 PREPARATION

A. General
   1. New and existing concrete surfaces shall be free of oil, grease, curing compounds, loose particles, moss, algae growth, laitance, friable matter, dirt, and bituminous products.
   2. Moisture Testing: Perform anhydrous calcium chloride test ASTM F 1869-98.
      a. Perform three tests for the first 1,000 sf and then one test per 1,000 sf after that.
         1) Application will proceed only when the vapor/moisture emission rates from the slab is less than and not higher than 12 lbs/1,000 sf/24 hrs.
         2) If the vapor drive exceeds 12 lbs/1,000 sf/24 hrs then the Owner and/or Engineer shall be notified and advised of additional cost for the possible installation of a vapor mitigation system that has been approved by the manufacturer or other means to lower the value to the acceptable limit.
         3) Mechanical surface preparation
            (a) Shot blast all surfaces to receive flooring system with a mobile steel shot, dust recycling machine (Blastrac or equal). All surface and embedded accumulations of paint, toppings hardened concrete layers, laitance, power trowel finishes and other similar surface characteristics shall be completely removed leaving a bare concrete surface having a minimum profile of CSP 4-5 as described by the International Concrete Repair Institute.
            (b) Floor areas inaccessible to the mobile blast machines shall be mechanically abraded to the same degree of cleanliness, soundness and profile using diamond grinders, needle guns, bush hammers, or other suitable equipment.
            (c) Where the perimeter of the substrate to be coated is not adjacent to a wall or curb, a minimum 1/4 inch key cut shall be made to properly seat the system, providing a smooth transition between areas. The detail cut shall also apply to drain perimeters and expansion joint edges.
            (d) Cracks and joints (non-moving) greater than 1/8 inch wide are to be chiseled or chipped-out and repaired per manufacturer's recommendations.
         4) At spalled or worn areas, mechanically remove loose or delaminated concrete to a sound concrete and patch per manufactures recommendations.

3.03 APPLICATION

A. General
   1. The system shall be applied in three distinct steps as listed below:
      a. Substrate preparation
      b. Topping/overlay application with quartz aggregate broadcast.
      c. Topcoat application

2. Immediately prior to the application of any component of the system, the surface shall be dry and any remaining dust or loose particles shall be removed using a vacuum or clean, dry, oil-free compressed air.
3. The handling, mixing and addition of components shall be performed in a safe manner to achieve the desired results in accordance with the Manufacturer's recommendations.
4. The system shall follow the contour of the substrate unless pitching or other leveling work has been specified by the Architect.
5. A neat finish with well-defined boundaries and straight edges shall be provided by the Applicator.

B. Topping
1. The topping shall be applied as a self-leveling system as specified by the Architect. The topping shall be applied in one lift with a nominal thickness of 1/8 inch.
2. The topping shall be comprised of three components, a resin, hardener and filler as supplied by the Manufacturer.
3. The hardener shall be added to the resin and thoroughly dispersed by suitably approved mechanical means. SL Aggregate shall then be added to the catalyzed mixture and mixed in a manner to achieve a homogenous blend.
4. The topping shall be applied over horizontal surfaces using a flat squeegee, trowels or other systems approved by the Manufacturer.
5. Immediately upon placing, the topping shall be degassed with a loop roller.
6. Flake aggregate shall be broadcast to excess into the wet material at the rate of 1 lbs/sf.
7. Allow material to fully cure. Vacuum, sweep and/or blow to remove all loose aggregate.

C. Topcoat
1. The topcoat shall be mixed and applied per manufacturer recommended procedure.
2. The topcoat shall be comprised of three components, a resin, hardener and filler as supplied by the manufacturer.
3. The topcoat will be applied at the rate of 100 sf per kit.
4. Non-Skid if required is broadcast at the rate of 1 lb per 100 sf and back rolled into the coating.
5. The finish floor will have a nominal thickness of 3/16 inch minimum.
6. Top coat to be applied minimum 3 coats for hardness and smoothness.

3.04 FIELD QUALITY CONTROL

A. Tests, Inspection
1. The following tests shall be conducted by the Applicator:
   a. Temperature
      1) Air, substrate temperatures and, if applicable, dew point.
2. Coverage Rates
   a. Rates for all layers shall be monitored by checking quantity of material used against the area covered.

3.05 CLEANING AND PROTECTION

A. Cure flooring material in compliance with manufacturer's directions, taking care to prevent their contamination during stages of application and prior to completion of the curing process.

B. Remove masking. Perform detail cleaning at floor termination, to leave cleanable surface for subsequent work of other sections.

END OF SECTION 09 67 23

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:

D. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
   5. Floors, unless specifically indicated.
   6. Glass.
   7. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

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

B. Section 09 91 23 - Interior Painting.

C. Section 09 96 00 - High-Performance Coatings.

D. Section 23 37 00 - Air Outlets and Inlets

E. Section 23 37 10 - Exterior Wall Louvers

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. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; current edition, www.paintinfo.com.

C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.

D. SSPC-SP 1 - Solvent Cleaning; 2015.

E. SSPC-SP 2 - Hand Tool Cleaning; 2018.

F. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

G. SSPC-SP 13 - Surface Preparation of Concrete; 2018.

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. MPI product number (e.g. MPI #47).
   3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.

C. Samples: Submit three paper samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
   1. Where sheen is specified, submit samples in only that sheen.
   2. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens not required.
   3. Allow 30 days for approval process, after receipt of complete samples by Architect.

D. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
   3. Label each container with color in addition to the manufacturer's label.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum five yearsdocumented experience.

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

1.06 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the paint product manufacturer's temperature ranges.

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 for exterior; unless required otherwise by manufacturer's instructions.

PART 2 PRODUCTS

2.01 REFER TO "FINISH MATERIAL SCHEDULE" ON SHEET A9 FOR MANUFACTURER INFORMATION AND MATERIAL SELECTIONS. ALSO REFERENCE OTHER SERIES DRAWINGS (FINISH PLANS) FOR ADDITIONAL INFORMATION, LOCATIONS, AND EXTENT OF MATERIALS.

2.02 MANUFACTURERS

A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
   1. If a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
   2. Substitution of MPI-approved products by a different manufacturer is preferred over substitution of unapproved products by the same manufacturer.
   3. Substitution of other products by the same manufacturer is preferred over substitution of products by a different manufacturer.

B. Paints:
   1. Behr Process Corporation: www.behr.com.
   2. PPG Paints: www.ppgpaints.com.
   3. Pratt & Lambert Paints: www.prattandlambert.com.

4. Sherwin-Williams Company: www.sherwin-williams.com/.

C. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready-mixed, unless required to be a field-catalyzed paint.
   1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
   2. 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.
   3. 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.
   4. Supply each paint material in quantity required to complete entire project's work from a single production run.
   5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is described explicitly 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. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

2.04 PAINT SYSTEMS - EXTERIOR

A. Paint E-OP - Exterior Surfaces to be Painted, Unless Otherwise Indicated: Including primed wood and primed metal.
   1. Two top coats and one coat primer.
   2. Top Coat(s): Exterior Latex; MPI #10, 11, 15, 119, or 214.
      a. Products:
         1) Behr Marquee Exterior Satin Enamel [No. 9450]. (MPI #15)
         2) Pittsburgh Paints Acri-Shield Max Exterior Latex, 739-10 Series, Satin.
         3) Rodda Protector Satin, 532201. (MPI #15)
         4) Sherwin-Williams Resilience, Satin. (MPI #15)
   3. Top Coat(s): Exterior Light Industrial Coating, Water Based; MPI #161, 163, or 164.
      a. Products:
         1) Behr Premium Interior/Exterior Direct-To-Metal Paint Gloss [No. 8200]. (MPI #164)
         2) Pittsburgh Paints Pitt-Tech Plus DTM Industrial Enamel, 90-1310 Series, Gloss.

B. Paint ME-OP-2L - Ferrous Metals, Primed, Latex, 2 Coat:
   1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
   2. Semi-gloss: Two coats of latex enamel.

2.05 PRIMERS

A. Primers: Provide the primer as required or recommended by manufacturer of top coats.

2.06 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

C. Test shop-applied primer for compatibility with subsequent cover materials.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

F. Galvanized Surfaces:
   1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
   2. Prepare surface according to SSPC-SP 2.

G. Ferrous Metal:
   1. Solvent clean according to SSPC-SP 1.
   2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.
   3. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

3.03 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

D. Apply each coat to uniform appearance.

E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

F. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

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

3.05 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION 09 91 13

SECTION 09 91 23
INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
   1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
   2. Elevator pit ladders.
   3. Mechanical and Electrical:
      a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
      b. Paint interior surfaces of air ducts and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.

D. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
   5. Floors, unless specifically indicated.
   6. Ceramic and other tiles.
   7. Glass.
   8. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

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

B. Section 09 91 13 - Exterior Painting.

C. Section 09 96 00 - High-Performance Coatings.

D. Division 23 - Mechanical

E. Section 23 37 00 - Air Outlets and Inlets

F. Section 23 37 10 - Exterior Wall Louvers

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 D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.

C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.

D. SSPC-SP 1 - Solvent Cleaning; 2015.

E. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

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. MPI product number (e.g., MPI #47).
   3. Cross-reference to specified paint system products to be used in project; include description of each system.
   4. Manufacturer's installation instructions.

C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
   1. Where sheen is specified, submit samples in only that sheen.
   2. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens not required.
   3. Allow 30 days for approval process, after receipt of complete samples by Architect
   4. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as masonry, have been approved.

D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.

E. Manufacturer's Instructions: Indicate special surface preparation procedures.

F. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Paint and Finish Materials: 1 gal of each color; from the same product run, store where directed.
   3. Label each container with color in addition to the manufacturer's label.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum five yearsdocumented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years documented experience.

1.06 MOCK-UP

A. See Section 01 43 00 - Quality Assurance, for general requirements for mock-up.

B. Locate where directed by Architect.

C. 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 and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply materials when relative humidity exceeds 85 percent, at temperatures less than 5 degrees F above the dew point, or to damp or wet surfaces.

D. Minimum Application Temperatures for Paints: 50 degrees F for interiors unless required otherwise by manufacturer's instructions.

E. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior, unless required otherwise by manufacturer's instructions.

F. Provide lighting level of 80 fc measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 REFER TO "FINISH MATERIAL SCHEDULE" ON SHEET A9.1 FOR MANUFACTURER INFORMATION AND MATERIAL SELECTIONS. ALSO REFERENCE OTHER A9 SERIES DRAWINGS (FINISH PLANS) FOR ADDITIONAL INFORMATION, LOCATIONS AND EXTENT OF MATERIALS.

2.02 MANUFACTURERS

A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
   1. If a single manufacturer cannot provide specified products; minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
   2. Substitution of MPI-approved products by a different manufacturer is preferred over substitution of unapproved products by the same manufacturer.
   3. Substitution of other products by the same manufacturer is preferred over substitution of products by a different manufacturer.

B. Paints:
   1. Behr Process Corporation: www.behr.com.
   2. PPG Paints: www.ppgpaints.com.
   3. Pratt & Lambert Paints: www.prattandlambert.com.
   4. Sherwin-Williams Company: www.sherwin-williams.com.
   5. Valspar Corporation: www.valsparpaint.com.

C. Primer Sealers: Same manufacturer as top coats.

D. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready-mixed, unless intended to be a field-catalyzed paint.
   1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
   3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
   4. Supply each paint material in quantity required to complete entire project's work from a single production run.

5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. 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. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

D. Colors: As indicated on drawings.
   1. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling under which they are mounted.

2.04 PAINT SYSTEMS - INTERIOR

A. Paint I-OP - Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board, concrete masonry units, wood, uncoated steel, shop primed steel, and galvanized steel.

B. Sheen: Eggshell / Satin
   1. Two top coats and one coat primer.
   2. Top Coat(s): Institutional Low Odor/VOC Interior Latex; MPI #143, 144, 145, 146, 147, or 148.
      a. Products:
         1) Behr Premium Plus Interior Flat [No.1050]. (MPI #143)
         2) Behr Premium Plus Interior Satin Enamel [No.7050]. (MPI #146)
         3) Behr Premium Plus Interior Semi-Gloss Enamel [No.3050]. (MPI #147)
         4) Pittsburgh Paints Speedhide Zero Interior Latex, 6-5110 Series, Flat. (MPI #143)
         5) Pittsburgh Paints Speedhide Zero Interior Latex, 6-5310 Series, Eggshell.
         6) Pittsburgh Paints Speedhide Zero Interior Latex, 6-5510 Series, Semi-Gloss. (MPI #147)
         7) Sherwin-Williams ProMar 200 Zero VOC Interior Latex, Flat.
         8) Sherwin-Williams ProMar 200 Zero VOC Interior Latex, Low Sheen. (MPI #144)
         9) Sherwin-Williams ProMar 200 Zero VOC Interior Latex, Semi-Gloss.
   3. Top Coat Sheen:
      a. Flat: MPI gloss level 1; use this sheen for ceilings and other overhead surfaces.
      b. Eggshell: MPI gloss level 3; use this sheen at all locations unless otherwise noted.
   4. Primer: As recommended by top coat manufacturer for specific substrate.

C. Paint I-OP-MD-DT - Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals and wood:
   1. Medium duty applications include doors, door frames, railings, handrails, and guardrails.
   2. Sheen: Semi-gloss
   3. Two top coats and one coat primer.
   4. Top Coat(s): Interior Light Industrial Coating, Water Based; MPI #151, 153, or 154.
      a. Products:
         1) Pittsburgh Paints Pitt-Tech Plus EP WB DTM Industrial Enamel. 90-1610 Series, Semi-Gloss. (MPI #153)
         2) Sherwin-Williams Pro Industrial Acrylic Coating, Semi-Gloss. (MPI #153)
         3) Substitutions: See Section 01 60 00 - Product Requirements
   5. Top Coat Sheen:

a. Semi-Gloss: MPI gloss level 5; use this sheen at all locations unless otherwise noted.

6. Primer: As recommended by top coat manufacturer for specific substrate.

D. Paint I-OP-MD-WC - Medium Duty Vertical: Including gypsum board, plaster, concrete, and concrete masonry units. Use at all locations designated as Epoxy Paint (EPT) on drawings.
   1. Two top coats and one coat primer.
   2. Top Coat(s): Interior Light Industrial Coating, Water Based; MPI #151, 153, or 154.
      a. Products:
         1) Behr Pro, Pre-Catalyzed Waterborne Epoxy Semi-Gloss No. HP 150
         2) Pittsburgh Paints Pitt-Tech Plus EP WB DTM Industrial Enamel, 90-1510 Series, Gloss. (MPI #154)
         3) Sherwin-Williams Pro Industrial Acrylic Coating, Gloss. (MPI #154)
         4) Substitutions: See Section 01 60 00 - Product Requirements
   3. Top Coat Sheen:
      a. Eggshell: MPI gloss level 3; use this sheen at all locations.
      b. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
   4. Primer: As recommended by top coat manufacturer for specific substrate.

E. Paint WI-OP-3L - Wood, Opaque, Latex, 3 Coat:
   1. One coat of latex primer sealer.
   2. Semi-gloss: Two coats of latex enamel.

2.05 PRIMERS

A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
   1. Interior/Exterior Latex Block Filler; MPI #4.

2.06 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 adequately prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

D. Test shop-applied primer for compatibility with subsequent cover materials.

E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums:
   1. Gypsum Wallboard: 12 percent.
   2. Plaster and Stucco: 12 percent.
   3. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
   4. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
   5. 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 mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. 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.

F. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

G. Plaster: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high-alkali surfaces.

H. Galvanized Surfaces:
   1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.

I. Ferrous Metal:
   1. Solvent clean according to SSPC-SP 1.
   2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
   3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 Commercial Blast Cleaning. Protect from corrosion until coated.

3.03 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

F. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

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

3.05 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION 09 91 23

GARMANN MILLER

Division 10

Specialties

SECTION 10 14 19
DIMENSIONAL LETTER SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Building Letters.

1.02 RELATED SECTIONS

A. Section 01 60 00 - Products Requirements

1.03 REFERENCES

A. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible To and Usable By Physically Handicapped People.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.

C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
   1. When room numbers to appear on signs differ from those on the drawings, include the drawing room number on schedule.
   2. When content of signs is indicated to be determined later, request such information from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
   3. Submit for approval by Owner through Architect prior to fabrication.

D. Samples:
   1. Submit one (1) sample building letter, room/occupancy sign shown construction, text style, etc.
   2. Submit one sample other signs required, of size not less than 10 inches by 12 inches similar to that required for project, illustrating sign style, font, and method of attachment.
   3. Sample will be returned to contractor.

E. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.

F. Verification Samples: Submit samples showing colors specified not less than 10 inches by 12 inches.

G. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.

1.05 QUALIFICATIONS

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

1.06 REGULATORY REQUIREMENTS

A. Conform to OBBC code and ANSI A117.1 for requirements for the physically handicapped.

B. Signage shall conform to with the Americans with Disabilities Act Accessibility Guidelines (ADAAG). These requirements supersede Technical Specifications in this Section.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Section 01 6000 - Product Requirements.

B. Store adhesive attachment tape at ambient room temperatures.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Do not install signs when ambient temperature is lower than recommended by manufacturer.

B. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS

2.01 REFER TO A12 SERIES DRAWINGS FOR SIGNAGE MATERIALS, LAYOUT AND LOCATIONS

2.02 BUILDING LETTERS

A. Manufacturer:
   1. Ace Sign Systems Inc., Ft Wayne Indiana
   2. Americraft Co. Inc
   3. ASI Sign Systems, Indianapolis, Indiana: Cleveland, Ohio: Cincinnati, Ohio
   4. Columbus Graphics Inc.
   5. Ellet Sign Company: www.elletneon.com
   6. Forty Nine Degrees, Coldwater, Ohio
   7. Matthews, Pittsburgh, Pennsylvania
   8. Substitutions: See Section 01 6000 - Products Requirements
      a. Provide data showing product and hardware of proposed substitution are equivalent to better than specified product.
      b. Provide sample of items to be considered for review by the Architect. Samples will be returned.

B. Product: Dimensional Letters - Fabricated Metal Letters, non-illuminated.
   1. Letter Style: Century Gothic or as indicated on the drawings
   2. Text: As indicated on the drawings
   3. Letter Height: As indicated on the drawings
   4. Thickness:
      a. Letter thickness 1 inches
      b. Material thickness 1/16 inch minimum
   5. Material: Aluminum
   6. Color: Refer to A9.1 for color or as indicated on the drawings
   7. Fabrication
      a. Design, fabricate, and install sign assemblies to prevent buckling, opening up of joints, and over-stressing of welds and fasteners.
      b. Mill joints to a tight, hairline fit. Form joints exposed to the weather to exclude water penetration.
      c. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.
      d. Create signage to required sizes and layout. Comply with requirements indicated for design, dimensions, finish, color, and details of construction.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.02 GENERAL INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install signs and letters level and plumb.

C. Install product in locations indicated using mounting methods recommended by sign manufacturer and free from distortion, warp, or defect adversely affecting appearance

D. Install product at heights to conform to Americans with Disabilities Act Accessibility Guidelines (ADAAG) and applicable local amendments and regulations.

3.03 DIMENSIONAL LETTERS

A. Locate lettering where indicated on drawings.

B. Install neatly, with horizontal edges level.

C. Confirm attachement to surface during submittal process.

3.04 CLEANING AND PROTECTION

A. Clean exposed surfaces. Remove construction and installation marks.

B. Remove temporary coverings.

C. Protect installed signs from subsequent construction operations.

END OF SECTION 10 14 19

SECTION 10 14 20
VINYL SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exterior Door Identification

1.02 REFERENCES

A. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible To and Usable By Physically Handicapped People.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. See Section 01 6116 VOC Content Restrictions, for VOC submittal procedures

C. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.

D. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
   1. When room numbers to appear on signs differ from those on the drawings, include the drawing room number on schedule.
   2. When content of signs is indicated to be determined later, request such information from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
   3. Submit for approval by Owner through Architect prior to fabrication.

E. Samples:
   1. Submit one (1) sample building letter, room/occupancy sign shown construction, text style, etc.
   2. Submit one sample other signs required, of size not less than 10 inches by 12 inches similar to that required for project, illustrating sign style, font, and method of attachment.
   3. Sample will be returned to contractor.

F. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.

G. Verification Samples: Submit samples showing colors specified not less than 10 inches by 12 inches.

H. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.

1.04 QUALIFICATIONS

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

1.05 REGULATORY REQUIREMENTS

A. Conform to OBBC code and ANSI A117.1 for requirements for the physically handicapped.

B. Signage shall conform to with the Americans with Disabilities Act Accessibility Guidelines (ADAAG). These requirements supersede Technical Specifications in this Section.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Section 01 6000 - Product Requirements.

B. Store adhesive attachment tape at ambient room temperatures.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Do not install signs when ambient temperature is lower than recommended by manufacturer.

B. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS

2.01 REFER TO A12 SERIES DRAWINGS FOR SIGNAGE MATERIALS, LAYOUT AND LOCATIONS

2.02 EXTERIOR DOOR IDENTIFICATION

A. Dimensional Letters - Cut Vinyl Dimensional Letters 2 mil thick, non-illuminated, colored acrylic
   1. Application: On exterior doors
   2. Letter Style: Arial
   3. Text: As indicated on the drawings
   4. Letter Height: As indicated on the drawings
   5. Material: 2 mil vinyl film
   6. Mounting Method: Adhesive
   7. Color: Integrally-Colored - selected from manufacturer's standard colors
   8. Fabrication
      a. Design, fabricate, and install sign assemblies to prevent buckling, opening up of joints, and over-stressing of welds and fasteners.
      b. Mill joints to a tight, hairline fit. Form joints exposed to the weather to exclude water penetration.
      c. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.
      d. Create signage to required sizes and layout. Comply with requirements indicated for design, dimensions, finish, color, and details of construction.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.02 GENERAL INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install signs and letters level and plumb.

C. Install product in locations indicated using mounting methods recommended by sign manufacturer and free from distortion, warp, or defect adversely affecting appearance

D. Install product at heights to conform to Americans with Disabilities Act Accessibility Guidelines (ADAAG) and applicable local amendments and regulations.

3.03 EXTERIOR DOOR IDENTIFICATION

A. Locate:
   1. Sign where indicated
   2. Dimensional Letters Unless indicated otherwise: Locate on interior side of glass with centerline of sign at 72 inches above finished floor, center on door.
   3. Acrylic: Unless indicated otherwise: Locate on wall at latch side of door with centerline of sign at 72 inches above finished floor.

B. Install neatly, with horizontal edges level.

C. Mounting:

1. Dimensional Letters: Adhered

3.04 CLEANING AND PROTECTION

A. Clean exposed surfaces. Remove construction and installation marks.

B. Remove temporary coverings.

C. Protect installed signs from subsequent construction operations.

END OF SECTION 10 14 20

SECTION 10 14 67
TACTILE SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Room and Restroom Signs

1.02 RELATED SECTIONS

A. Section 01 60 00 - Products Requirements

1.03 REFERENCES

A. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible To and Usable By Physically Handicapped People.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.

C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
   1. When room numbers to appear on signs differ from those on the drawings, include the drawing room number on schedule.
   2. When content of signs is indicated to be determined later, request such information from Owner through Garmann/Miller & Associates Inc.Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
   3. Submit for approval by Owner through Garmann/Miller & Associates Inc.Architect prior to fabrication.

D. Samples:
   1. Submit one (1) sample building letter, room/occupancy sign shown construction, text style, etc.
   2. Submit one sample other signs required, of size not less than 10 inches by 12 inches similar to that required for project, illustrating sign style, font, and method of attachment.
   3. Sample will be returned to contractor.

E. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.

F. Verification Samples: Submit samples showing colors specified not less than 10 inches by 12 inches.

G. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.

1.05 QUALIFICATIONS

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

1.06 REGULATORY REQUIREMENTS

A. Conform to OBBC code and ANSI A117.1 for requirements for the physically handicapped.

B. Signage shall conform to with the Americans with Disabilities Act Accessibility Guidelines (ADAAG). These requirements supersede Technical Specifications in this Section.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Section 01 6000 - Product Requirements.

B. Store adhesive attachment tape at ambient room temperatures.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Do not install signs when ambient temperature is lower than recommended by manufacturer.

B. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS

2.01 REFER TO A9 AND A1 SERIES DRAWINGS FOR SIGNAGE MATERIALS, LAYOUT AND LOCATIONS

2.02 ROOM AND RESTROOM SIGNS

A. Manufacturer:
   1. Ace Sign Systems Inc., Ft Wayne Indiana
   2. ASI Sign Systems, Indianapolis, Indiana: Cleveland, Ohio: Cincinnati, Ohio
   3. Columbus Graphics Inc.
   4. Ellet Sign Company: www.elletneon.com
   5. Matthews, Pittsburgh, Pennsylvania
   6. Substitutions: See Section 01 6000 - Products Requirements
      a. Provide data showing product and hardware of proposed substitution are equivalent to better than specified product.
      b. Provide sample of items to be considered for review by the Architect. Samples will be returned.

B. Product: Acrylic w/ subsurface Graphic Sign.
   1. Material: 1/2" thick non glare exterior grade acrylic, integrally colored.
   2. Graphic Process: Tactile letters and braille achieved through Raster process. Surface applied letters and braille are not permitted.
   3. Letters: Letters and numbers shall be raised 1/32 inch from sign face. All text shall be accompanied by Grade 2 Braille.
   4. Colors: The architect will select from manufacturers standard colors for background and text. Characters, symbols and text shall contract with background and and have a non-glare finish .
   5. Sign Size:
      a. Toilet Room Handicapped Sign: 9 inch by 9 inch with 3/8 inch radius corners.
      b. Interior Room Name and Number Sign: 9 inch by 9 inch with 3/8 inch radius corners.
   6. Sign Text:
      a. Toilet Room Handicapped Sign: International Men/Women Symbol, accessibility symbol, text "Men" or "Women" and Grade 2 Braille.
      b. Interior Room Name and Number Sign: Copy to be centered horizontally and vertically. Text size 1inch high. Text type to be Gothic, Upper and lower case. Copy to be provided by the architect.
   7. Mounting: Stand-off mount hardware for exterior grade application. 1/2" diameter round stand-off mechanical mount.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.02 GENERAL INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install signs and letters level and plumb.

C. Install product in locations indicated using mounting methods recommended by sign manufacturer and free from distortion, warp, or defect adversely affecting appearance

D. Install product at heights to conform to Americans with Disabilities Act Accessibility Guidelines (ADAAG) and applicable local amendments and regulations.

3.03 CLEANING AND PROTECTION

A. Clean exposed surfaces. Remove construction and installation marks.

B. Remove temporary coverings.

C. Protect installed signs from subsequent construction operations.

END OF SECTION 10 14 67

SECTION 10 26 23
PROTECTIVE WALL COVERING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fiberglass reinforced plastic panels.

B. Trim.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics; 2010.

B. ASTM D2583 - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor; 2013a.

C. ASTM D5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels; 2017.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

C. Samples: Submit two samples 12 by 12 inch in size illustrating material and surface design of panels.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store panels flat, indoors, on a clean, dry surface. Remove packaging and allow panels to acclimate to room temperature for 48 hours prior to installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fiberglass Reinforced Plastic Panels:
   1. Marlite; Artizan Collection: www.marlite.com.
   2. Acceptable Manufacturers:
      a. Crane Composites, Inc: www.cranecomposites.com.
      b. Inpro Corp, www.inprocorp.com
      c. Nudo: www.nudo.com.
   3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PANEL SYSTEMS

A. Wall Panels Fiberglass Reinforced Panel, FRP1:
   1. Panel Size: 4 by 8 feet.
   2. Panel Thickness: 0.09 inch.
   3. Surface Design: Embossed.
   4. Color: Refer to A9.1 Finish Material Schedule.
   5. Attachment Method: Mechanical fasteners concealed by trim, with sealant in joints and sealants behind majority of panel.
   6. Fiberglass reinforced thermosetting polyester resin panel sheets complying with ASTM D 5319.

a. Coating: Multi layer print, primer and finish coats.
b. Dimensions:
    1) Thickness - 0.090 inch (2.29mm) nominal
    2) Width - 4'-0" (1.22m) nominal
    3) Length - As indicated on the drawings.
c. Tolerance:
    1) Length and Width: +/-1/8 inch (3.175mm)
    2) Square - Not to exceed 1/8 inch for 8 foot (2.4m) panels or 5/32 inch (3.96mm) for 10 foot (2.4m) panels
d. Properties: Resistant to rot, corrosion, staining, denting, peeling, and splintering.
    1) Flexural Strength - 1.0 x 104 psi per ASTM D 790. (7.0 kilogram-force/square millimeter)
    2) Flexural Modulus - 3.1 x 105 psi per ASTM D 790. (217.9 kilogram-force/square millimeter)
    3) Tensile Strength - 7.0 x 103 psi per ASTM D 638. (4.9 kilogram-force/square millimeter)
    4) Tensile Modulus - 1.6 x 105 psi per ASTM D 638. (112.5 kilogram-force/square millimeter)
    5) Water Absorption - 0.72% per ASTM D 570.
    6) Barcol Hardness (scratch resistance) of 35 55 as per ASTM D 2583.
    7) Izod Impact Strength of 72 ft. lbs./in ASTM D 256

7. Manufacturers: Refer to "Finish Material Schedule" on drawing A9.0.

2.03 MATERIALS

A. Panels: Fiberglass reinforced plastic (FRP), complying with ASTM D5319.
    1. Surface Burning Characteristics: Maximum flame spread index of 25 and smoke developed index of 450; when system tested in accordance with ASTM E84.

B. Trim: Vinyl; color coordinating with panel. Unless noted otherwise on drawings.

C. Fasteners: Glue on backside of panel. Minimal use of exposed fasteners is desired. .

D. Adhesive: Type recommended by panel manufacturer.

E. Sealant: Type recommended by panel manufacturer; color matching panel.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions and substrate flatness before starting work.

B. Verify that substrate conditions are ready to receive the work of this section.

3.02 INSTALLATION - WALLS

A. Install panels in accordance with manufacturer's instructions.

B. Cut and drill panels with carbide tipped saw blades, drill bits, or snips.

C. Pre-drill fastener holes in panels, 1/8 inch greater in diameter than fastener, spaced as indicated by panel manufacturer.

D. Apply adhesive to the back side of the panel using trowel as recommended by adhesive manufacturer.

E. Apply panels to wall with seams plumb and pattern aligned with adjoining panels.

F. Install panels with manufacturer's recommended gap for panel field and corner joints.

G. Drive fasteners to provide snug fit, and do not over-tighten.

H. Place trim on panel before fastening edges, as required.

I. Fill channels in trim with sealant before attaching to panel.

J. Install trim with adhesive and screws or nails, as required.

K. Seal gaps at floor, ceiling, and between panels with applicable sealant to prevent moisture intrusion.

L. Remove excess sealant after paneling is installed and prior to curing.

3.03 CLEANING

A. Clean panel surfaces in compliance with manufacturer's recommendations.

B. Use a clean, damp, nonabrasive cotton cloth and a mild liquid detergent or household cleaner.

C. Rinse with clean water using a clean, nonabrasive cotton cloth.

D. Dry panels with a soft, clean nonabrasive cotton cloth.

E. Do not use cleaners containing acid, alkali or sodium hypochlorite.

END OF SECTION 10 26 23

SECTION 10 28 00
TOILET ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Commercial toilet accessories.

B. Accessories for toilet rooms.

C. Electric hand/hair dryers.

D. Grab bars.

E. Installation of accessories supplied by owner.

1.02 RELATED REQUIREMENTS

A. Section 10 21 13.19 - Plastic Toilet Compartments.

B. Section 26 05 76 - Hair Dryers/Hand Dryers: Electric hand dryers.

1.03 REFERENCE STANDARDS

A. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2015a (Reapproved 2019).

B. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.

C. ASTM C1036 - Standard Specification for Flat Glass; 2011.

D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.

1.04 ADMINISTRATIVE REQUIREMENTS

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

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

C. Manufacturer's Installation Instructions: Indicate special procedures.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Keys: Master keys to lockable accessories
   3. Liners: Extra baby changing station liners.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Bobrick Washroom Equipment Inc..

B. Commercial Toilet, Shower, and Bath Accessories:
   1. AJW Architectural Products: www.ajw.com.
   2. American Specialties, Inc: www.americanspecialties.com.
   3. Bradley Corporation: www.bradleycorp.com.
   4. Georgia-Pacific Professional: www.blue-connect.com.
   5. Substitutions: Section 01 60 00 - Product Requirements.

C. Provide products of each category type by single manufacturer.

2.02 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
   1. Provide vandal-resistant fasteners and anchors
   2. Grind welded joints smooth.
   3. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.

B. Keys: Provide 1 keys for each accessory to Owner; master key lockable accessories.

C. Stainless Steel Sheet: ASTM A666/A666M, Type 304.

D. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.

E. Mirror Glass: Tempered safety glass, ASTM C1048; and ASTM C1036 Type I, Class 1, Quality Q2, with silvering as required.

F. Adhesive: Two component epoxy type, waterproof.

G. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

H. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.03 FINISHES

A. Stainless Steel: Satin finish, unless otherwise noted.

2.04 COMMERCIAL TOILET ACCESSORIES

A. See Toilet Accessory Schedule on the drawings

B. TA1; Grab Bars
   1. Stainless steel, nonslip grasping surface finish.
   2. Push/Pull Point Load: 250 pound-force, minimum.
   3. Dimensions: 1 1/2 inch outside diameter, minimum22 gage wall thickness, concealed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
   4. Length and Configuration: As indicated on drawings.
   5. Product: B-6806 Series manufactured by Bobrick.

C. TA2.; Mirrors
   1. Stainless steel framed, 6 mm thick tempered glass mirror.
   2. Frame: 3/4 x 3/4 inch angle shapes, with mitered and welded and ground corners, and tamperproof hanging system; No.4 finish.
   3. Size and Configuration: As indicated on drawings.
   4. Product: B 2908 Series manufactured by Bobrick.

D. TA3.2; Toilet Paper Dispenser
   1. Surface-mounted multi-roll toilet tissue dispenser shall be type-304 stainless steel with all-welded construction, including dispensing mechanism, inner housing and cam; exposed surfaces shall have satin finish. Front of toilet tissue dispenser door shall be drawn, one-piece, seamless construction. Door shall equipped with a tumbler lock keyed like other accessories
   2. Unit shall dispense two standard-core toilet tissue rolls up to 5-1/4" (133mm) diameter.
   3. Extra roll shall automatically drop in place when bottom roll is depleted.
   4. Unit shall be equipped with two theft-resistant, heavy-duty, one piece, molded ABS spindles.
   5. Product: B-2888 manufactured by Bobrick.

E. TA4.1; Sanitary Napkin Disposal Unit
   1. Stainless steel, surface-mounted, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.

2. Product: B-254 manufactured by Bobrick.

F. TA5.1; Soap Dispenser
   1. Surface-mounted soap dispenser shall be type-304 stainless steel with satin-finish. Corrosion-resistant valve shall dispense commercially marketed all-purpose hand soaps.
   2. Valve shall be operable with one hand and with less than 5 pounds of force (22.2 N) to comply with barrier-free accessibility guidelines (including ADAAG in the U.S.A.).
   3. Container shall be equipped with a clear acrylic refill-indicator window; a locked, hinged stainless steel lid for top filling; and shall have a capacity of 40-fl oz (1.2-L).
   4. Unit shall have concealed, vandal-resistant mounting.
   5. Product: B-2111 manufactured by Bobrick.

G. TA6.1 Paper Towel Dispenser:
   1. Surface-mounted roll-paper-towel dispenser with durable, high-impact, dark translucent grey resin door with high-gloss finish on exposed surfaces and durable, high-impact, light grey resin housing with matte finish. Door shall be secured to housing with two stainless steel hinge pins and keyed lock. Door shall have lock which is opened with removable key.
   2. Towel mechanism accommodates up to 8" (205mm) wide, 8" (205mm) diameter, non-perforated paper towel rolls. Towel mechanism dispenses one 12" (305mm) length of towel per pull. Automatic transfer shall dispense stub roll up to 3-1/2" (90mm) diameter before new roll is dispensed. Equipped with paper towel feed wheel for use in filling the dispenser, for user to advance paper.
   3. Paper towels are dispensed with pull force of less than 5 pounds (22.2 N) to comply with accessible design guidelines (including ADAAG in U.S.A.).
   4. Product: B-72860 manufactured by Bobrick.

H. TA8.1; Baby Changing Station: Station shall be high-density polyethylene, surface mounted. Unit shall be equipped with a pneumatic cylinder for controlled opening and closing of bed. Bed shall be secured to back plate with a concealed, full length steel on steel hinge. No hinge structure shall be exposed on interior or exterior surfaces. Unit shall have 11 gauge steel mounting plates with mounting hardware included. Unit shall have Mircorban antimicrobial embedded into plastic material. Bed shall have smooth concave changing area with nylon safety strap and two hooks for bags or purses. Unit shall have built in liner dispenser, universal instruction graphics, and safety messages in six languages and braille.
   1. Unit shall have a built-in Liner Dispenser for use with 3-ply chemical free biodegradable bed liners, instructional graphics and safety messages in 4 languages. Provide braille labels. Unit shall be backed by manufacturer's 5-year limited warranty on materials and workmanship and include a provision for replacement caused by vandalism.
   2. Provide one (1) case of bed liners (500 liners per case).
   3. Product: KB300 manufactured by Koala Kare Products a Division of Bobrick

I. Electric Dryers: Traditional fan-in-case type, with downward nozzle.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.

D. Verify that field measurements are as indicated on drawings.

E. See Section 06 1000 for installation of blocking, reinforcing plates, and concealed anchors in walls.

3.02 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

A. Refer to A0.2 Drawing for mounting heights and locations.

B. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.

C. Install accessories with vandal-resistant fasteners.

D. Install plumb and level, securely and rigidly anchored to substrate.

E. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

3.04 PROTECTION

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

END OF SECTION 10 28 00

SECTION 10 41 16
EMERGENCY KEY CABINETS

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. High-Security key lock box cabinet, accessories and their installation.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.

B. Division 26 - Electrical

C. Division 28 - Fire Alarm System

1.03 REFERENCES

A. UL 437 - Standard for Key Locks

B. UL 1037 - Standard for Anti-Theft Alarms and Devices

C. UL 1332 - Standard for organic coatings for steel enclosures for outdoor use.

D. UL 1610 - Standard for central station burglar alarm units

E. NFPA. OFC, IBC

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Small-scale plans showing details of key lock box cabinet.

C. Product Data: Materials description for key lock box cabinet include roughing-in dimensions, details showing mounting methods, relationships to surrounding construction, door hardware, cabinet type and materials, trim style and door construction, door style and materials.

D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

1.05 DELIVERY, STORAGE & HANDLING

A. Deliver materials in manufacturer's original packaging with identification labels intact.

B. Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

C. Remove from site and dispose of packaging materials at appropriate recycling facilities.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Manufacturer: Knox Company
   1. 1601 W. Deer Valley Rd
   2. Phoenix, AZ 85207
   3. P: 1-800-552-5669
   4. www.knoxbox.com

B. Basis of Design - Knoxbox 3200

C. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 HIGH - SECURITY KEY LOCK BOX

A. Mounting Type: Recessed

B. Finish: Fire resistant finish.

C. Color: As selected from manufacturers standard colors.

D. Capacity: 10 keys and Key Fob.

E. Cabinet Construction: 1/4 inch plate steel fully welded.

F. Exterior Dimensions:
   1. Cabinet Body: 4 inches high x 5 inches wide x 3 7/8 inches deep
   2. Recessed Mount Flange: 7 inches wide x 7 inches high

G. Door Construction: 1/2 inch thick steel.

H. Weather-Resistant door gasket.

I. Stainless Steel door hinge.

J. 1/8 inch thick stainless steel dust cover for over keyed lock area.

2.03 ACCESSORIES

A. Provide 4 key tags and key rings.

B. Provide 1 - Tag - Out Tamper Seal.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

3.02 PREPARATION

A. Ensure surfaces are clean and free of dirt and other foreign matter harmful to performance of key cabinet materials.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Arrangement of Equipment: Arrange equipment so that removal for repairs or replacement does not require undue dismantling or removing of other equipment components.

C. Coordinate key lock box cabinet work with work of other trades for proper time and sequence to avoid construction delays.

3.04 ADJUSTMENT

A. Be sure that the lock functions smoothly and the door opens easily.

3.05 CLEANING

A. Upon completion, remove surplus and excess materials, rubbish, tools and equipment.

3.06 PROTECTION

A. Protect installed products from damage during construction in accordance.

END OF SECTION 10 41 16

SECTION 10 44 00
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire extinguishers.

B. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.

1.03 REFERENCE STANDARDS

A. FM (AG) - FM Approval Guide; current edition.

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

C. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.

C. Product Data: Provide extinguisher operational features.

D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

1.05 REGULATORY REQUIREMENTS

A. Fire extinguishers are required to be tagged and punched by an indvidual licensed in the State of Ohio.

1.06 FIELD CONDITIONS

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

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fire Extinguishers:
   1. JL Industries, Inc: www.jlindustries.com.
   2. Larsen's Manufacturing Co: www.larsensmfg.com.
   3. Potter-Roemer: www.potterroemer.com.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

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 (DIR) or FM (AG) for purpose specified and as indicated.

B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
   1. Stored Pressure Operated: Deep Drawn.
   2. Class: A:B:C type.
   3. Size: 10 pound.
   4. Finish: Baked polyester powder coat red color.
   5. Temperature range: -65 degrees F to 120 degrees F.
   6. Location: All locations unless otherwise indicated

2.03 ACCESSORIES

A. Extinguisher Brackets: Formed steel, chrome-plated.

B. Cabinet Signage: "FIRE EXTINGUISHER" decal in black letters.
   1. Provide signage on front of cabinet.
   2. Provide signage on side of cabinet (semi recessed and surface mounted) with a cabinet exposure of 2 1/2 inches or greater.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install brackets on walls. Reference drawings for mounting heights and also coordinate with requirements on authorities having jurisdiction.

C. Install cabinets plumb and level in wall openings. Reference details on drawings and coordinate with requirements of authorities having jurisdiction to confirm mounting heights and cabinet locations.

D. Secure rigidly in place.

E. Place extinguishers in cabinets and on wall brackets.

3.03 ADJUSTMENT

A. Adjust cabinet doors to achieve smooth operation.

3.04 CLEANING

A. Clean all surfaces.

B. Upon completion, remove surplus and excess materials, rubbish, tools and equipment.

3.05 PROTECTION

A. Protect installed products from damage during construction in accordance.

END OF SECTION 10 44 00

GARMANN MILLER

Division 11

Equipment

SECTION 10 21 13.19
PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Solid plastic toilet compartments.

B. Urinal screens.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Blocking and supports.

B. Section 10 28 00 - Toilet Accessories.

1.03 REFERENCE STANDARDS

A. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2024.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the work with placement of support framing and anchors in walls and ceilings.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.

C. Product Data: Provide data on panel construction, hardware, and accessories.

D. Samples: Submit two samples of partition panels, 6 inch by 6 inch in size illustrating panel finish, color, and sheen.

E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Solid Plastic Toilet Compartments:
   1. ASI Accurate Partitions: www.accuratepartitions.com
   2. Hadrian, Inc, www.hadrian-inc.com
   3. Inpro: www.inprocorp.com
   4. Metpar Corp: www.metpar.com
   5. Partition Systems International of South Carolina; PolyLife HDPE Toilet Partitions: www.psisc.com
   6. Scranton Products (Santana/Comtec/Capital): www.scrantonproducts.com
   7. Substitutions: Section 01 60 00 - Product Requirements.

2.02 PLASTIC TOILET COMPARTMENTS

A. Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid molded high density polyethylene (HDPE), tested in accordance with NFPA 286, floor-mounted headrail-braced.
   1. HDPE resins to be tested in accordance with NFPA 286.
   2. Polyethylene (HDPE) resins. Partitions shall be fabricated from polymer resins compounded under high pressure, forming a single component which is waterproof, non-absorbent and has a self-lubricating surface that resists marks from pens, pencils, markers and other writing instruments.

3. All plastic components shall be covered with a protective plastic masking.
4. Color: as selected by Architect from manufacturers standard line.

B. Doors:
1. Thickness: 1 inch.
2. Width:
   a. Standard Stall, less than 6'-0" deep: 24 inches.
   b. Standard Stall, 6'-0" and more deep: 30 inches.
   c. Wheelchair accessible stall: 36 inch, out-swinging.
   d. Ambulatory accessible stall: 34 inch, out-swinging.
3. Height: 55 inch. (nominal -manufacturer standard height)

C. Panels:
1. Thickness: 1 inch.
2. Height: 55 inch. (nominal - manufacturer standard height)
3. Depth: As indicated on drawings.

D. Pilasters:
1. Thickness: 1 inch.
2. Width: As required to fit space; minimum 3 inch.

E. Urinal Screens: Match compartments; mounted to wall with Continuous panel brackets .
1. Thickness: 1 inch
2. Height: 48 inch
3. Depth: 24 inch

2.03 ACCESSORIES

A. Pilaster Shoes: Stainless steel, satin finish, 3 inches high; concealing floor fastenings.
1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.

B. Head Rails: Extruded aluminum, anti-grip profile.
1. Size: 1 inch by 1 1/2 inch, minimum.

C. Wall and Pilaster Brackets: Satin stainless steel; continuous type.

D. Attachments, Screws, and Bolts: Stainless steel , tamper proof type.
1. For attaching panels and pilasters to brackets: Through-bolts and nuts ; tamper proof.

E. Hinges: Stainless steel; satin finish.
1. Continuous hinge, gravity-type self closing.

F. Door Hardware: Stainless steel; satin finish.
1. Door Latch: Slide type with exterior emergency access feature.
2. Door Strike and Keeper with Rubber Bumper: Continuous type, mount on pilaster in alignment with door latch.
3. Provide door pull each side for outswinging doors.

G. Coat Hook with Rubber Bumper: One per compartment, mounted on door.

H. Wall Stop: Provide wall mounted rubber bumper for outswinging doors that swing against walls.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify correct spacing of and between plumbing fixtures.

C. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.

B. Maintain 3/8 inch to 1/2 inch space between wall and panels and 1/2 inch and 1 inch between wall and end pilasters.

C. Attach panel brackets securely to walls using anchor devices.

D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

3.03 TOLERANCES

A. Maximum Variation From True Position: 1/4 inch.

B. Maximum Variation From Plumb: 1/8 inch.

3.04 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.

B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.

C. Adjust adjacent components for consistency of line or plane.

END OF SECTION 10 21 13.19

SECTION 11 30 33
RETRACTABLE STAIRS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manual disappearing stairways.

1.02 RELATED REQUIREMENTS

1.03 REFERENCES

A. ANSI A14.9: Safety Requirements for Ceiling Mounted Disappearing Climbing Systems.

1.04 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Shop Drawings for Stairs:
   1. Plan and section of stair installation.
   2. Indicate rough opening dimensions for ceiling and/or roof openings.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store stairway until installation inside under cover in manufacturer's unopened packaging. If stored outside, under a tarp or suitable cover.

1.06 WARRANTY

A. Limited Warranty: One year against defective material and workmanship, covering parts only. Defective parts, as deemed by the manufacturer, will be replaced at no charge, freight excluded, upon inspection at manufacturer's plant.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer: Precision Ladders, LLC, P. O. Box 2279; Morristown, TN 37816-2279; Tel: 423-586-2265; Fax: 423-586-2091; www.PrecisionLadders.com

B. Requests for substitutions will be considered in accordance with provisions of Section 01 6000.

2.02 MANUAL DISAPPEARING STAIRWAY.

A. Manual Disappearing Stairway.
   1. Standard Model: Super Simplex Disappearing Stairway as manufactured by Precision Ladders LLC.
      a. Stairs for ceiling heights 9'-10" - 12'-0": Model S1144-B-30

B. Performance Standard: Unit shall comply with ANSI A14.9,
   1. Commercial Type, for rough openings between 22 1/2 inches to 64 inches.
      a. Stairway capacity shall be rated at 500 lbs.

C. Accessories:
   1. Steel pole to aid opening and closing stairways.
   2. Stairs for ceiling heights 9' -10" - 12' -0" shall be equipped with one (1) Fold Assist.
   3. Keyed lock for door.

D. Components:
   1. 1. Ceiling Opening

a. Ceiling heights from 9' 10" - 12' 0" require opening of 22 1/2 inches x 64 inches

2. Stairway Stringer: 6005-T5 Extruded aluminum channel 5" x 1" x 1/8"; tri-fold design; steel blade type hinges; adjustable feet with plastic Mar-guard. Pitch shall be 63°.
3. Stairway Tread: 6005-T5 extruded aluminum channel 5 3/16 inches by 1 1/4 inches by 1/8 inch. Depth is 5 3/16 inches. Deeply serrated top surface. Riser Height: 9-1/2 inches. Clear Tread Width for Standard Width: 18 inches.
4. Railing: Aluminum bar handrail riveted to stringers, upper section only.
5. Frame:
   a. If ceiling to floor (or roof deck) above is under 12", frame shall be 1/8" steel formed channel, box.
   b. When ceiling to floor (or roof deck) above is 12" or greater, the frame shall be 1/8" steel, 63° (with built-in steps) on the hinge end, 90° on the other end, custom depth to fill distance from ceiling to floor above. This custom frame will require a longer opening in the floor above than is required at the ceiling level.
6. Door Panel
   a. Standard (non-fire rated) door shall be constructed of 1/8 inch (3 mm) aluminum sheet attached to stairway frame with a steel piano hinge. Door overlaps bottom flange of frame. Eye bolt accommodates pole for opening and closing door.
7. Hardware:
   a. Steel blade type hinge connecting stringer sections. Zinc plated and chromate sealed.
   b. Steel operating arms, both sides. Zinc coat with clear trivalent chromate.
   c. Double acting steel springs and cable, both sides.
   d. Rivets rated at 1100 lb (499 kg) shear strength each.
   e. Steel section alignment clips at stringer section joints.
   f. Molded rubber guards at corners of aluminum door panel.
8. Ladder Finish: Mill finish aluminum stairway components.
9. Ceiling Frame Finish: Prime coat from factory. Finish paint in field to match ceiling.

2.03 FABRICATION

A. Completely fabricate ladder ready for installation before shipment to the site.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until rough opening and structural support have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Examine materials upon arrival at site. Notify the carrier and manufacturer of any damage.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.03 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 11 30 33

GARMANN MILLER

Division 12

Furnishings

SECTION 12 36 00
COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Countertops for manufactured casework.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry

B. Section [07 92 00 - Joints Sealants]

C. Section 12 35 50.13 - Educational Casework

D. Section 22 40 00 - Plumbing Fixtures: Sinks.

1.03 REFERENCE STANDARDS

A. ANSI A208.1 - American National Standard for Particleboard; 2016.

B. ANSI A208.2 - American National Standard for Medium Density Fiberboard for Interior Use; 2016.

C. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.

D. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2022.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

F. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2018).

G. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.

H. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.

I. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

J. PS 1 - Structural Plywood; 2009.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Verification Samples: For each finish product specified, minimum size 6 inches square, representing actual product, color, and patterns.

C. Test Reports: Chemical resistance testing, showing compliance with specified requirements.

D. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than Five years of documented experience.

B. Quality Certification:
   1. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
   2. Provide designated labels on shop drawings as required by certification program.
   3. Provide designated labels on installed products as required by certification program.

4. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.
5. Replace, repair, or rework all work for which certification is refused.

1.06 DELIVERY, STORAGE, AND HANDLING

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

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 COUNTERTOPS

A. Plastic Laminate Countertops: High-pressure decorative laminate (HPDL) sheet bonded to substrate.
   1. Laminate Sheet: NEMA LD 3, Grade HGS, 0.048 inch nominal thickness.
      a. Manufacturers:
         1) Formica Corporation: www.formica.com.
         2) Panolam Industries International, Inc; Nevamar Standard HPL: www.panolam.com.
         3) Wilsonart: www.wilsonart.com.
         4) Substitutions: See Section 01 60 00 - Product Requirements.
      b. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
      c. NSF approved for food contact.
      d. Laminate Core Color: Same as decorative surface.
      e. Finish: Matte or suede, gloss rating of 5 to 20.
      f. Surface Color and Pattern: As indicated on A9.1 Material Finish Schedule.
   2. Exposed Edge Treatment: Square, substrate built up to minimum 1-1/4 inch thick; covered with matching laminate.
   3. Back and End Splashes: Same material, same construction.

B. Stainless Steel Countertops: ASTM A666/A666M, Type 304, stainless steel sheet; 16 gage, 0.0625 inch nominal sheet thickness.
   1. Finish: 4B satin brushed finish.
   2. Exposed Edge Shape: Straight turndown with return; 1-1/2 inch high face, 1/2 inch return to face of case ; reinforced with hardwood or steel.
   3. Back and End Splashes: Same material; welded 1/4 inch radius coved joint to countertop; square top edge with 1 inch wide top surface and minimum 1/2 inch turndown.
   4. Splash Dimensions: 4 inch high by 1 inch thick, unless otherwise indicated.

2.02 MATERIALS

A. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.

B. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.

C. Joint Sealant: Mildew-resistant silicone sealant, white.

2.03 FABRICATION

A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
   1. Join lengths of tops using best method recommended by manufacturer.
   2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
   3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.

B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
   1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
   2. Height: 4 inches, unless otherwise indicated.

C. Stainless Steel: Fabricate tops up to 144 inches long in one piece including nosings and back and end splashes; accurately fitted mechanical field joints in lengths over that dimension are permitted.
   1. Weld joints; grind smooth and polish to match.
   2. Provide stainless steel hat channel stiffeners, welded or soldered to underside, where indicated on drawings.
   3. Provide wall clips for support of back/end splash turndowns.
   4. Sound Deadening: Apply water resistant, fire resistant sound deadening mastic to entire bottom surface.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.

B. Attach plastic laminate countertops using screws with minimum penetration into substrate board of 5/8 inch.

C. Attach stainless steel countertops using stainless steel fasteners and clips.

D. Seal joint between back/end splashes and vertical surfaces.

3.04 TOLERANCES

A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.

B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.

C. Field Joints: 1/8 inch wide, maximum.

3.05 CLEANING

3.06 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION 12 36 00

GARMANN MILLER

Division 13

Special Construction

SECTION 12 35 50.13
EDUCATIONAL CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Casework manufactured with plastic laminate facing.

1.02 RELATED SECTIONS

A. Section 07 92 00 - Joints Sealants

B. Section 12 36 00 - Countertops

C. Division 22 - Plumbing

D. Division 26 - Electrical

E. Division 27 - Communications

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on all hardware.

C. Shop Drawings shall be submitted soon after the award of contract. Drawings shall consist of floor plans indicating arrangement and relationship to adjacent work and equipment, complete elevations of casework. Centerline of services requirement shall be noted.

D. Submit three (3) complete color samples of every component for Architect selection. Selection shall be from manufacturer standards.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum 3 years of experience.

C. Casework Grade: Provide plastic laminate faced casework complying with the referenced quality standard and the following grade:
   1. Grade: custom.

D. Design Requirements for Educational Casework
   1. Design system of cabinets which will be chip and abrasion-resistant under normal usage and will protect student clothing, materials, musical instruments and cases from damage under normal use.
   2. Design shelving to withstand continuous use without surface or front edge breakdown.
   3. Hanger rods or hooks to support a minimum vertical load of 200 pounds applied anywhere.
   4. Full-height door to support a minimum vertical load of 200 pounds applied at outer edge.

1.05 PRE-INSTALLATION MEETING

A. Convene two weeks before starting work of this section.

1.06 DELIVERY, STORAGE, AND PROTECTION

A. Do not deliver casework to project until dry and heated storage space is provided.

1.07 PROJECT CONDITIONS

A. Casework supplier shall be responsible for quantities shown on the drawings.

B. Casework supplier shall be responsible for making field measurements to insure proper fit of casework items.

C. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

D. For delivery and installation of casework and equipment, building conditions shall be as follows:
   1. Building is secure and weather tight, with windows and doors installed, heat and air conditioning systems functional. Walls and openings are plumb, straight and square.
   2. Concrete floors must be level within acceptable trade tolerances. Floor must be within 1/8 inch of level per 10 foot run, non-accumulative, when tested with a straight edge in any one direction.
   3. Wood or metal blocking (wall grounds) must be installed within partitions prior to delivery of casework and furnishings to allow for immediate installation on delivery.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Stevens Cabinets Co, Model 1200 Series (3MM Edge, Full Overlay).
   1. The catalog numbers of the manufacturer listed are intended to include a complete and total item as the catalog number is specified in the current catalog. The item shall be provided complete with hardware, accessories, features and components.

B. Other Acceptable Manufacturers:
   1. TMI Systems Design Corporation, Dickinson North Dakota: Model Series Educational.
   2. Case Systems, Normal Wood Products, Midland, Michigan; Model Series Education.
   3. Hoge Lumber Company, New Knoxville, Ohio; Model Series Educational.
   4. Substitution Procedures: See Section 01 60 00 - Product Requirements.
      a. Submit samples of each proposed substitution to the offices of Garmann/Miller & Associates for evaluation. Samples shall be retrieve by submitter upon evaluation by Architect.
      b. Sample size to be nominally 2'-0" by 3'-0" with a drawers, doors, shelves and accessories showing compliance with this specification.

2.02 MATERIALS

A. Wood Base Components
   1. Wood fabricated from old growth timber is not permitted.
   2. Wood fabricated from timber recovered from riverbeds or otherwise abandoned is permitted, unless otherwise noted, provided it is clean and free of contamination; identify source; provide lumber re-graded by an inspection service accredited by the American Lumber Standard Committee, Inc.
   3. Particleboard, medium density fiberboard, plywood, wheatboard, strawboard, and panel substrates shall contain no added urea-formaldehyde resins

B. Plastic laminates, provide one of the following
   1. High Pressure decorative laminate complying with NEMA LD3, Grade GP-28
   2. High Pressure decorative laminate complying with NEMA LD3, Grade CL-20
   3. High Pressure decorative laminate complying with NEMA LD3, Grade BK-20

C. Edge Banding for Plastic Laminate:
   1. Rigid PVC extrusions, through color with satin finish, 3 mm thick at door and drawer fronts, 1 mm thick elsewhere.

D. Melamine Faced Particleboard:
   1. Medium density particleboard complying with ANSI A208.1, Grade M-2, with decorative surface of thermally fused melamine impregnated web complying with ALA 1992.

E. Particleboard: ANSI A 208.1, Grade M-2

F. Hardboard: AHA A135.4, Class 1 tempered
   1. AHA A135.4, Class 1 tempered

2.03 HARDWARE

A. Hinges: Heavy duty five knuckle style, with overlaying leaves capable of 270 degree swing. Hinges shall be constructed of 0.90 inch minimum thickness steel, hospital tipped with non-removable pin.
   1. Color: as selected from manufacturer's standard.
   2. Doors less than 47 inches in height shall have two (2) hinges and doors 47 inches in height and greater shall have three (3) hinges
   3. Hinges shall have vertical adjustment and shall be mounted with two (2) 5 mm thread screws, each leaf with additional #8 screws: two (2) in cabinet leaf and three (3) in door leaf. Total nine (9) fasteners per hinge.

B. Door Catches:
   1. Catches shall be a heavy duty spring loaded, large diameter (17.5 mm) roller type catch. Doors less than 48 inches in height shall one (1) catch mounted at the bottom and doors 48 inches in height and greater shall be provided with catches both top and bottom of door.
   2. Catch strike plate shall be injection molded ABS, with integrally molded engagement ring. Strike shall have a wide face bumper insuring a positive door stop.

C. Pulls: Solid metal, 5 inches in length
   1. Style: A minimum of (5) different styles as offered by Cabinet manufacturers' standard. Stevens - Stainless Steel Collection - Bar 128
   2. Color: as selected from manufacturer's standard. - Stainless Steel

D. Hangard Bars: Shall be heavy chrome plated oval tubing mounted in adjustable end wall sockets.

E. Shelf Supports: Adjustable shelf supports shall be injection molded clear polycarbonate. Supports shall incorporate integral molded lock tabs to retain shelf from tipping or inadvertent lift out. Supports shall have 5 mm diameter double pin engagement into precision bored cabinet vertical hole patterns. Adjustment shall be 1-1/4 inches (32mm) spacing. Supports shall have a compression ridge effecting force against shelf edge to maintain positive pin engagement. Supports shall have molded-in screw attachment feature. Static test load shall exceed 200 pound per clip. Shelf spans above 27 inches shall have 5-point support with backs drilled to receive a mid-span shelf support, further reducing deflection. Shelf spans 27 inches or less shall have end 4-point support.

F. Casters and Mounting Frame: Heavy duty non-maring swivel casters shall have ball bearing swivels, four (4) bolt mounting and tread braking. Mobile cabinets shall have 5 inch diameter casters, rated for 300 pounds each. Two (2) casters to be swivel braking and two (2) to be non-swivel, non-braking. Casters shall be integral bolted onto steel channel cabinet member. Fourteen (14) gauge formed channel member shall be 3 3/4 inch wide with 3/4 inch downturn legs each with double thick hem edge. Steel frame member shall have bolt attachment to bottom and cross bolted into barrel style fastening system.

G. Locks:
   1. Provide either of the lock systems listed below:
      a. High security 6-tumbler lock system shall be provided where noted by model number or indicated on drawings. Locks shall have diecast body with dead bolt engagement tang. Locks shall have removable and interchangeable 6-tumbler core for easily field and customer re-keying options.
      b. Locks shall be cylinder type, die-cast, with five (5) disc tumbler mechanism. Each lock shall be provided with a key.
   2. Keying:
      a. Each room shall be keyed alike with each room keyed differently.

b. Locks shall be master keyed using the casework manufacturers master keying system. (This is independent of any other master keying system)
c. Provide lock where indicated.
d. Provide locks on all wardrobe units and tall storage units.

H. Chain Stop:
1. Manufacturers standard, install on all doors that will hit casework components or adjacent walls

I. Cabinet Boxes - cut outs:
1. All cabinet box cut outs must be completed in the field unless otherwise noted on the cabinet shop drawing submittals.
2. Special attention to field measuring, cutting or drilling shall be made when making any cabinet cut outs.
3. Cut outs shall be made as tight to the size of the cabinet penetration as possible.
4. Cut outs for low voltage wiring shall be trimmed accordingly with specified mounting bracket.
a. Manufacturer:
1) Erico, Caddy Mounting Bracket, (MPL series) or equal
2) Mounting brackets placed inside the cabinet box shall match the same size, location and configuration as the box placed inside the wall that the cabinet butts up against.
3) Mounting Bracket furnished and installed by Low Voltage Contractor.
4) Install mounting brackets in cabinet using proper length wood screws.
5. Cut outs for electrical wiring shall be made so that outlet box extension is mounted flush to back panel of casework. Casework installer shall field measure and cut holes in casework to accommodate outlet installation.
6. Excessively overcutting any cabinet cut outs is not permitted, unless specifically approved by Garmann/ Miller & Associates.
7. Plumbing penetrations and cut outs shall have proper finish trim around pipes to properly cover any cut outs. Trims to be supplied and installed by Plumbing Contractor.

2.04 COMPONENTS

A. Cabinet Boxes - Base and Wall:
1. Core:
a. Base Cabinets:
1) Front and Sides: 3/4 inch particleboard
2) Base - Bottom - Toe Kick: 3/4 inch plywood
3) Back: Entrapped 3/8 inch particle or 1/4 inch tempered hardboard
b. Wall Cabinets:
1) Top and Bottom: 3/4 inch particleboard
2) Sides: 3/4 inch particleboard
3) Back: Entrapped 3/8 inch particle or 1/4 inch tempered hardboard
2. Surface:
a. Exposed Vertical Surfaces: GP28
b. Semi-exposed parts (interior of open cabinets, not including drawer body): CL20 or melamine
c. Concealed Surfaces: CL20 or melamine
d. Panel ends: GP28
3. Edge: Finish all exposed edges (including wall cabinet top and bottom) with 1 mm PVC
4. Construction/Joinery: Doweled, glued under pressure

B. Cabinet Doors

1. Core: 3/4 inch particleboard
2. Surface: GP28 with CL20 liner on back
3. Edge: 3 mm PVC
4. Hardware: Heavy duty, 5 (five) knuckle, 2-3/4 inch institutional type hinge (no concealed hinges)
5. Construction/Joinery: Doweled, glued under pressure

C. Interior Cabinet Shelves:
1. Core: 1 inch particle board
2. Top and Bottom Surface: Thermofused Laminate
   a. Color: Match the interior color; Pearl unless noted othwerwise.
3. Edge: 1 mm PVC on front and back edges
4. Construction/Joinery: Multiple holes (minimum 5 mm diameter at 1-1/4 inches on center.
5. Hardware: Adjustable shelf supports

2.05 FABRICATION

A. Cabinets parts shall be accurately machined and precision bored for premium grade quality joinery construction. Cabinets shall be assembled under controlled case clamp conditions assuring final cabinet squareness and proper joint compression.

B. Cabinet corners shall be joined with dowel pin construction with 8 mm industrial grade hardwood laterally fluted dowels with chamfered edges..

C. Cabinet ends shall be dowel pinned into horizontal members. Ends shall be one piece continuous from top to floor for added load carrying capacity.

D. Tops and bottoms shall be joined to cabinets ends using dowels and glue. Top of base cabinet shall be full depth.

E. Frame rails shall be joined to ends with dowels and glue.

F. Two (2) toe kick panels shall be insert from cabinet from and back edges, and doweled into cabinet with the same fluted dowel pin and glue joint construction as base and wall cabinets

G. Wall cabinet top and bottoms shall feature the same fluted dowel pin and glue construction.

H. Mounting rails shall be fully concealed behind backs. Rails shall be 3/4 inch thick and fastened to cabinet ends the dowel and glue construction. Wall cabinets and tall cabinets shall incorporate two (2) rails. Wall cabinets shall have rails positioned at top and bottom. Tall cabinets shall have rails positioned at top and intermediate location. Base cabinet units shall have rail positioned in the upper back area.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that job site and the conditions under which the work of this section is to be performed. Notify the Architect of any unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable.

3.02 INSTALLATION

A. Be sure that any concete floor finish is complete before installing any cabinets or other materials that may affect the finish of the specified flooring.

B. Install in accordance with manufacturer's instructions.

C. Casework, countertops and related materials to be conditioned to average prevailing humidity condition in installation areas prior to start of work.

D. Casework shall be installed plumb, level, true, straight with no distortions. Securely attach to building structure with anchorage devices of appropriate type size and quantity to meet codes and safety conditions.

E. Where laminated clad casework and countertops abuts other finished work scribe and trim to accurate fit.

F. Cut openings in countertops for sinks and other items required. Cut to size from template furnished by supplier for sinks or use designated sink on job.

G. Countertops shall be installed flush against wall. Provide clear sealant at top and around ends of countertops, endsplashes and backsplashes where they meet wall.

H. Adjust casework and hardware so that doors and drawers operate smoothly without or bind.

I. Install a chain stop on doors where door will hit an obstruction casework components or adjacent walls before it is full opened install on all doors that will hit

3.03 CLEANING

A. Clean exposed surfaces, edges, and cabinet interiors. Clean construction and installation marks.

B. Protect installed casework from subsequent construction operations.

END OF SECTION 12 35 50.13

SECTION 13 34 41
PRE-ENGINEERED SHELTERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section includes the design, fabrication, and supply of the pre-engineered shelter.

B. Structural engineering of shelter and footings is by manufacturer.

1.02 RELATED REQUIREMENTS

A. Section 01 60 00 – Products Requirements

B. Section 07 61 00 – Sheet Metal Roofing

1.03 DESIGN REQUIREMENTS

A. Dead, live, snow loads per local building code.

B. Wind and seismic loads per local building code.

1.04 QUALIFICATIONS

A. The shelter supplier must be a company specializing in the design and fabrication of shelters with a minimum of five (5) years documented experience.
   1. Approved manufacturer:
      a. Western Wood Structures, Inc. PO Box 130 Tualatin, Oregon 97062-0130 (800) 547-5411

B. The shelter roof installer must be a company specializing in installation of metal roofs with a minimum of five (5) year documented experience.
   1. Approved Installer:
      a. Premier Pacific Roofing, www.pprquality.com

C. Submittals:
   1. Submit product data and to-scale shop drawings under the provisions of Section 01300. Shop drawings shall include: general framing plan, truss or beam profiles, loads, and fabrication details for all wood members and steel assemblies. Also indicate dimensions, wood grades, drilled holes, fasteners and cambers.
   2. Submit design calculations stamped by a registered engineer, licensed to practice in the state where the shelter is being constructed.
   3. Furnish an AITC or APA-EWS Certificate of Conformance stating that the glulams conform to the specifications.
   4. Furnish a WCILB or WWPA Certificate of Conformance for all sawn lumber.
   5. Provide a written warranty against defects in material and workmanship for a period of five (5) years.
   6. Provide documentation verifying requirements per A and B.

PART 2 PRODUCTS

2.01 MATERIALS

A. Glulam shall be Douglas Fir. Stress grades shall be as required by the design. The appearance shall be Premium, S3S. Adhesive shall be 100% waterproof phenolic resin glue.

B. Columns shall be HSS.

C. Decking shall be 2"x6" Douglas Fir Select Dex, S2S, KD, EV1S, paper Wrap.

D. Two-piece fascia. Reference drawings.

E. Steel and Hardware. Steel to be ASTM A-36 and hardware to be ASTM A-307. Welding by certified welders per AWS specifications.

F. Roof
   1. Pitch: 4/12
   2. Decking: 2" x 6" Douglas Fir
   3. Plywood for shear on top
   4. Vapor Barrier
   5. Roof: Reference Spec Section 07 61 00.

2.02 FINISHES

A. Columns: Treated in Hi Clear II with CuBor wraps

B. Steel: A36 powder coated, color: black.

C. Hardware: A307 powder coated, color: black.

2.03 FABRICATION

A. The main structural beams and/or trusses are to be fabricated and assembled to the fullest extent possible in a plant with facilities for performing work specified. Factory drill all holes to the extent possible using steel as templates. For glulam or sawn members of 8" nominal width or greater, drill holes from both sides of members to ensure the true hole alignment.

B. Concealed connector locations shall be fabricated to within 1/8" of true position. Fabricate length of members to be within 1/8" of required length to achieve tight connections. Make end cuts flat and true to ensure consistent load transfer.

PART 3 EXECUTION

3.01 DELIVERY, STROAGE AND HANDLING

A. The purchaser or installer is responsible for handling and protection of shelter framing materials after arrival at destination. All trusses and/or beams shall be unloaded and handled with a forklift or crane using nylon slings.

B. If the materials are to be stored at the site, they must be placed on a level surface and stickered to prevent warpage and twisting

C. Any damage must be reported immediately to the truss manufacturer's professional engineer.

3.02 INSTALLATION

A. Install the shelter according to supplier's shop details and installation instructions. Do not field cut, drill, or alter structural members without written approval from the pre-engineered building supplier. Set framing members in locations and to elevations indicated. Make provisions for erection loads and provide temporary bracing to maintain framing members true and plumb, and in true alignment until completion of erection.

B. Maintain factory-applied wrapping until roof structure is enclosed.

END OF SECTION

GARMANN MILLER

Division 22

Plumbing

SECTION 13 34 16
GRANDSTANDS AND BLEACHERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Design and fabrication of continuous angle frame bleacher unit.

1.02 RELATED SECTIONS

A. Section 03 30 00 - Cast in Place Concrete

1.03 REFERENCES

A. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength; 2003.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Shop Drawings: Complete layouts with dimensions.

1.05 QUALITY ASSURANCE

A. Manufacturer shall have a minimum of 10 years of experience in the design and manufacture of bleacher and bleacher systems.

B. Welds shall be AWS certified.

C. Source Quality Control: Mill Test Certification.

D. Codes and Standards: Ohio Basic Building Code

1.06 DELIVERY, STORAGE, AND HANDLING

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

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 WARRANTY

A. Bleacher products to be free from defects in material and workmanship for a period of five (5) years beginning with completion of installation. Warranty excludes defects resulting from abnormal use or abuse and accidental damages.

B. See Section 01 7800 (01780) - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Belson, belson.com
   1. Product: BS-0427C

B. Acceptable manufacturers:
   1. Southern Bleacher, southernbleacher.com
   2. Sightlines Bleacher, sightlinesbleachers.com
   3. Dant Clayton, dantclayton.com

C. Substitutions: See Section 01 6000 (01600) - Product Requirements.

2.02 APPLICATIONS

A. Bleachers General:
   1. Install per manufacturers recomendations.
   2. Provide guardrails with chain link fence infill at sides and back.

B. Bleachers
   1. Aluminum Bleacher - Bench seating (no backed seats)
      a. Rows: 4
      b. Length: 27 feet
      c. 2"x10" anodized seats
      d. Guardrails on sides and back.
      e. Seating Capacity: Approximately 72
   2.

2.03 COMPONENTS

A. Framing System: Prefabricated, modular frames with cross bracing.
   1. Material: Extruded aluminum structural sections, of alloy 6061-T6, with mill finish.
   2. Welding: By AWS certified welders.
      a. All welding shall be seal welded to eliminate moisture infiltration.
   3. Finish: All structural parts shall be acid cleaned.

B. Tread Planks: Extruded aluminum sections, of alloy 6063-T6, with ribbed top and mill finish.
   1. Size: 2 inches deep by 10 inches wide.
   2. Provide end caps on each exposed end.
   3. Wherever sections are placed end to end, provide joint sleeve assembly of same material to maintain alignment.

C. Seat Planks: Extruded aluminum sections, of alloy 6063-T6, with ribbed top and Class II AA-M10C22A31 natural anodized finish.
   1. Size: 2 inches deep by 10 inches wide.
   2. Provide end caps on each exposed end.
   3. Wherever sections are placed end to end, provide joint sleeve assembly of same material to maintain alignment.

D. Step Planks: Extruded aluminum sections, of alloy 6063-T6, with ribbed top and anodized finish.
   1. Size: 2 inches deep by 10 inches wide.
   2. Provide end caps on each exposed end.

E. Plank End Caps: Formed aluminum, of alloy 6063-T6, with Class II AA-M10C22A31 natural anodized finish.

F. Railings: Anodized aluminum pipe railing with formed elbows at corners and caps at ends of straight runs, fastened to framing system.
   1. Pipe Size: 1.9 inch outside diameter.
   2. Height at Back and Sides: 42 inches above adjacent seat.
   3. Infill at Back and Sides: 9 gage diameter aluminum wire woven chain link with twisted selvages, fastened to aluminum pipe panel frame.
   4. Designed to withstand the following loads:
      a. Vertical Live Load: 100 pounds per linear foot applied to top rail.
      b. Horizontal Live Load: 50 pounds per linear foot applied to top rail.

G. Fasteners:
   1. Bolts and Nuts: ASTM A 307, steel, hot-dipped galvanized or cadmium-plated.
   2. Hold-Down Clips: Aluminum, alloy 6063-T6.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Garmann/Miller & Associates Inc. of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.04 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products after Substantial Completion.

END OF SECTION 13 34 16

SECTION 26 05 83
EQUIPMENT WIRING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical connections to equipment.

1.02 RELATED REQUIREMENTS

A. Section 26 05 19 - CONDUCTORS.

B. Section 26 05 33.13 - CONDUIT.

C. Section 26 0526 - Grounding and Bonding

D. Section 26 05 33.16 - BOXES.

E. Section 26 27 26 - WIRING DEVICES.

F. Section 26 28 16.16 - ENCLOSED SWITCHES.

1.03 REFERENCE STANDARDS

A. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (R 2010).

B. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2012.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.05 COORDINATION

A. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.

B. Determine connection locations and requirements.

C. Sequence rough-in of electrical connections to coordinate with installation of equipment.

D. Sequence electrical connections to coordinate with start-up of equipment.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
   1. Colors: Comply with NEMA WD 1.
   2. Cord Construction: NFPA 70, Type SO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
   3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

B. Disconnect Switches: As specified in Section 26 28 16.16 and in individual equipment sections.

C. Wiring Devices: As specified in Section 26 27 26.

D. Flexible Conduit: As specified in Section 26 05 33.13.

E. Wire and Cable: As specified in Section 26 05 19.

F. Boxes: As specified in Section 26 05 33.16.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 ELECTRICAL CONNECTIONS

A. Make electrical connections in accordance with equipment manufacturer's instructions.

B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
   1. Flexible conduit shall be limited to a maximum of 3'-0" in length. Provide hard pipe from junction box, disconnect, etc. to within 3'-0" of mechanical equipment termination point, provide transition to flexible conduit as necessary.

C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.

D. Provide receptacle outlet to accommodate connection with attachment plug.

E. Provide cord and cap where field-supplied attachment plug is required.

F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.

H. Install terminal block jumpers to complete equipment wiring requirements.

I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

END OF SECTION 26 05 83

SECTION 22 05 01
PLUMBING MATERIALS & METHODS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping specialties

B. Installation requirements common to piping systems and equipment specification sections

C. Concrete Housekeeping Pads.

D. Emergency repairs or operation

E. Provisions for later installations

F. Final completion

G. Project Conditions

H. Quality Assurance

I. Warranty

J. Supervision and cooperation

K. Coordination Drawings

L. Maintenance and operating manuals

M. Record drawings

1.02 RELATED REQUIREMENTS

A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1 and 2, General Requirements, are included as a part of this Section as though bound herein.

B. Refer to Division 26, Electrical Specifications, and to the requirements stated therein applicable to the Mechanical Work, where coordination of trades is covered.

C. The Drawings prepared for this Project are an outline to show where pipes, and apparatus must go in order to harmonize with the building and installations of the various trades. Work must be installed in accordance with the Drawings insofar as possible. Drawings shall be carefully checked during the course of bidding and construction. If discrepancies, errors, or omissions are discovered prior to or during the construction phase, notify the Engineer immediately for interpretation or correction. Take necessary measurements and be responsible for same, including clearances for equipment that is to be furnished. The Architect/Engineer shall reserve the right to make minor location changes of piping and equipment where such adjustments are deemed desirable from an appearance or operational standpoint. Such changes will be anticipated sufficiently in advance to avoid extra work or unduly delay progress on the Project.

D. The general building drawings shall be used to obtain dimensions and exact locations and as a check with other Contractors to avoid interferences with their Work. Refer to applicable Drawings on branches of the Work where other trades are involved on the Project so that added field work and job delays resulting from conflicts between crafts can be avoided. Piping that is prefabricated before coordinating with the other trades may have to be redone at no additional cost if conflicts are encountered.

1.03 SUMMARY

A. The Contractor(s) shall provide the labor, materials, equipment, appliances, services and transportation, and perform the operations in connection with the construction and installation of the Work. Work shall be as herein specified and as denoted on the accompanying Drawings.

B. The Contractor(s) shall arrange and pay for permits and inspections required in connection with the Work. The Contractor shall apply for and pay for meters, regulators, recorders, and gauges required. The Contractor must present to the Owner through the Architect/Engineer, properly signed certificates of final inspection by the governing authorities when they become due and shall not cover up Work until approved by those authorities.

C. The Contractor(s) shall make arrangements for connection of the permanent utilities (gas); include connection costs as part of the Work under this Contract. Verify exact requirements of the utility with regard to such service; and include in the Work costs related to same.

D. Materials or labor obviously required to fully complete the Work shall be included, even though each item necessarily involved is not specifically mentioned or shown. Such Work and materials shall be furnished and shall be of the same grade or quality as the parts actually specified and shown. Should there be a conflict between the plans and Specifications, the greater quantity and better quality shall be furnished.

E. Should an overlap of Work between the various trades become evident, the Engineer shall be notified. Such an event shall not relieve the Contractor of the responsibility for the Work called for under his branch of the Specifications until a written clarification or directive is issued concerning the matter.

F. Related Work by Others
   1. Motors which are shipped loose from the mechanical equipment shall be installed as Work under Division 26, Electrical, or other trades as may be required, at the expense of the Contractor furnishing the loose motor(s).
   2. Unless otherwise stipulated under a specific Section of this Division, motor disconnects and starters shall be provided as Work under Division 26, Electrical.
   3. Electric power wiring shall be included as Work under the electrical wiring section of Division 26, Electrical, except as follows:
      a. Control wiring regardless of voltage shall be included as Work under specific Sections of Division 22.
      b. Internal package type wiring as specified under specific Sections of Division 22.

G. Cutting of water lines, electric conduit, or similar service lines in the course of Work performed under this Section shall be immediately repaired as part of the Work of this Section.

1.04 REFERENCE STANDARDS

A. Standards are described by reference to various associations. These are in addition, but not limited to, to those listed in:
   1. AGA American Gas Association
   2. ANSI American National Standards Institute
   3. ASHRAE American Society of Heating, Refrigeration, and Air Conditioning Engineers
   4. ASME American Society of Mechanical Engineers
   5. ASPE American Society of Plumbing Engineers
   6. AWS American Welding Society
   7. AWWA American Water Works Association
   8. CISPI Cast Iron Soil Pipe Institute
   9. NFPA National Fire Protection Association
   10. OSHA Occupational Safety and Health Act
   11. SMACNA Sheet Metal and Air Conditioning Contractors National Association
   12. UL Underwriters' Laboratories, Inc.

B. Work shall be in complete accordance with codes, rules, and ordinances, regulations of authorities, bodies, associations, and governments, having proper or legal jurisdiction. Specifically, the following requirements shall be met in their entirety.
   1. State and Local Rules, Regulations, Codes, Statutes, and Ordinances

2. Ohio Plumbing Code, 2017 Edition
3. ASHRAE 90.1-2010; Energy Standard for Buildings Except Low Rise Residential Buildings
4. NFPA 54 - National Fuel Gas Code
5. NFPA 70 - National Electrical Code; National Fire Protection Association; 2017 applicable requirements.
6. National Board of Fire Underwriters
7. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 1993 (and Revision 1,2,3).
8. Other Codes and Standards as specifically noted in each Section of the Specifications.
9. Americans with Disabilities Act (ADA)

C. References made to codes and standards, in these Specifications or on the Drawings, shall be taken to mean the latest edition, amendment, or revision of such reference in effect as of the date indicated on the Bid Documents unless otherwise noted.

1.05 SUBMITTALS

A. Submit capacity requirements, catalog cuts, and illustrations in accordance with requirements of specifications and as required by specific Sections of this Specification.

B. Shop Drawings shall be prepared by the Contractor or supplier.
1. Where limited space is available due to the nature of the Work, the requirements for shop and working drawings will apply, and the Contractor is required to prepare complete shop drawings showing the exact disposition of apparatus, equipment, piping, ductwork, and the like, and its relation to the building so there will be no irregularities or interferences. Shop drawings shall be prepared in coordination with other Contractors and other trades.

C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Instruments used by the Contractor shall be accurately calibrated and maintained in good working condition.

B. Products and test instruments used shall be subject to approval of Architect/Engineer.

C. Products and test instruments used shall be provided by each respective Contractor.

D. Note that systems involved under this Contract heading shall be in accordance with applicable requirements listed in NFPA Standard 90A.

E. Materials used in this Contract shall be those specified herein unless proposals for the use of alternate materials have been submitted and accepted in writing, as provided hereinbefore. Materials shall be strictly first grade of their kind and shall be new and in first-class condition when installed. Damaged materials will be rejected and must be replaced by proper and acceptable materials. Materials shall be similar and in accordance with the provisions of this Specification.

F. No materials or equipment may be installed under this contract heading which do not meet the approval of the authorities having jurisdiction. Specific materials may have certain restrictions or exclusions as to their usage, including where they may not be located. Such regulations shall be adhered to where applicable. The requirements and regulations of the local and state building codes and regulations currently adopted shall be adhered to.

G. Piping systems shall be installed by workmen having skills acquired by working at the trade which is recognized as necessary for competency.

H. Pressure piping systems installed shall conform to the requirements of the State piping and welding codes where applicable.

1.07 PROJECT CONDITIONS

A. Unless otherwise stipulated under a particular heading, the following rules relative to responsibilities of the several Contractors and subcontractors will apply.
   1. Each Contractor shall install roughing-in work pertaining to his trade for connection of Work performed under other Sections of these Specifications.

B. Certain areas will be designated for the storage of materials and equipment and cooperation with the Owner in minimizing interference with existing operations will be mandatory.
   1. Where possible, store materials inside and protected from weather. Where necessary to store outside, elevate above grade and enclose with durable, waterproof wrapping.
   2. Follow manufacturer's instructions for receiving, inspecting, handling, storage, and protection of products prior to final installation

C. Equipment Clearances and Requirements
   1. For many items of equipment described in these Specifications, several manufacturers are listed. The manufacturer listed on the drawings is the make on which the layout was based and on which clearances, service required electrical, and plumbing characteristics, etc., have been checked. Additional manufacturers listed are considered acceptable.
   2. Due to the possibility of restrictions imposed by space limitations, the responsibility for resolving conflicts resulting from the use of equipment other than first named shall rest with the equipment supplier and the Contractor. Submittals for this equipment will be considered as a statement that clearances for access, service, maintenance, etc., have been checked and found adequate.
   3. Alternate equipment or the equipment of additional manufacturers named in these documents shall meet Base Bid Specifications. In the event such equipment or any equipment which the bidder proposes to furnish, deviates from the requirements of equipment first named regarding electric service, power wiring, control wiring, plumbing or piping, sound attenuation, or vibration damping, it shall be the responsibility of the bidder to include in his price a sufficient sum to cover additional costs or charges resulting therefrom.

D. In general, the piping shown on the Drawings shall be considered as diagrammatic for clearness in indicating the general run and connections required, and may not be shown in its true position. The piping and equipment may have to be offset, lowered or raised, as required, or as directed at the site in order to accommodate field conditions.

1.08 SUPERVISION AND COOPERATION

A. Work done by the Contractor under this Division shall include the services of an experienced superintendent, who shall be constantly in charge of the work, together with the qualified journeymen, helpers, and laborers required to properly unload, install, connect, adjust, start, and operate, and test the Work involved, including related equipment and materials furnished under other contracts or by the Owner.

B. A Pre-Installation meeting shall convene one week before starting work of this section.

1.09 WARRANTY

A. See Section 01 7000 - Closeout Procedures, for additional warranty requirements.

B. Correct defective Work within a one year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MATERIALS

A. Provide motors and starter/disconnect switches having the voltage and electrical characteristics of the service available and where denoted on Drawings or as required.
   1. All motors shall be high efficiency type.

2.02 ESCUTCHEONS AND PLATES

A. Provide approved plates around each pipe passing through walls, floors, partitions, and ceilings when piping is exposed to view and on exterior of building. Plates shall be chrome-plated metal and sized to cover exposed ends of pipe insulation and pipe sleeves.

B. Floor plates shall be split-type, heavy chrome-plated and securely attached to the pipe.

2.03 PIPE SLEEVES

A. Steel pipe sleeves shall be fabricated from Schedule 40 galvanized steel pipe.

B. Sleeves for copper piping shall be of compatible material to prevent interaction of piping materials.

PART 3 EXECUTION

3.01 INSTALLATION

A. Motors, Starters, Controls, and Wiring
   1. Alignment of motors, that are factory coupled or mounted and field coupled and mounted, shall be performed by the equipment manufacturer and shall be rechecked after connections have been made and after 48 hours of operation in designed service.
   2. Starter/disconnects, controls, and wiring shall be coordinated with the appropriate Contractors and completed as required by these Documents.

B. Cutting and Patching
   1. Cutting and drilling of walls, slabs, and structural members, required in conjunction with Work under this Section, shall be done under the supervision of the Architect/Engineer. Work shall be neatly done, removing no unnecessary material. Holes, openings, etc., shall be located where they will not weaken the structure. No beams, joists, etc., shall be cut without the written consent of the Architect/Engineer.
   2. Cutting of holes in masonry and concrete shall be performed with a core drill to minimize spalling, and limit damage to wall. Locations shall be accurately determined and checked, and the appropriate drill bit shall be used to minimize hole size.
   3. Sleeves or thimbles for holes as well as escutcheons and trim plates shall be provided. Installation shall permit free movement of pipe.
   4. Patching of work, where necessary, is to be done by a mechanic of the appropriate trade. Unless otherwise noted, patching for Work performed under this Section shall be immediately repaired as part of the Work of this Section.

C. Pipe Sleeves: Install pipe sleeves where piping passes through walls, floors, ceilings, and roofs.
   1. Do not install sleeves through structural members of work, except as detailed on Drawings, or as reviewed and approved by Architect/Engineer.
   2. Install sleeves accurately centered on pipe runs.
   3. Size sleeves so that piping and insulation (if any) will have free movement in sleeve, including allowance for thermal expansion; but not less than 2 pipe sizes larger than piping run.
   4. Where insulation includes vapor barrier jacket, provide sleeve with sufficient clearance for installation.
   5. Install length of sleeve equal to thickness of construction penetrated, and finish flush to surface; except floor sleeves.
   6. Extend floor sleeves 1/4 inch above level floor finish, and 3/4 inch above floor finish sloped to drain unless otherwise noted.
   7. Provide temporary support of sleeves during placement of concrete and other work around sleeves, and provide temporary closure to prevent concrete and other materials from entering sleeves.
   8. Where insulated piping passes through fire barriers, stop insulation at barrier for fire barrier penetration seal.

9. Where piping passes through non-fire rated, or non-waterproof, partitions, floors, and walls, apply pipe insulation continuous through pipe sleeves.
10. Do not install sleeves through suspended ceilings.
11. Caulk non-fire rated sleeves with sealant.

D. Protection
1. Provide proper protection to the building during the execution of Work involved under this contract heading.
2. This protection shall include covering apparatus, building surfaces, and other materials to protect same from dirt; adequate temporary connections to protect apparatus from damage and required shielding to protect finished parts of the building. The following shall apply where applicable:
a. Protect finished floors from chips and cutting oil by the use of metal chip receiving pans and oilproof floor covers.
b. Protect equipment and finished surfaces from welding and cutting spatters with baffles and spatter blankets.
c. Protect equipment and finished surfaces from paint droppings, insulation adhesive, and sizing droppings, etc., by use of drop cloths.
3. Pumps, motors, fans, and other rotating/reciprocating equipment stored for this Project shall be adequately protected with openings, bearings, etc., covered to exclude dust and moisture. Stock piled pipe, valves, fittings, ductwork, etc., shall be placed on dunnage and protected from weather and from entry of foreign material.
4. During installation and until final connections are made, piping and ductwork shall be protected against entry of foreign matter. Equipment connections shall be carefully sealed until the actual time of system tie-in.

E. Accessibility
1. Provide a union or flange in the piping at each screwed or welded valve, device, or item of equipment, and elsewhere as required for accessibility of repair. Each union shall be so installed as to permit the removal of item without disconnection of any piping except at the union.

3.02 CONCRETE HOUSEKEEPING PADS

A. Contractor shall refer to Specification Section 03 3000 for requirements of concrete housekeeping pads.

3.03 EMERGENCY REPAIRS OR OPERATION

A. The Owner reserves the right to make emergency repairs and protection of the equipment and systems in operation without voiding the Contractor's guarantee bond or relieving the Contractor of his responsibility during the bonding period.

3.04 PROVISIONS FOR LATER INSTALLATIONS

A. Where work cannot be installed as the structure is being erected, the Contractor for such work shall provide and arrange for the building-in of boxes, sleeves, inserts, fixtures, and devices necessary to permit installation of the omitted work during later phases of construction. The Contractor shall arrange for layout, chases, holes, and other openings which must be provided in masonry, concrete, and other work.

B. The Contractor shall be responsible for becoming informed of the nature and arrangement of the materials and construction to which his work attached or passes through.

3.05 FINAL COMPLETION

A. Work shall be cleaned prior to Substantial Completion of the Work.

B. Retouch or repaint factory painted prime and finish coats where scratched or damaged. Whenever retouching will not be satisfactory, in the opinion of the Architect/Engineer, the

Architect/Engineer has the option to require complete repainting until the desired appearance is obtained.

C. The Contractor shall clean equipment; restore damaged materials, remove grease, oil chemical, paint spots, and stains; and leave the Work in condition acceptable to Owner and Architect/Engineer.

D. On completion of his Work, the Contractor shall remove and see that each of his subcontractors removes from the site tools, equipment, surplus materials, and rubbish pertaining to his operations, and pay cost for such removal and disposition.

E. Contractor shall explain all components of the plumbing system and demonstrate their operation and maintenance to the owner's representative.
   1. All demonstrations and training shall be video-taped by the Division 22 Plumbing Contractor. Two copies shall be turned over to the owner's representative.

3.06 COORDINATION DRAWINGS

A. Division 23 Mechanical contractor shall be responsible for creating Coordination drawings. Division 22 Plumbing contractor shall coordinate plumbing piping layout including plumbing mains, vent piping mains with Division 23 Mechanical contractor to include work on coordination drawings.
   1. All coordination drawings are to be created with a 3D modeling software that is compatible with Autodesk Navisworks.

3.07 MAINTENANCE AND OPERATING MANUALS AND INSTRUCTIONS

A. Comply with Section 01 7800 and the following:

B. Bind the written operating instructions, shop drawings, equipment catalog cuts, and manufacturer's instructions into the binder with each section separated by tabbed dividers. Material to be assembled as follows:
   1. First Page --Title of Job, Owner, Address, Date of submittal, Name of Contractor, and Name of Architect/Engineer. Emergency operating instructions and/or list of service organizations (including address and telephone numbers) capable of rendering emergency service on 24 hour calls.
   2. Second page--Index
   3. Sections--Each section shall include a subsection with a tab divider. The tab shall list the contents of the the divided section. There shall be a subsection that contains the following information:
      a. Written list of items requiring service and either state the service needed or refer to the manufacturer's data in the binder that described the proper service.
      b. A copy of the approved shop drawing for all systems, equipment, and components (clearly marked for item furnished).
      c. A copy of each manufacturer's operating instructions with an index at the beginning of the section.
      d. A list of equipment used on the job, Contractor's purchase order numbers, supplier's name, and address.
   4. Maintenance and operating manuals and instructions shall be also forwarded in electronic format via USB flash drive. Folders shall be created for each section and subfolder for each fixture and/or equipment required for the project.

3.08 RECORD DRAWINGS

A. The Contractor shall keep a running record of each change and deviation from the Drawings. Record shall be kept clean and undamaged upon a set of Drawings used for no other purpose. Upon completion of the Project, the Contractor shall submit to the Architect/Engineer one complete set of drawings which have been corrected to show deviations plus "Project Record

Drawing" and the Contractor's letterhead type information. With the submittal shall be 2 sets of prints made from the corrected drawings.

1. CADD drawing option may be used by Contractor. Disks with specific Drawings are available from Architect/Engineer.

B. Record Drawings shall show:
   1. Size, type, and capacity of materials, devices, or pieces of equipment.
   2. Location of devices or pieces of equipment.
   3. Routing of piping (above and below grade), or other building services.

C. These drawings shall also record the location of concealed piping by indication of measured dimensions to each such line from readily identifiable and accessible walls or corners of the building.

D. Record drawings must be complete and accurate with regard to concealed piping, like equipment, or devices. Unless record drawings are sufficiently accurate to permit immediate location and identification of concealed work with a minimum of cutting, record drawings will be considered inadequate and the contract work deemed incomplete.

END OF SECTION 22 05 01

SECTION 22 05 19
METERS AND GAGES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pressure gauges and pressure gauge taps.

B. Thermometers and thermometer wells.

1.02 RELATED REQUIREMENTS

A. Section 01 3329 - Sustainable Design Reporting

B. Section 22 1005 - Plumbing Piping

1.03 REFERENCE STANDARDS

A. ASME B40.100 - Pressure Gauges and Gauge Attachments; 2013.

B. ASME MFC-3M - Measurement of Fluid Flow in Pipes Using Orifice, Nozzle, and Venturi; 2004 (Reaffirmed 2017).

C. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers; 2014.

D. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers; 2014 (Reapproved 2021).

E. UL 404 - Gauges, Indicating Pressure, for Compressed Gas Service; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.

PART 2 PRODUCTS

2.01 PRESSURE GAUGES

A. Manufacturers:
   1. Trerice.
   2. Ashcroft.
   3. Weiss.
   4. Dwyer Instruments, Inc: www.dwyer-inst.com.
   5. Moeller Instrument Company, Inc: www.moellerinstrument.com.
   6. Omega Engineering, Inc: www.omega.com.
   7. Substitutions: See Section 01 60 00 - Product Requirements.

B. Pressure Gauges: ASME B40.100, UL 393 drawn stainless steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.
   1. Case: Steel with brass bourdon tube.
   2. Size: 4-1/2 inch diameter.
   3. Mid-Scale Accuracy: One percent.
   4. Scale: Psi.
   5. Range: 0-100 psi.
   6. Gauges shall have 1/4 inch NPT bottom connection. Each gauge shall have a Trerice #735-2 or approved equal Brass Needle Valve 1/4 inch NPT for positive shut-off. #872-2 or approved equal Trerice Pressure Snubber 1/4 inch NPT must be installed wherever pulsation occurs.

2.02 STEM TYPE THERMOMETERS

A. Manufacturers:
   1. Miljoco.
   2. Trerice.
   3. Ashcroft.
   4. Weiss.
   5. Dwyer Instruments, Inc: www.dwyer-inst.com/#sle.
   6. Omega Engineering, Inc: www.omega.com/#sle.
   7. Weksler Glass Thermometer Corp: www.wekslerglass.com/#sle.
   8. Substitutions: See Section 01 60 00 - Product Requirements.

B. Thermometer: ASTM E 1, adjustable angle, red or blue appearing, non-toxic, spirit filled, lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device.
   1. Size: 9 inch scale.
   2. Window: Clear Lexan.
   3. Size: 9 inch scale.
   4. Window: Clear glass.
   5. Stem: 3/4 inch NPT brass.
   6. Accuracy: 2 percentper ASTM E77.
   7. Calibration: Degrees F.
   8. Range: 0-200 Degrees F.

2.03 DIAL THERMOMETERS

A. Manufacturers:
   1. Miljoco.
   2. Trerice.
   3. Ashcroft.
   4. Weiss.
   5. Dwyer Instruments, Inc: www.dwyer-inst.com/#sle.
   6. Omega Engineering, Inc: www.omega.com/#sle.
   7. Weksler Glass Thermometer Corp: www.wekslerglass.com/#sle.
   8. Substitutions: See Section 01 60 00 - Product Requirements.

B. Thermometers - Fixed Mounting: Dial type bimetallic actuated; ASTM E1; stainless steel case, silicone fluid damping, white with black markings and black pointer, hermetically sealed lens, stainless steel stem.
   1. Size: 5 inch diameter dial.
   2. Lens: Clear glass.
   3. Size: 5 inch diameter dial.
   4. Lens: Clear glass.
   5. Accuracy: 1 percent.
   6. Calibration: Degrees F.
   7. Range: 0-200 Degrees F.

C. Thermometers - Adjustable Angle: Dial type bimetallic actuated; ASTM E1; stainless steel case, adjustable angle with front recalibration, silicone fluid damping, white with black markings and black pointer, hermetically sealed lens, stainless steel stem.
   1. Size: 5 inch diameter dial.
   2. Size: 3 inch diameter dial.
   3. Lens: Clear glass.
   4. Accuracy: 1 percent.
   5. Calibration: Degrees F.

6. Range: 0-200 Degrees F.

2.04 THERMOMETER SUPPORTS

A. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inch for installation of thermometer sockets. Ensure sockets allow clearance from insulation.

C. Provide instruments with scale ranges selected according to service with largest appropriate scale.

D. Install gauges and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.

E. Adjust gauges and thermometers to final angle, clean windows and lenses, and calibrate to zero.

F. Locate test plugs adjacent thermometers and thermometer sockets.
   1. Plumbing: Thermometers shall be installed with range up to 180 degrees at the following locations:
      a. Domestic water heater inlet and outlet.

G. Locate test plugs and pressure gauges.
   1. Plumbing: Pressure Gauges shall be installed with range up to 150 psi at the following locations:
      a. At inlet and outlet of main Reduced Pressure Backflow Preventer.
      b. At inlet to expansion tanks.

END OF SECTION 22 05 19

SECTION 22 07 17
PIPING SAFETY COVERS

PART 1 GENERAL

2.01 SECTION INCLUDES

A. Piping Safety Covers.

2.02 RELATED REQUIREMENTS

A. Section 22 07 19 - Plumbing Piping Insulation.

B. Section 22 10 05 - Plumbing Piping.

2.03 REFERENCE STANDARDS

A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 1998.

B. ASTM C 177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2004.

C. ASTM D 635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2003.

D. ASTM D 2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2005.

E. UL 94 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances; Underwriters Laboratories Inc.; 1996.

2.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's descriptive literature for products specified in this section.

C. Shop Drawings: Indicate locations and configurations of piping insulation for indicated plumbing configurations.

D. Manufacturer's printed installation instructions for each specified product.

2.05 DELIVERY, STORAGE, AND HANDLING

A. Store products of this section in manufacturer's unopened packaging until installation; maintain storage conditions for products in accordance with manufacturer's recommendations.

PART 2 PRODUCTS

3.01 MANUFACTURERS

A. Truebro, Inc.

B. Dearborn Safety Series

C. McGuire Manufacturing, Inc.

D. Plumberex

E. Keeney Manufacturing Co.

F. Proflo.

G. Zurn.

H. Substitutions: See Section 01 60 00 - Product Requirements.

3.02 PIPING INSULATION ACCESSORIES

A. Provide products that comply with the following:
   1. Americans With Disabilities Act (ADA), Article 4.19.4.

2. ANSI/ICC A117.1, American National Standard for Accessible Buildings and Facilities.
3. BOCA Basic Building Code.
4. Requirements of applicable building code.

B. Piping Safety Covers:
1. Characteristics: Three-piece molded assembly, minimum 1/8 inch wall thickness, with internal ribs to provide air space between piping and piping insulation jacket, molded to receive manufacturer's snap-clip fasteners.
2. Vinyl Material: Impact-resistant and stain-resistant molded closed-cell anti-microbial vinyl compound, UV-stable, non-fading, non yellowing; having the following performance characteristics:
   a. Burning Characteristics: 0 seconds Average Time of Burning (ATB), 0 mm Area of Burning (AEB), when tested in accordance with ASTM D 635.
   b. Thermal Conductivity: K-value 1.17, when tested in accordance with ASTM C 177.
   c. Indentation Hardness: 60, minimum, when tested in accordance with ASTM D 2240, using Type A durometer.
3. Trap Assembly Cover: Three-piece assembly, with removable clean-out nut enclosure.
4. Angle Stop Covers: Formed with hinged cap for access to valve without requiring cover removal.
5. Configurations: In accordance with manufacturer's product data for project piping configurations indicated on drawings.
6. Color: China White, gloss finish; paintable.
7. Fasteners: Manufacturer's standard re-usable snap-clip fasteners; wire-tie fasteners not permitted.

PART 3 EXECUTION

4.01 EXAMINATION

A. Verify that piping configurations are correct type for piping cover component configurations specified.

4.02 INSTALLATION

A. Install products of this section in accordance with manufacturer's printed installation instructions.

4.03 PROTECTION OF INSTALLED PRODUCTS

A. Do not allow damage to installed products by subsequent construction activities; protect products until Substantial Completion.

END OF SECTION 22 07 17

SECTION 22 07 19
PLUMBING PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.

B. Jackets and accessories.

1.02 RELATED REQUIREMENTS

A. Section 22 10 05 - Plumbing Piping: Placement of hangers and hanger inserts.

1.03 REFERENCE STANDARDS

A. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation; 2017.

B. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2020.

C. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2019.

D. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2017, with Editorial Revision (2018).

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

F. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.

G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

H. ASHRAE Standard 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.05 QUALITY ASSURANCE

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

1.06 DELIVERY, STORAGE, AND HANDLING

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

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, UL 723, or NFPA 255.

B. All mastics, sealants, adhesives and etc. used for interior insulation installation shall meet voc limits as defined by LEED.

2.02 GLASS FIBER

A. Manufacturers:
   1. Johns Manville Corporation; _____: www.jm.com/#sle.
   2. Knauf Fiber Glass
   3. Owens Corning Corp
   4. Manson
   5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Insulation: ASTM C547 ; rigid molded, noncombustible, end grain adhered to jacket.
   1. K Value: ASTM C177, 0.24 at 75 degrees F.
   2. Maximum Service Temperature: 850 degrees F.
   3. Maximum moisture absorption: 5 percent by weight.

C. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.

D. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

E. All joints to be sealed with factory-applied, self-seal lap and butt strips.

2.03 FLEXIBLE ELASTOMERIC FOAM INSULATION

A. Manufacturers:
   1. Aeroflex USA, Inc; Aerocell
   2. Armacell LLC
   3. K-Flex USA LLC
   4. Nomaco.
   5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Insulation material shall be an EPDM rubber, flexible, closed-cell elastomeric insulation in tubular or sheet form. The product will be tested for and meet or exceed the requirements defined in ASTM C 534.

C. EPDM elastomeric insulation material shall be manufactured without the use of CFC's, HFC's or HCFC's.

D. EPDM elastomeric insulation shall have a flame-spread index of 25 or less and a smoke-developed index of 50 or less when tested in accordance with ASTM E 84, for all products through 2" thickness. Product to be suitable for use from -297F to 300F continuous service temperature, per ASTM C 411.

E. EPDM elastomeric insulation shall have a maximum thermal conductivity of 0.245 Btu-in./h-ft2 F at a 75 F mean temperature when tested in accordance with ASTM C 177 or ASTM C 518.

F. EPDM elastomeric insulation shall have a maximum water vapor transmission of 0.03 perm-inches when tested in accordance with ASTM E 96, Procedure A, latest revision.

G. Product must exhibit long-term UV resistance, when unfinished in outdoor installations, per ASTM G 7 and ASTM G 90.

H. EPDM elastomeric insulation must not contribute to external stress corrosion cracking as when tested by ASTM C 692.

I. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation. Accessories and adhesives shall not detract from any of the system ratings as specified above.

2.04 JACKETS

A. PVC Plastic.
   1. Manufacturers:
      a. Knauf

b. Owens Corning Corp
c. Johns Manville International, Inc
d. Certainteed Corp
e. Zeston 2000
f. PROTO PVC Corp.
g. VentureClad
h. Speedline Corp.
i. Substitutions: See Section 01 60 00 - Product Requirements.

2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
   a. Minimum Service Temperature: 0 degrees F.
   b. Maximum Service Temperature: 150 degrees F.
   c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
   d. Thickness: 10 mil.
   e. Connections: Brush on welding adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with the Midwest Insulation Contractors Association (MICA), National Commercial and Insulation Standard.

C. All insulation shall be applied so that there is no fiberglass exposed to the return air plenum. All fiberglass insulation, including all exposed edges, shall be coated, or mylar or other suitable material shall be provided between fiberglass and the air stream.

D. Exposed Piping: Locate insulation and cover seams in least visible locations.

E. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

F. Glass fiber insulated pipes conveying fluids below ambient temperature:
   1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
   2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive, Hi/Low Temp Inserts, and PVC fitting covers.

G. Glass fiber insulated pipes conveying fluids above ambient temperature:
   1. Provide standard jackets, with vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
   2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.

H. Inserts and Shields:
   1. Application: Piping 1/2 inches diameter or larger.
   2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
   3. Insert Location: Between support shield and piping and under the finish jacket.

4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

I. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 84 00.

J. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 5 feet above finished floor): Finish with PVC jacket and fitting covers.

K. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with PVC or aluminum jacket with seams located on bottom side of horizontal piping.

3.03 SCHEDULES

A. Plumbing Systems:
1. Domestic Hot Water Supply:
a. Glass Fiber Insulation:
1) Pipe Size Range: 1 1/4 inch and less:
(a) Thickness: 1 inch.
2) Pipe Size Range: 1 1/2 inch and above:
(a) 1 1/2 inch.
b. Flexible Elastomeric Foam Insulation:
1) Pipe Size Range: 1 1/4 inch and below:
(a) Thickness: 1/2 inch.
2) Pipe Size Range 1 1/2 inch and above:
(a) Thickness: 1 inch.
2. Domestic Hot Water Recirculation:
a. Glass Fiber Insulation:
1) Pipe Size Range: 1 1/4 inch or below:
(a) Thickness: 1 inch.
2) Pipe Size Range: 1 1/2 inch or above:
(a) Thickness: 1 1/2 inch
b. Flexible Elastomeric Foam Insulation:
1) Pipe Size Range: 1 1/4 inch and below:
(a) Thickness: 1/2 inch.
2) Pipe Size Range: 1 1/2 inch and above:
(a) Thickness: 1 inch
3. Domestic Cold Water:
a. Glass Fiber Insulation:
1) Pipe Size Range: All sizes.
(a) Thickness: 1 inch.
b. Flexible Elastomeric Foam Insulation:
1) Pipe Size Range: 1 1/4 inch and below:
(a) Thickness: 1/2 inch.
2) Pipe Size Range: 1 1/2 inch and above
(a) Thickness: 1 inch
4. Sanitary Above Grade serving mechanical mezzanine floor drains.
a. Glass Fiber Insulation:
1) Pipe Size Range: All sizes.
(a) Thickness: 1/2 inch.

b. Flexible Elastomeric Foam Insulation:
   1) Pipe Size Range: All sizes.
      (a) Thickness: 1/2 inch.

END OF SECTION 22 07 19

SECTION 22 10 05
PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe, pipe fittings, specialties, and connections for piping systems.
   1. Sanitary sewer.
   2. Domestic water.
   3. Flanges, unions, and couplings.
   4. Pipe hangers and supports.
   5. Valves.
   6. Check.
   7. Relief valves.
   8. Strainers.

B. Testing and Repair

C. Disinfection of Domestic Water Piping System

D. Service Connections

1.02 RELATED REQUIREMENTS

A. Section 31 23 16 - Excavation.

B. Section 31 23 23 - Fill.

C. Section 31 23 16.13 - Trenching.

D. Section 33 13 00 - Disinfecting of Water Utility Distribution.

E. Section 07 84 00 - Firestopping.

F. Section 08 31 00 - Access Doors and Panels.

G. Section 09 91 23 - Interior Painting.

H. Section 22 05 53 - Plumbing Identification.

I. Section 22 07 19 - Plumbing Piping Insulation.

J. Section 31 23 16 - Excavation.

K. Section 33 01 10.58 - DISINFECTION OF WATER DISTRIBUTION.

1.03 REFERENCE STANDARDS

A. ASME B31.2 - Fuel Gas Piping; The American Society of Mechanical Engineers; 1968.

B. ASME BPVC-IV - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers; 2019.

C. ASME BPVC-IX - Qualification Standard for Welding, Brazing, and Fuzing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators - Welding Brazing and Fusing Qualifications; 2019.

D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.

E. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2021.

F. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2022.

G. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2016.

H. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2016.

I. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2020a.

J. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2015, with Editorial Revision (2018).

K. ASTM D2680 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping; 2001 (Reapproved 2014).

L. AWWA C606 - Grooved and Shouldered Joints; 2015.

M. AWWA C651 - Disinfecting Water Mains; 2014.

N. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications; 2017 (Revised 2018).

O. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).

P. NSF 61 - Drinking Water System Components - Health Effects; 2022, with Errata.

Q. NSF 372 - Drinking Water System Components - Lead Content; 2022.

R. MSS SP-89 - Pipe Hangers and Supports - Fabrication and Installation Practices; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2003.

S. ANSI/ASME Section 9, AWS D10.9 and D1.1 National Certified Pipe Welding Bureau.

T. ANSI B16.18 - Soldering Procedures.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

C. Project Record Documents: Record actual locations of valves and pipe routings above ceiling and below floor.

1.05 QUALITY ASSURANCE

A. Maintain one copy of drawings on project site to mark pipe routings and valve locations.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

C. Welding Materials and Procedures: Comply with ASME BPVC-IX and applicable state labor regulations.

D. Welder Qualifications: Certified in accordance with ASME BPVC-IX.

E. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

F. All piping shall be American made and shall comply with the Buy American Provision of the ARRA.

1.06 REGULATORY REQUIREMENTS

A. Perform Work in accordance with State of Ohio plumbing code.

B. Conform to applicable code for installation of backflow prevention devices.

C. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

1.07 DELIVERY, STORAGE, AND HANDLING

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

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

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

1.08 FIELD CONDITIONS

A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.01 SANITARY SEWER AND VENT PIPING

A. Cast Iron Pipe: CISPI 310, hubless. Piping shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and be listed by NSF International.
   1. Fittings: Cast iron Hubless, CISPI 310
   2. Joints: CISPI 310, ASTM D 1247 Standard Duty, neoprene gasket and stainless steel clamp and shield assemblies.

B. ABS Pipe: Schedule 40 ABS DWV, ASTM D 2661 or ASTM F 628.
   1. Fittings: ABS.
   2. Joints: Solvent welded with ASTM D2235 cement.

C. PVC Pipe: Schedule 40 solid wall, ASTM D1785, ASTM D2665 or ASTM D3034.
   1. Fittings: PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.
   3. Joints: No Hub, CISPI-310 compression type with ASTM C 564 neoprene gaskets and stainless steel clamp and shield assembly.

D. Sanitary and vent piping in return air plenums, chases exposed to plenums and through fire walls shall be cast iron no hub and no hub fittings. ABS, CPVC and PVC piping will not be allowed in any of the spaces noted.

E. Kitchen sanitary piping and vent piping from equipment using water 140 degrees F or above shall be constructed of one one of the following. PVC piping will not be allowed.
   1. Cast Iron no hub and no hub fittings.
   2. Copper

F. PVC, CPVC and ABS piping shall only be used in under ground applications. All plumbing chases shall be cast iron unless completely sealed off to the plenum space.

2.02 SANITARY SEWER PIPING, ABOVE GRADE

A. Cast Iron Pipe: ASTM A74, service weight.
   1. Fittings: Cast iron.
   2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.

B. Cast Iron Pipe: CISPI 301, hubless, service weight.
   1. Fittings: Cast iron.
   2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.

C. Copper Tube: ASTM B306, DWV.
   1. Fittings: ASME B16.29, wrought copper, or ASME B16.23, sovent.
   2. Joints: ASTM B32, alloy Sn50 solder.

D. Copper Tube: ASTM B88 (ASTM B88M), Type K (A).
   1. Fittings: ASME B16.29, wrought copper, or ASME B16.23, sovent.
   2. Joints: ASTM B32, alloy Sn50 solder.

E. Copper Pipe: ASTM B42.
   1. Fittings: ASME B16.23, cast copper, or ASME B16.29, wrought copper.
   2. Joints: ASTM B32, alloy Sn50 solder.

F. Aluminum DWV Pipe:
   1. Fittings: Cast iron.
   2. Joints: ASTM C564, thermoplastic rubber coupling and stainless steel clamps.

G. Steel Pipe: ASTM A53/A53M Schedule 40, galvanized, using one of the following joint types:
   1. Threaded Joints: ASME B16.4 cast iron fittings.
   2. Threaded Joints: ASME B16.3 malleable iron fittings.
   3. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.

H. ABS Pipe: ASTM F628.
   1. Fittings: ABS.
   2. Joints: Solvent welded with ASTM D2235 cement.

I. ABS Pipe: ASTM D2661.
   1. Fittings: ABS.
   2. Joints: Solvent welded with ASTM D2235 cement.

J. PVC Pipe: ASTM D2729.
   1. Fittings: PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

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

L. PVC Pipe: ASTM D1785 Schedule 40, or ASTM D2241 SDR 26 with not less than 150 psi pressure rating.
   1. Fittings: ASTM D2466, PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.03 DOMESTIC WATER PIPING

A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B).
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze. All fittings shall be lead free and conform to NSF-61-G.
   2. Joints: ASTM B32, alloy Sn95 solder.
   3. Joints: Grooved Pipe. Fittings to conform to ASTM B75 or ASTM B-152.
   4. Joints: Copper press fittings. Fittings to conform to ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze. All fittings shall be lead free and conform to NSF-61-G.
   5. Solders and flux: ASTM B828, ASTM B813, containing 0.2% lead or less.

B. Grooved Pipe:
   1. Manufacturers:
      a. Victaulic, Style 607 "Quick Vic"
      b. Tyco/Grinnell; Style 672
      c. Anvil/Gruvlok; Style 6400
      d. Apollo- Shurjoint; Style C305
      e. Substitutions: Not Permitted.
   2. Couplings 2 inches thru 8 inches shall be installation ready wrought copper fittings conforming to ASTM B75/B75M or ASTM B-152, angle-pattern bolt pads to provide rigidity, complete with a pressure responsive synthetic rubber Grade "P" Fluoroelastomer

compound gasket with red and blue color code, rated from 0 degrees F to +180 degrees F, with plated nuts and bolts to secure unit together.

3. If rigid couplings are provided by Tyco Grinnell or Anvil Gruvlok, bolt pads must have equal gaps on each side and a torque wrench must be used to attain the manufacturer's documented torque rating, this will be verified by the engineer's field representative.
4. Gaskets by Anvil Gruvlok, in copper applications, must be lubricated (inside and out) with Gruvlok Xtreme Lubricant.
5. Option to fittings used for tees and outlets in grooved piping systems may be mechanical tee type consisting of a cast bronze upper housing with female NPT threaded outlet and locating collar, ductile iron lower housing coated with copper-colored enamel and synthetic rubber gasket.
6. All grooved end couplings and fittings shall be tested and certified to conform to ASTM F1476-93. Grooves must be rolled and must meet ANSI/AWWA C606.
7. The use of mechanical couplings may not be utilized as a means of expansion regardless of manufacturer.
8. Flaring of tube and fitting ends to IPS dimensions will not be allowed.

C. Copper Press Fittings:
   1. Material:
      a. Press Fittings: Copper press fittings shall conform to the material and sizing requirements of ASME B16.18 or ASME B16.22. O-rings for copper press fittings shall be EPDM. All fittings shall be lead free and conform to NSF-61-G.
   2. Installation: Copper press fittings shall be made in accordance with the manufacturers installation instructions. The tubing shall be fully inserted into the fitting and the tubing marked at the shoulder of the fitting. The fittings alignment shall be checked against the mark on the tubing to assure the tubing is fully inserted into the fitting. The joints shall be pressed using the tool approved by the manufacturer.

D. Cross linked polyethylene / PEX
   1. Manufacturers:
      a. Uponor
      b. Zurn
      c. Viega
      d. Watts
      e. Nibco
      f. Rahau
      g. Substitutions: See Section 01 6000 - Product Requirements
   2. Pipe:
      a. Cross-linked polyethylene (PEX) manufactured by the PEX-A (Engel Method), PEX-B (Silane Method), or PEX-C (Electron Beam Method).
      b. Non Barrier Type
         1) Shall have a pressure and temperature rating of 160 psi at 73 degrees F, 100 PSI at 180 degrees F, and 80 PSI at 200 degrees F.
         2) Tubing shall have a minimum of 6 months UV protection.
      c. Manufacture in accordance with ASTM F876 and ASTM F877 and tested for compliance by an independent third-party agency.
      d. Minimum bend radius shall be no less than 6 times the outside diameter.
   3. Fittings:
      a. Crimp or Clamp Style with barb fittings. Manufacture in accordance with ASTM F1807 or ASTM F2159 and/or comply with ASTM F877 system standard as identified on the fitting. Fittings to be constructed of brass or EP. Copper crimp ring, stainless steel crimp ring, and stainless steel clamps shall be listed to ASTM F1807 and/or ASTM F877. Use for PEX-B or PEX-C tubing only.

b. Expansion Fitting: Manufacture in accordance with ASTM F1960. Fittings to be constructed of brass or EP. Use for PEX-A tubing only.

4. Tools:
   a. All tools and fittings shall be provided or approved for use by the PEX tubing manufacturer.
5. Manifold:
   a. QuickPort Preassembled
   b. Copper Manifold System
   c. CR Manifold
   d. Multiport fittings
   e. Copper Header
6. Valves:
   a. Shall be of the metal type with barbed fittings for connection to PEX tubing. Shall meet the requirements of ASTM F877. See additional requirements below.

2.04 FLANGES, UNIONS, AND COUPLINGS

A. Unions for Pipe Sizes 3 Inches and Under:
   1. Ferrous pipe: Class 150 malleable iron threaded unions.
   2. Copper tube and pipe: Class 150 bronze unions with soldered joints.

B. Flanges for Pipe Size Over 1 Inch:
   1. Ferrous Pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
   2. Copper Tube and Pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.

C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.
   1. Dimensions and Testing: In accordance with AWWA C606.
   2. Housing Material: Provide ASTM A47/A47M malleable iron or ductile iron, galvanized.
   3. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
   4. When pipe is field grooved, provide coupling manufacturer's grooving tools.

D. Grooved and Shouldered Pipe End Couplings:
   1. Housing: Malleable iron clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; steel bolts, nuts, and washers; galvanized for galvanized pipe.
   2. Sealing gasket: "C" shape composition sealing gasket.

E. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.05 PIPE HANGERS AND SUPPORTS

A. Plumbing Piping - Drain, Waste, Storm, and Vent:
   1. Conform to ASME B31.9.
   2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
   3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable swivel, clevis.
   4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
   5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
   6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
   7. Vertical Support: Steel riser clamp.

8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

B. Plumbing Piping - Water, Gas, Compressed Air:
1. Conform to ASME B31.9.
2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable swivel, clevis.
4. Multiple or Trapeze Hangers: Steel channels with welded supports or spacers and hanger rods.
5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
7. Structural Supports shall be beam clamps, sloped beam clamps, or strap in strut mount hangers.
   a. Arrange all mechanical supports to prevent eccentric loading of joists and joist girders. Locate supports at joist panel points.
   b. If support must occur between panel joints, then threaded rods shall be dropped from both panel points, an adequate angle to both, and then the support attached to the angle is required.
   c. Unless specifically indicated or approved by Garmann Miller & Associates Inc. do not provide support from roof decks or floor decks.
8. Vertical Support: Steel riser clamp.
9. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
10. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.
11. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

C. Copper tubing 1/2 inch to 2 inch: When attached directly to copper piping or tubing, hangers shall be equipped with permanently attached factory liner of high compression factor, chemically treated to resist moisture, abrasion, heat, cold and vermin. Liner shall be felt or equally approvable material, or hangers shall be copper plated. Lined or plated hangers not required when hanger is oversized to cover an insulated line.

D. Pex Piping 1/2 inch to 3 inch: When suspended piping applications with hangers or unistrut shall have pipe supports installed to provide similar pipe mounting spacing to copper piping. Pipe supports shall be equal to Uponor model: PEX-a Pipe Support, 9 foot length.

2.06 GLOBE VALVES

A. Manufacturers:
1. Conbraco Industries / Apollo Valves.
2. Nibco, Inc.
3. Crane Co. - Valve Division.
4. Hammond.
5. Watts.
6. Milwaukee Valve Company.
7. Kitz.
8. Substitutions: See Section 01 60 00 - Product Requirements.

B. Up To and Including 2 Inches
1. Valves shall be Class 150 and manufactured in accordance with MSS SP 80; body and bonnet are to be of bronze ASTM B-62. Stems shall be of dezincification-resistant silicone

bronze ASTM B-371 or low zinc alloy B-99, non asbestos packing, TFE seat disc and malleable or ductile iron handwheel. Where higher operating pressures approach 150 PSI, Class 150 union bonnet valves of like construction will be used. Valve ends may be threaded or solder type.

C. 2-1/2 Inches and Larger
   1. Valves to be Class 125 manufactured in accordance to MSS SP 85, flanged, bolted bonnet, OS&Y, iron body, bronze trimmed, with body and bonnet conforming to ASTM A-126 class B cast iron. Packing and gaskets to be non-asbestos. Provide chain wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

2.07 BALL VALVES

A. Manufacturers:
   1. Apollo Valves; _____: www.apollovalves.com/#sle.
   2. Conbraco Industries / Apollo Valves.
   3. Crane Co. - Valve Division.
   4. Hammond.
   5. Watts.
   6. Milwaukee Valve Company.
   7. Jomar Valve
   8. Kitz.
   9. Substitutions: See Section 01 60 00 - Product Requirements.

B. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze or ductile iron body, 304 stainless steel or chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, threaded or grooved ends with union.

C. Valves shall be rated 150 psi CWP and 600 psi non-shock WOG and will have 2 piece cast bronze lead free bodies conforming to NSF-61-G and ISO 6509, TFE seats, full port, separate packnut with adjustable stem packing, anti-blowout stems and chrome plated bronze ball. Valve ends shall have full depth ANSI threads or extended solder connections and be manufactured to comply with MSS SP-110.
   1. Valves shall have a permanent marking on valve body identifying valve as lead free in conformance with NSF-61-G.

D. Valve handles shall be lever type, metal handle with epoxy coated finish. Plastic handles will not be approved.
   1. Where piping is insulated, ball valves shall be equipped with 2" extended handles of non-thermal conductive material. Also provide a protective sleeve that allows operation of the valve without breaking the vapor seal or disturbing the insulation. Memory stops, which are fully adjustable after insulation is applied, shall be included.

2.08 PLUG VALVES

A. Manufacturers:
   1. Conbraco Industries / Apollo Valves.
   2. Crane Co. - Valve Division.
   3. Hammond.
   4. Watts.
   5. Milwaukee Valve Company.
   6. Kitz.
   7. Homestead
   8. Nordstrom
   9. Substitutions: See Section 01 60 00 - Product Requirements.

B. Construction 2-1/2 Inches and Larger: ANSI B16.1, 175 psi CWP, cast iron body and plug, pressure lubricated, teflon or Buna N packing, flanged or grooved ends. Provide lever operator with set screw.

2.09 BUTTERFLY VALVES

A. Manufacturers:
1. Apollo Valves; _____: www.apollovalves.com/#sle.
2. Victaulic
3. Conbraco Industries / Apollo Valves.
4. Hammond Valve.
5. Crane Valve.
6. Watts.
7. Milwaukee Valve Company.
8. Jomar Valve
9. Kitz.
10. Substitutions: See Section 01 60 00 - Product Requirements.

B. Valves shall be lug of I.P.S. grooved body style manufactured in accordance with MSS SP-67 rated at least 200 psi non-shock cold water working pressure. Body to have 2 inch extended neck for insulating and to be cast iron or ductile iron. Valve to have aluminum bronze alloy disc with EPDM rubber seat and seals; or EPDM rubber encapsulated disc with polymer coated body. Stem shall be 400 series stainless steel and shall not have exposed stem to disc fasteners. Sizes 2 inch - 6 inch shall be lever operated with 10 position throttling plate; sizes 8 inch and larger shall have gear operators. Lug style and grooved style shall be capable for use as isolation valves and recommended by the manufacturer for dead-end service at full pressure without the need for downstream flanges.

2.10 SWING CHECK VALVES

A. Manufacturers:
1. Hammond Valve.
2. Conbraco Industries / Apollo Valves.
3. Crane Co. - Valve Division.
4. Watts.
5. Milwaukee Valve Company.
6. Kitz.
7. Substitutions: See Section 01 60 00 - Product Requirements.

B. Up to 2 Inches:
1. Valves shall be Y-Pattern swing-type manufactured in accordance with MSS SP-80 Class 150, bronze ASTM B-62 lead free bodies conforming to NSF-61-G with TFE seat disc. Where higher operating pressures approach 150 psi, Class 150 valves of like construction shall be used. Valve ends may be threaded or solder type.

C. Over 2 Inches:
1. For horizontal lines shall be swing-type manufactured in accordance with MSS SP-71 Class 125, flanged, ASTM A-126 Class B, cast iron body with bronze trim, non-asbestos gasket. For vertical lines or pump discharge, valves shall be wafer or lug style, in line, spring actuated lift check manufactured in accordance with MSS SP-126. Body shall be cast iron ASTM A-126, Class B with stainless steel spring, bronze disc plates, rubber seat

2.11 SPRING LOADED CHECK VALVES

A. Manufacturers:
1. Hammond Valve.
2. Conbraco Industries / Apollo Valves.

3. Crane Valve.
4. Watts.
5. Milwaukee Valve Company.
6. Kitz.
7. Substitutions: See Section 01 60 00 - Product Requirements.

B. Class 125, iron body, bronze lead free trim conforming to NSF-61-G , stainless steel springs, bronze disc, Buna N seals, wafer style ends.

2.12 RELIEF VALVES

A. Pressure Relief:
1. Manufacturers:
a. Cla-Val Co
b. Henry Technologies
c. Watts Regulator Company
d. Conbraco Industries / Apollo Valves
e. Caleffi
f. Substitutions: See Section 01 60 00 - Product Requirements.
2. ANSI Z21.22 certified, bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated.

B. Temperature and Pressure Relief:
1. Manufacturers:
a. Cla-Val Co
b. Henry Technologies
c. Watts Regulator Company
d. Conbraco Industries / Apollo Valves
e. Caleffi
f. Substitutions: See Section 01 60 00 - Product Requirements.
2. ANSI Z21.22 certified, bronze lead free body conforming to NSF-61-G, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME (BPV IV) certified and labelled.

C. Vacuum Relief:
1. Manufacturers:
a. Cla-Val Co
b. Henry Technologies
c. Watts Regulator Company
d. Conbraco Industries / Apollo Valves
e. Caleffi
f. Substitutions: See Section 01 60 00 - Product Requirements.
2. ANSI Z21.22 certified, brass lead free body conforming to NSF-61, silicon washer, stainless steel stem and springs, automatic, direct vacuum relief maximum 250 degrees F, capacity ASME (BPV IV) certified and labelled.

2.13 STRAINERS

A. Manufacturers:
1. Mueller.
2. Armstrong International, Inc.
3. Nibco, Inc
4. Sarco.
5. Hoffman.
6. Metalflex.

7. Conbraco Industries / Apollo Valves
8. Substitutions: See Section 01 60 00 - Product Requirements.

B. Size 2 inch and Under:
1. Threaded bronze body, lead free conforming to NSF-61-G, for 200 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
2. Class 125, threaded bronze lead free bodyor iron body 400 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.

C. Size 1-1/2 inch to 4 inch:
1. Class 125, flanged iron body, Y pattern with 1/16 inch stainless steel perforated screen.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Sanitary, storm, and vent piping in return air plenums, chases exposed to plenums and through fire walls shall be cast iron. PVC piping will not be allowed in any of the plenum spaces noted.

C. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

D. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

E. Install piping to maintain headroom, conserve space, and not interfere with use of space. Coordinate all installation with all other trades.

F. Group piping whenever practical at common elevations.

G. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

H. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

I. Provide access where valves are not exposed. Coordinate size and location of access doors with Section 08 31 00.

J. Establish elevations of buried piping outside the building to ensure not less than 4 ft of cover for domestic water piping.

K. Install vent piping penetrating roofed areas to maintain integrity of roof assemblyand insulate roof penetration with spray foam. Vent piping termination through the roof to be cast iron no-hub. Paint vent through roof to color as selected by Architect/Engineer.

L. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

M. Provide support for utility meters in accordance with requirements of utility companies.

N. Excavate in accordance with Section 31 23 16.

O. Install valves with stems upright or horizontal, not inverted. All valve handles shall be easily accessible.

P. Install water piping to ASME B31.9.

Q. Provide 1/2" elastomeric insulation around all piping in walls and through floors.

R. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.

S. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.

T. Sleeve pipes passing through partitions, walls and floors.

U. Inserts:
   1. Provide inserts for placement in concrete formwork.
   2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
   3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
   4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
   5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.

V. Pipe Hangers and Supports:
   1. Install in accordance with ASME B31.9.
   2. Bent hanger rods will not be allowed. Provide swivel type clamps to avoid bent hanger rods.
   3. Support horizontal piping as scheduled. No pipe or duct shall be hung from another pipe, pipes or electrical conduit.
   4. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
   5. Place hangers within 12 inches of each horizontal elbow.
   6. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   7. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
   8. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
   9. Provide copper plated hangers and supports for copper piping.
   10. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
   11. Support cast iron drainage piping at every joint.

3.04 APPLICATION

A. Use grooved mechanical couplings and fasteners only in accessible locations.

B. Install press fittings using only the manufacturers approved press fitting equipment.

C. Install unions downstream of valves and at equipment or apparatus connections.

D. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

E. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers. Gate valves will not be allowed on this project.

F. Install globe valves for throttling, bypass, or manual flow control services.

G. Provide check valves on cold water inlet to water heater, on hot water return connection to cold water line, and as shown on drawings.

3.05 TOLERANCES

A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/8 inch per foot slope.

3.06 TESTING AND REPAIR

A. Upon completion of each respective piping/ductwork system, but prior to insulating, covering, or backfilling, each system shall be thoroughly cleaned and flushed to remove construction dirt and foreign matter.

B. Test Piping as Specified Herein
   1. No piping work shall be concealed or covered until it has been inspected and approved by the project inspector, who shall be notified when the Work is ready for inspection. Work shall be completely installed and tested as required by this Contract and Ordinances of the local Municipality and shall be leaktight to the satisfaction of those making the inspection and the Architect/ Engineer.
   2. In general, pressure tests shall be applied to piping. In no case shall piping be subject to pressure exceeding its rating. Defective work shall be promptly repaired or replaced and test shall be repeated until the particular system and component parts thereof receive approval of the Architect/Engineer.
   3. Provide temporary equipment for testing, including pump, blower, and gauges. Test piping system before insulation is installed and remove control devices before testing. Test each natural section of each piping system independently, but do not use piping system valves or to isolate sections where test pressure exceeds valve pressure rating.
   4. Repair piping system sections which fail required piping test by disassembly and reinstallation, using new materials to extent required to overcome leakage. Do not use chemicals, stopleak compounds, mastics, or other temporary repair methods.
   5. Drain test water from piping systems after testing and repair work has been completed.
   6. Pressure for Testing of Piping Systems shall be as follows:
      a. Domestic Cold Water, Hot Water, and Non-Potable Water Piping
         1) Piping shall be tested and results approved by Architect/Engineer prior to application of insulation.
         2) Piping system shall be capped and subjected to a static water pressure of 50 psig above operating pressure and a minimum of 125 psig, and pressure maintained for 4 hours with no leaks or loss in pressure.
         3) Test source shall be isolated before conducting pressure tests.
      b. Sewer, Soil, and Waste Piping
         1) Soil and waste piping shall be plugged and subjected to not less than a 10 foot head of water. Water column shall be maintained for 2 hours with no leaks.
         2) Where subject to freezing, use air or smoke test for not less than 30 minutes and as required by code.
   7. Accurately record and report methods of testing, times, and dates of test, witnesses to the test, and the results of the test. Test reports shall be neatly typewritten on standard 8-1/2 inch by 11 inch sheets and submitted in 5 copies to Architect/Engineer for approval within 5 days after test has been performed.

C. Damage resulting from tests shall be repaired or damaged materials replaced, to satisfaction of Architect/Engineer, and at no cost to Owner.

3.07 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Disinfect water distribution system in accordance with Section 33 01 10.58.

B. Prior to starting work, verify system is complete, flushed and clean.

C. Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).

D. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.

E. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.

F. Maintain disinfectant in system for 24 hours.

G. If final disinfectant residual tests less than 25 mg/L, repeat treatment.

H. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.

I. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.08 SERVICE CONNECTIONS

A. Provide new sanitary sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.

B. Provide new water service complete with approved strainer, reduced pressure backflow preventer and shutoff valves.

3.09 SCHEDULES

A. Pipe Hanger Spacing:
   1. Metal Piping:
      a. Pipe Size: 1/2 inches to 1-1/4 inches:
         1) Maximum Hanger Spacing: 6.5 ft.
         2) Hanger Rod Diameter: 3/8 inches.
      b. Pipe Size: 1-1/2 inches to 2 inches:
         1) Maximum Hanger Spacing: 10 ft.
         2) Hanger Rod Diameter: 3/8 inch.
      c. Pipe Size: 2-1/2 inches to 3 inches:
         1) Maximum Hanger Spacing: 10 ft.
         2) Hanger Rod Diameter: 1/2 inch.
      d. Pipe Size: 4 inches to 6 inches:
         1) Maximum Hanger Spacing: 10 ft.
         2) Hanger Rod Diameter: 5/8 inch.
   2. Copper Piping
      a. Pipe size: Up to 1 inch
         1) Maximum hanger spacing: 5 ft.
         2) Hanger rod diameter: 3/8 inch
      b. Pipe size: 1-1/4 inch to 2 inch
         1) Maximum hanger spacing: 8 ft.
         2) Hanger rod diameter: 3/8 inch
      c. Pipe size: 2-1/2 inch
         1) Maximum hanger spacing: 9 ft.
         2) Hanger rod diameter: 1/2 inch
      d. Pipe size: 3 inch to 4 inch
         1) Maximum hanger spacing: 10 ft.
         2) Hanger rod diameter: 1/2 inch
   3. Plastic Piping:
      a. All Sizes:
         1) Maximum Hanger Spacing: 6 ft.
         2) Hanger Rod Diameter: 3/8 inch.

END OF SECTION 22 10 05

SECTION 22 10 06
PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Drains.

B. Floor drains.

C. Cleanouts.

D. Hose bibbs.

E. Hydrants.

F. Backflow preventers.

G. Water hammer arrestors / Shock Absorbers.

H. Sumps and interceptors.

I. Mixing valves.

J. Interceptors.
   1. Grease Interceptor

K. Trap Seal Protection Devices

L. Sumps and Interceptors.

1.02 RELATED REQUIREMENTS

A. Section 22 10 05 - Plumbing Piping.

B. Section 22 40 00 - Plumbing Fixtures.

1.03 REFERENCE STANDARDS

A. ASME A112.6.3 - Floor and Trench Drains; 2019.

B. ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers; 2017.

C. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers; 2011.

D. ASSE 1019 - Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance; 2011 (Reaffirmed 2016).

E. ASSE 1070 - Performance Requirements for Water Temperature Limiting Devices; 2015.

F. NSF 61 - Drinking Water System Components - Health Effects; 2022, with Errata.

G. NSF 372 - Drinking Water System Components - Lead Content; 2022.

H. PDI-WH 201 - Water Hammer Arresters; 2017.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.

C. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.

D. Certificates: Certify that grease interceptors meet or exceed specified requirements.

E. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.05 QUALITY ASSURANCE

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

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept specialties on site in original factory packaging. Inspect for damage.

1.07 EXTRA MATERIALS

A. Supply for Owner's use in maintenance of project:
   1. Two loose keys for each outside wall hydrants and indoor hose bibbs.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.02 DRAINS

A. Manufacturers:
   1. Zurn Industries, Inc.
   2. Wade.
   3. Josam Company.
   4. Jay R. Smith Manufacturing Company.
   5. Watts Regulator Company.
   6. MIFAB
   7. Sioux Chief
   8. ABT, Inc
   9. Hubell, Inc.
   10. Froet Industries
   11. Eric'sons Dura Trech
   12. ACO, Inc
   13. Substitutions: See Section 01 60 00 - Product Requirements.

B. Floor Drain (FD):
   1. ASME A112.21.1; cast iron two piece body with double drainage flange, weep holes, and round, adjustable nickel-bronze strainer.

C. Floor Sink (FS):
   1. Cast iron 12 inch by 12 inch by 8 inch floor drain sink with a square cast iron grate, with separate trap, seepage flange, interior dome strainer, 1/2 grate.

2.03 CLEANOUTS

A. Manufacturers:
   1. Wade
   2. Jay R. Smith Manufacturing Company
   3. Josam Company
   4. Zurn Industries, Inc
   5. Watts Regulator Company.
   6. MIFAB
   7. Sioux Chief
   8. Neenah
   9. Substitutions: See Section 01 60 00 - Product Requirements.

B. Cleanouts at Exterior Surfaced Areas (RH):
   1. Round cast nickel bronze access frame and non-skid cover.

C. Cleanouts at Interior Finished Floor Areas (CO):
   1. Cast iron, inside caulking, with adjustable nickel-bronze round tops. Provide "72" carpet marker in carpeted areas. Review Finish Schedule for locations.

2. PVC, inside caulking, with adjustable nickel-bronze round tops. Provide "72" carpet marker in carpeted areas. Review Finish Schedule for locations.

D. Cleanouts at Interior Finished Wall Areas (WCO):
1. Concealed screw plug with countersunk wrench hole and stainless steel screwed flush cover.

2.04 HOSE BIBBS

A. Manufacturers:
1. Zurn Industries, Inc
2. Woodford.
3. Acorn Engineering Company.
4. Wade.
5. Josam.
6. Jay R. Smith Manufacturing Company.
7. Watts Regulator Company.
8. MIFAB
9. Substitutions: See Section 01 60 00 - Product Requirements.

B. Interior Hose Bibbs:
1. Bronze or brass with integral mounting flange, replaceable hexagonal disc, hose thread spout, chrome plated where exposed with lockshield and removable key where noted on drawings, integral vacuum breaker in conformance with ASSE 1011.
2. ASSE 1019; self-draining type with chrome plated wall plate hose thread spout, handwheel, and integral vacuum breaker.
3. Refer to fixture schedule on drawings for additional requirements.

2.05 HYDRANTS

A. Manufacturers:
1. Zurn Industries, Inc
2. Woodford.
3. Acorn Engineering Company.
4. Wade.
5. Josam.
6. Jay R. Smith Manufacturing Company.
7. Watts Regulator Company.
8. MIFAB
9. Substitutions: See Section 01 60 00 - Product Requirements.

B. Wall Hydrants:
1. ASSE 1019; freeze resistant, self-draining type with chrome plated wall plate lockable recessed box hose thread spout, lockshield and removable key, andintegral vacuum breaker.
2. Refer to fixture schedule on drawings for additional requirements.
3. Seal recessed box wall penetration air and water tight with clear silicone caulk on top and sides. Do not seal the bottom edge. It should be left open to allow for draining.

2.06 BACKFLOW PREVENTERS

A. Manufacturers:
1. Zurn Wilkins
2. ITT Lawler.
3. Watts Regulator Company
4. Conbraco Industries/ Apollo Valves
5. Caleffi

6. Substitutions: See Section 01 60 00 - Product Requirements.

B. Reduced Pressure Backflow Preventer: HVAC / Domestic water 3/4 inch to 2 inch.
   1. ASSE 1013; lead free bronze body with lead free bronze internal parts, and stainless steel springs; two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve that opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two ball valves, strainer, and four test cocks. Pipe relief to nearest floor drain. All components shall be lead free in compliance with NSF-61-G.

C. Reduced Pressure Backflow Preventer: Domestic Water 3 inch and above.
   1. ASSE 1013; Epoxy coated Ductile Iron body or stainless steel body with stainless steel internal parts and stainless steel springs; two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve that opens under back pressure in case of diaphragm failure; threaded vent outlet; assembled with two gate valves, strainer, and test cocks. Pipe relief to nearest floor drain. All components shall be lead free in compliance with NSF-61-G.

2.07 WATER HAMMER ARRESTORS / SHOCK ABSORBER

A. Manufacturers:
   1. Jay R. Smith Manufacturing Company.
   2. Zurn Industries, Inc.
   3. Watts Regulator Company.
   4. Wade.
   5. Josam.
   6. MIFAB
   7. Oatey
   8. Precision Plumbing Products
   9. Substitutions: See Section 01 60 00 - Product Requirements.

B. Water Hammer Arrestors:
   1. Stainless Steel or Copper construction, ASSE Listed, Piston or Bellow type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range 34 to 250 degrees F and maximum 150 psi working pressure.

2.08 TRAP SEAL PROTECTION DEVICES

A. As an alternate to the trap primers for floor drains, a trap seal protection device can be used as allowed per the OBC, section 106.7.1

B. Manufacturers:
   1. Sureseal
   2. Mifab
   3. Oatey
   4. Green Drain, Inc.
   5. Zurn
   6. Substitutions: See section 01 6000 - Product Requirements

C. Construction: Mechanical device shall be an inline floor drain trap sealer, ASSE 1072 or IPC 09.1 listed. Body shall be constructed of ABS plastic. Diaphragm and sealing gasket to be constructed of neoprene rubber. Compression fitting sealing gasket 80 durometer.

2.09 SUMP AND INTERCEPTORS

A. Grease Interceptors:
   1. Manufacturers:
      a. Xerxes
      b. GreenTurtle, Proceptor Series

c. Thermaco
d. Highland Tank Company
e. Schier
f. Town and Country
g. Substitutions: See Section 01 6000 - Product Requirements.

2. Construction:
a. Material: Chemical Resistant High Density Polyethylene.
b. Alternate Material: High Strength, mild carbon steel to ASTM specifications and coated both inside and outside with high solids polyurethane.
c. Ratings: The Grease Interceptor shall meet the IAPMO standards for sanitary systems and ASSHTO structural requirements. It shall be H-20 load rated when installed in accordance with manufacturer's installation details.
d. Rough-in: On floor. Refer to detail on drawings.
e. Accessories: Multi-weir baffle assembly, integral deep seal trap, adjustable riser to match finish grade.
f. Cover: Heavy duty, Traffic rated cover equal to Neenah R-6461-EH. Cover shall be lockable.
g. Inspection port: Fiberglass or HDPE inspection port with adjustable riser and heavy duty, traffic rated, lockable cover. Inspection port shall be provided separate of the grease interceptor and installed in the outlet piping as shown on the drawings Refer to the drawings for additional information.

3. Unit Rating: Refer to drawings for unit size and capacity.

2.10 MIXING VALVES

A. Mixing Valves:
1. Manufacturers:
a. Powers.
b. Symmons
c. Lawler
d. Bradley
e. Acorn
f. Conbraco Industries/ Apollo Valves
g. Caleffi
h. Arm
i. Leonard Valve Company
j. Guardian
k. Morris Group International
l. Substitutions: See Section 01 60 00 - Product Requirements.

2. Lavatory thermostatic mixing valve: Nickel plated brass/bronze lead free body conforming to NSF-61-G. Adjustable hand knob to allow for exact temperature adjustment. Meet the performance requirements of ASSE 1070 and CSA B125 certified. Capable to provide tempered water to multiple lavatories.

3. Accessories:
a. Check valve on inlets.
b. Volume control shut-off valve on outlet.
c. Stem thermometer on inlets and outlet. Not required for lavatory mixing valve.
d. Strainer stop checks on inlets.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.

C. Encase exterior cleanouts in concrete flush with grade.

D. Install floor cleanouts at elevation to accommodate finished floor.

E. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on janitor rooms, flush valves, interior and exterior hose bibs.

F. Pipe relief from backflow preventer to nearest drain.

G. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to service sinks and flush valves serving water closets and urinals. All water hammer arrestors shall be accessible above the ceiling.

H. Thermostatic mixing valves shall be installed where and as denoted on the Drawings to mix hot and cold water, delivering a mixture at a constant temperature.

I. Install mixing valves at +5'-0" above finished floor.

J. Install lavatory thermostatic mixing valves serving single lavs directly below the lavatory. Locate as high as possible below lavatory.

K. Install lavatory thermostatic mixing valves serving multiple lavs above lay-in ceiling. Locate as to provide maintenance access.

L. Install all drains at 99'-11-1/2" elevation (Finish Floor = 100'-0") unless noted otherwise on drawings. Install floor drains in shower areas to accommodate a floor slope of 1:48. The minimum height of the floor drain shall be 99'-11-1/2".

END OF SECTION 22 10 06

SECTION 22 40 00
PLUMBING FIXTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flush Valve Water closets.

B. Wall Hung Urinals.

C. Lavatories.

D. Sinks.

E. Service sinks.

F. Drinking fountains.

1.02 RELATED REQUIREMENTS

A. Section 22 10 05 - Plumbing Piping.

B. Section 22 10 06 - Plumbing Piping Specialties.

C. Section 22 30 00 - Plumbing Equipment.

1.03 REFERENCE STANDARDS

A. ASME A112.6.1M - Supports for Off-the-Floor Plumbing Fixtures for Public Use; 1997 (Reaffirmed 2017).

B. ASME A112.18.1 - Plumbing Supply Fittings; 2018, with Errata.

C. ASME A112.19.2 - Ceramic Plumbing Fixtures; 2018.

D. ASME A112.19.5 - Flush Valves and Spuds for Water Closets, Urinals, and Tanks; 2017.

E. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.

F. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

G. NSF 61 - Drinking Water System Components - Health Effects; 2022, with Errata.

H. NSF 372 - Drinking Water System Components - Lead Content; 2022.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

C. Samples: Submit one sets of color chips for each standard color.

D. Maintenance Data: Include fixture trim exploded view and replacement parts lists.

E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

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

B. Install per the requirements of the current plumbing code.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept fixtures on site in factory packaging. Inspect for damage.

B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.07 WARRANTY

A. Provide manufacturer's standard warranty for all plumbing fixtures and trim.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 FLUSH VALVE WATER CLOSETS

A. Manufacturers:
   1. American Standard, Inc
   2. Kohler Company
   3. Zurn Industries, Inc
   4. Sloan Valve Company.
   5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Bowl:
   1. ASME A112.19.2; wall hung, siphon jet flush action, vitreous china closet bowl, with elongated rim, 1-1/2 inch top spud, china bolt caps.
      a. Water Consumption: 1.28 gallon per flush

C. Flush Valve
   1. Manufacturers:
      a. Sloan Valve Company.
      b. Kohler.
      c. American Standard.
      d. Zurn Industries, Inc.
      e. Geberit
      f. Moen
      g. Hydrotek
      h. Substitutions: See Section 01 60 00 - Product Requirements.
   2. Manual Flush Valves: ASME A112.19.2; exposed chrome plated, diaphragm or piston type with oscillating handle, escutcheon, seat bumper, integral screwdriver stop and vacuum breaker
   3. Water consumption: 1.28 gallons per flush.

D. Seats:
   1. Manufacturers: (Refer to Schedule on Drawings for Model numbers)
      a. American Standard, Inc
      b. Beneke
      c. Bemis Manufacturing Company.
      d. Church Seat Company.
      e. Olsonite.
      f. Zurn Industries, Inc
      g. Substitutions: See Section 01 60 00 - Product Requirements.
   2. Solid white plastic, open front, extended back,self-sustaining hinge, brass bolts, with cover.

E. Carriers:
   1. Manufacturers:
      a. Watts Drainage
      b. JOSAM Company.
      c. Sloan Valve Company.

d. Zurn Industries, Inc.
e. Wade.
f. Substitutions: See Section 01 60 00 - Product Requirements.

2. ASME A112.6.1M; adjustable cast iron frame, integral drain hub and vent, adjustable spud, lugs for floor and wall attachment, threaded fixture studs with nuts and washers.
3. 500 pound load capacity
4. 3" sanitary oulet

2.03 WALL HUNG URINALS

A. Manufacturers
1. American Standard, Inc
2. Kohler Company
3. Zurn Industries, Inc
4. Sloan Valve Company
5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Urinals:
1. Vitreous china, ASME A112.19.2, vitreous china, wall hung, high efficiency washout urinal with shields, integral trap, 3/4" top spud, concealed support.
a. Water Consumption: 0.125 gpf (pint).

C. Flush Valve
1. Manufacturers:
a. Sloan Valve Company.
b. Kohler.
c. American Standard.
d. Zurn Industries, Inc.
e. Geberit
f. Moen
g. Hydroteck
h. Substitutions: See Section 01 60 00 - Product Requirements.
2. Manual Flush Valves: ASME A112.19.2, exposed chrome plated, diaphragm or piston type complete with oscillating handle, escutcheon, integral screwdriver stop and vacuum breaker.
3. Water Consumption: 0.125 gallon per flush (1 pint)

D. Carriers:
1. Manufacturers:
a. Watts Drainage.
b. JOSAM Company.
c. Sloan Valve Company.
d. Zurn Industries, Inc.
e. Substitutions: See Section 01 60 00 - Product Requirements.
2. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded fixture studs for fixture hanger, bearing studs.

2.04 LAVATORIES

A. Manufacturers:
1. American Standard, Inc
2. Kohler Company.
3. Zurn Industries, LLC: www.zurn.com/#sle.
4. Bradley
5. Acorn Engineering

6. Just
7. Elkay
8. Willoughby, Inc.
9. Franke
10. Substitutions: See Section 01 60 00 - Product Requirements.

B. Vitreous China Wall Hung Basin:
1. ASME A112.19.2; vitreous china wall hung lavatory, rectangular basin with splash lip, front overflow, soap depression, and concealed arm supports.
   a. Drilling Centers: 4 inch.

C. Stainless Steel Wall Hung Basin:
1. Wall hung, ADA compliant seamless welded construction, fabricated of 18 gauge stainless steel, with integral-formed backsplash and over flow. Furnish with wall clips and integral apron clip for wall mounting.
   a. Drilling Centers: 4 inch.

D. Supply Faucet:
1. Manufacturers: (Refer to Schedule on Drawings for Model Numbers)
   a. Zurn Industries, Inc.
   b. Chicago.
   c. American Standard Inc.
   d. Kohler
   e. Moen.
   f. Speakman
   g. Hydrotek
   h. T & S Brass.
   i. Sloan Valve Company.
   j. Substitutions: See Section 01 6000 - Product Requirements.
2. Manual Lavatory Faucet
   a. ASME A112.18.1; chrome plated brasslead free in accordance with NSF-61-G, supply fitting with open grid strainer, 1/4 turn ceramic disc valving, water economy aerator, ADA indexed handles, lever type. All removable parts of faucet shall be vandal resistant.
      1) Supply Faucet Centers: 4 inch
      2) Water Consumption: 0.35 gpm

E. Accessories:
1. Chrome plated 17 gage brass P-trap with clean-out plug and arm with escutcheon.
2. ASSE 1070 compliant, point of use thermostatic tempering valve where noted. Mount above ceiling in accessible location.
3. Grid Strainer.
4. Removable key handle stops.
5. Flexible supplies.
6. Under sink piping covers. Refer to specification section 22 0717 Piping Safety Covers.

F. Carrier:
1. Manufacturers:
   a. Zurn Industries, Inc.
   b. JOSAM Company: www.josam.com.
   c. Sloan Valve Company: www.sloanvalve.com.
   d. Wade.
   e. Watts Drainage.
   f. Substitutions: See Section 01 60 00 - Product Requirements.

2. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, concealed arm supports, bearing plate and studs.

2.05 SINKS

A. Manufacturers: (Refer to Schedule on Drawings for Model numbers)
   1. Just
   2. Elkay
   3. American Standard Inc.
   4. Kohler Company.
   5. Acorn Engineering
   6. Franke
   7. Substitutions: See Section 01 60 00 - Product Requirements.

B. Single Compartment Bowl:
   1. ASME A112.19.3M; 18 gage thick, Type 304 stainless steel, self-rimming and undercoated, with ledge back drilled for trim.
      a. Drain: 1-1/2 inch chromed brass drain.

C. Supply Faucet:
   1. Manufacturers:
      a. Zurn Industries, Inc.
      b. Chicago.
      c. American Standard Inc.
      d. Moen.
      e. T & S Brass.
      f. Sloan Valve Company
      g. Kohler.
      h. Speakman.
      i. Substitutions: See Section 01600 - Product Requirements.
   2. Faucets: ASME A112.18.1; chrome plated brass supply, lead free in accordance with NSF-61-G, ceramic disc valving with swing spout, vandal proof water economy aerator, ADA compliant indexed lever handles. Refer to drawings for additional requirements.
      a. Water consumption: 1.5 gpm

D. Accessories:
   1. Chrome plated 17 gage brass P-trap with clean-out plug and arm with escutcheon.
   2. Removable key handle stop.
   3. Rigid supplies.
   4. Strainer basket where required.

2.06 DRINKING FOUNTAINS - OUTDOOR

A. Fountain: 304 stainless steel with underside vandal proof cowling, vandal resistant bubbler with stream guard, automatic stream regulator, mechanical front bubbler button , mounting bracket, screwdriver stop.

2.07 DRINKING FOUNTAINS - BOTTLE FILLERS

A. Bottle Filler: Materials to match fountain, mechanical bottle filler button.

2.08 SERVICE SINKS

A. Manufacturers:
   1. Acorn Engineering Company: www.americanstandard-us.com/#sle.
   2. Zurn Industries, Inc:
   3. E. L. Mustee & Sons, Inc.
   4. Fiat.

5. Swan.
6. Willoughby, Inc.
7. Stern Williams Products
8. Substitutions: See Section 01 60 00 - Product Requirements.

B. Floor Service Sink:
1. 24 x 24 x 10 inch high white molded fiberglass, floor mounted, with one inch wide shoulders, vinyl bumper guard, stainless steel strainer.

C. Trim:
1. Trim Manufacturers: (Refer to Schedule on Drawings for Model numbers)
a. Zurn Industries, Inc: www.zurn.com.
b. Chicago.
c. American Standard Inc.
d. Moen.
e. T & S Brass.
f. Sloan Valve Company: www.sloanvalve.com.
g. Kohler Company.
h. Speakman
i. Substitutions: See Section 01 6000 - Product Requirements.
2. ASME A112.18.1 exposed wall type supply, ceramic disc valving with ADA lever handles, spout wall brace, vacuum breaker, check valves in water connections, hose end spout, strainers, eccentric adjustable inlets, bucket hook, removable key handle stops with covering caps and adjustable threaded wall flanges.

D. Accessories:
1. 5 feet of 1/2 inch diameter plain end reinforced plastic hose.
2. Hose clamp hanger.
3. Mop hanger.
4. Bumper Guard.
5. Stainless Steel Wall Guards (Set of 2) - #20 Gage

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.

B. Verify that electric power is available and of the correct characteristics.

C. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.02 PREPARATION

A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.03 INSTALLATION

A. Install each fixture with trap, easily removable for servicing and cleaning.

B. Provide chrome plated rigid or flexible braided stainless steel supply hose to fixtures with loose key stops, reducers, and escutcheons.

C. Install components level and plumb.

D. Install and secure fixtures in place with wall supports and bolts.

E. Seal fixtures to wall and floor surfaces with sealant as specified in Section 07 90 05, color to match fixture.

3.04 INTERFACE WITH WORK OF OTHER SECTIONS

A. All science sinks, and matching fixtures to be supplied by casework manufacturer. Casework manufacturer will supply stub to below countertop for all water and gas connections. Coordinate location of stub-ups with the general contractor.

B. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation. Provide casework manufacturer with templates for cutting sink holes.

3.05 ADJUSTING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.06 CLEANING

A. Clean plumbing fixtures and equipment.

3.07 SCHEDULES

A. Fixture Heights: Install fixtures to heights above finished floor as indicated on plumbing fixture schedule on drawings. Refer to drawings for locations of ADA fixtures.

END OF SECTION 22 40 00

GARMANN MILLER

Division 23

Heating, Ventilating and Air-Conditioning (HVAC)

SECTION 22 30 00
PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tank Type Water Heater - Electric

B. Bladder Type Expansion Tanks.

1.02 RELATED REQUIREMENTS

A. Section 22 0519 - Meters and Gages

B. Section 22 05 48 - Vibration and Seismic Controls for Plumbing Piping and Equipment.

C. Section 22 0553 - Plumbing Identification

D. Section 22 1005 - Plumbing Piping

1.03 REFERENCE STANDARDS

A. ANSI Z21.10.1 - Gas Water Heaters - Volume I - Storage Water Heaters with Input Ratings of 75,000 Btu per Hour or Less; 2009.

B. ASME (BPV VIII, 1) - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels; The American Society of Mechanical Engineers; 2007.

C. NFPA 70 - National Electrical Code; National Fire Protection Association; 1999.

D. UL 174 - Standard for Household Electric Storage Tank Water Heaters; Current Edition, Including All Revisions.

E. ASHRAE Standard 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittals procedures.

B. Product Data:
   1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
   2. Indicate pump type, capacity, power requirements.
   3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
   4. Provide electrical characteristics and connection requirements.

C. Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.

D. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

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

B. Identification: Provide pumps with manufacturer's name, model number, and rating/capacity identified by permanently attached label.

C. Performance: Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

D. Contractor shall explain all components of the plumbing system and demonstrate their operation and maintenance to the owner's representative.
   1. All demonstrations and training shall be video-taped by the Plumbing Contractor. Two copies shall be turned over to the owner's representative.

1.06 CERTIFICATIONS

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.08 WARRANTY

A. Provide three year manufacturer warranty for commercial tank type water heater.

PART 2 PRODUCTS

2.01 TANK TYPE WATER HEATER - ELECTRIC

A. Manufacturers:
   1. Lochinvar.
   2. Rheem.
   3. A.O. Smith Corporation.
   4. Bradford White.
   5. State.
   6. Substitutions: Refer to Section 01 6000 (01600) - Product Requirements.

B. Type: Automatic, electric, vertical storage.

C. Performance:
   1. See drawings for design criteria.

D. Tank: Glass lined welded steel, thermally insulated with one inch thick glass fiber; encased in corrosion-resistant steel jacket; baked-on enamel finish.

E. Controls: Automatic water thermostat withexternally adjustable temperature range from 120 to 170 degrees F, flanged or screw-in nichrome elements, enclosed controls and electrical junction boxand operating light.Wire double element units so elements do not operate simultaneously.

F. Accessories: Provide:
   1. Water Connections: Brass.
   2. Dip Tube: Brass.
   3. Drain Valve.
   4. Anode: Magnesium
   5. Temperature and Pressure Relief Valve: ASME labelled.

2.02 BLADDER-TYPE COMPRESSION TANKS

A. Manufacturers:
   1. Wilkins.
   2. Armstrong
   3. Amtrol Inc
   4. Xylem / Bell & Gossett
   5. Taco, Inc: www.taco-hvac.com/#sle.
   6. Watts Regulator Company.
   7. Wessels Company
   8. Grundfos
   9. Lochinvar

10. Patterson
11. Substitutions: See Section 01 60 00 - Product Requirements.

B. Construction: Welded steel, Non-ASME, rated for working pressure of 125 psig, with flexible heavy-duty butyl badder sealed into tank approved for use in potable water systems, and steel legs or saddles.

C. Accessories: Pressure gauge and air-charging fitting, tank drain; precharge to 12 psig.

D. See drawings for additional tank information and location.

2.03

PART 3 EXECUTION

3.01 INSTALLATION

A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.

B. All plumbing equipment should be started up by a manufacturer representative.

C. Coordinate with plumbing piping and related fuel piping and electrical work to achieve operating system.

D. Install and place in operation the water heater system as shown on the Drawings, complete with piping, supports, etc., and as recommended by the manufacturer. System shall meet or exceed state and local codes.

E. Provide shut-off valves and unions entering and leaving water heater. Provide check valve on cold water line to heater before expansion tank.

F. Expansion tank(s) shall be provided where, and as denoted on the drawings, thus providing a controlled space for the expansion of system water.

END OF SECTION 22 30 00

SECTION 23 05 01
MECHANICAL MATERIALS & METHODS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Lubrication and packing

B. Installation requirements common to piping systems and equipment specification sections

C. Emergency repairs or operation

D. Provisions for later installations

E. Final completion

F. Project Conditions

G. Quality Assurance

H. Supervision and cooperation

I. Maintenance and operating manuals

J. Record drawings

1.02 RELATED REQUIREMENTS

A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1 and 2, General Requirements, are included as a part of this Section as though bound herein.

B. Refer to Section 01 1200 - Multiple Contract Summary for Work under other contracts.

C. Commissioning

D. Refer to Division 26, Electrical Specifications, and to the requirements stated therein applicable to the Mechanical Work, where coordination of trades is covered.

E. The Drawings prepared for this Project are an outline to show where pipes, ducts, and apparatus must go in order to harmonize with the building and installations of the various trades. Work must be installed in accordance with the Drawings insofar as possible. Drawings shall be carefully checked during the course of bidding and construction. If discrepancies, errors, or omissions are discovered prior to or during the construction phase, notify the Engineer immediately for interpretation or correction. Take necessary measurements and be responsible for same, including clearances for equipment that is to be furnished. The Architect/Engineer shall reserve the right to make minor location changes of piping and equipment where such adjustments are deemed desirable from an appearance or operational standpoint. Such changes will be anticipated sufficiently in advance to avoid extra work or unduly delay progress on the Project.

F. The general building drawings shall be used to obtain dimensions and exact locations and as a check with other Contractors to avoid interferences with their Work. Refer to applicable Drawings on branches of the Work where other trades are involved on the Project so that added field work and job delays resulting from conflicts between crafts can be avoided. Piping or ductwork that is prefabricated before coordinating with the other trades may have to be redone at no additional cost if conflicts are encountered.

1.03 SUMMARY

A. The Contractor(s) shall provide the labor, materials, equipment, appliances, services and transportation, and perform the operations in connection with the construction and installation of the Work. Work shall be as herein specified and as denoted on the accompanying Drawings.

B. The Contractor(s) shall arrange and pay for permits and inspections required in connection with the Work. The Contractor shall apply for and pay for meters, regulators, recorders, and gauges required. The Contractor must present to the Owner through the Architect/Engineer, properly signed certificates of final inspection by the governing authorities when they become due and shall not cover up Work until approved by those authorities.

C. Materials or labor obviously required to fully complete the Work shall be included, even though each item necessarily involved is not specifically mentioned or shown. Such Work and materials shall be furnished and shall be of the same grade or quality as the parts actually specified and shown. Should there be a conflict between the plans and Specifications, the greater quantity and better quality shall be furnished.

D. Should an overlap of Work between the various trades become evident, the Engineer shall be notified. Such an event shall not relieve the Contractor of the responsibility for the Work called for under his branch of the Specifications until a written clarification or directive is issued concerning the matter.

E. Arrange all mechanical supports to prevent eccentric loading of joists and joist girders. Locate supports at joist panel points.
   1. If support must occur between panel joints, then threaded rods shall be dropped from both panel points, an adequate angle to both, and then the support attached to the angle is required.
   2. Unless specifically indicated or approved by Garmann Miller & Associates Inc. do not provide support from roof decks.

F. Related Work Specified Elsewhere
   1. Firestopping is Work of this Section though fire barrier sealants (firestopping) for walls and floors are specified in Section 07 8400. Contractors are responsible for proper sizing of their sleeves and core-drilled holes so that they are at least 1-1/2 inches larger in diameter than the penetrating items. Schedule 40 steel sleeves and core-drilled holes made excessively large or made and not used, will be firestopped and charged to the Contractor who was responsible.

G. Related Work by Others
   1. Motors which are shipped loose from the mechanical equipment shall be installed as Work under Division 26, Electrical, or other trades as may be required, at the expense of the Contractor furnishing the loose motor(s).
   2. Unless otherwise stipulated under a specific Section of this Division, motor disconnects and starters shall be provided as Work under Division 26, Electrical.
   3. Electric power wiring shall be included as Work under the electrical wiring section of Division 26, Electrical, except as follows:
      a. Control wiring regardless of voltage shall be included as Work under specific Sections of Division 23.
      b. Internal package type wiring as specified under specific Sections of Division 23.

H. Cutting of water lines, electric conduit, or similar service lines in the course of Work performed under this Section shall be immediately repaired as part of the Work of this Section.

1.04 REFERENCE STANDARDS

A. Standards are described by reference to various associations. These are in addition, but not limited to, to those listed in:
   1. AGA American Gas Association
   2. ANSI American National Standards Institute
   3. ASHRAE American Society of Heating, Refrigeration, and Air Conditioning Engineers
   4. ASME American Society of Mechanical Engineers
   5. AWS American Welding Society

6. AWWA American Water Works Association
7. CISPI Cast Iron Soil Pipe Institute
8. NFPA National Fire Protection Association
9. OSHA Occupational Safety and Health Act
10. SMACNA Sheet Metal and Air Conditioning Contractors National Association
11. UL Underwriters' Laboratories, Inc.

B. Work shall be in complete accordance with codes, rules, and ordinances, regulations of authorities, bodies, associations, and governments, having proper or legal jurisdiction. Specifically, the following requirements shall be met in their entirety.
1. State and Local Rules, Regulations, Codes, Statutes, and Ordinances
2. Ohio Mechanical Code, 2017 Edition.
3. ASHRAE 90.1-2010; Energy Standard for Buildings Except Low Rise Residential Buildings.
4. ASHRAE 62.1-2016; Ventilation for Acceptable Indoor Air Quality.
5. NFPA 70 - National Electrical Code; National Fire Protection Association; 2017 applicable requirements.
6. National Board of Fire Underwriters
7. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 1993 (and Revision 1,2,3).
8. Other Codes and Standards as specifically noted in each Section of the Specifications.
9. Americans with Disabilities Act (ADA)

C. References made to codes and standards, in these Specifications or on the Drawings, shall be taken to mean the latest edition, amendment, or revision of such reference in effect as of the date indicated on the Bid Documents unless otherwise noted.

1.05 SUBMITTALS

A. Submit capacity requirements, catalog cuts, and illustrations in accordance with requirements of specifications and as required by specific Sections of this Specification.

B. Shop Drawings shall be prepared by the Contractor or supplier.
1. Where limited space is available due to the nature of the Work, the requirements for shop and working drawings will apply, and the Contractor is required to prepare complete shop drawings showing the exact disposition of apparatus, equipment, piping, ductwork, and the like, and its relation to the building so there will be no irregularities or interferences. Shop drawings shall be prepared in coordination with other Contractors and other trades.

C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Instruments used by the Contractor shall be accurately calibrated and maintained in good working condition.

B. Products and test instruments used shall be subject to approval of Architect/Engineer.

C. Products and test instruments used shall be provided by each respective Contractor.

D. Note that systems involved under this Contract heading shall be in accordance with applicable requirements listed in NFPA Standard 90A.

E. Materials used in this Contract shall be those specified herein unless proposals for the use of alternate materials have been submitted and accepted in writing, as provided herein before. Materials shall be strictly first grade of their kind and shall be new and in first-class condition when installed. Damaged materials will be rejected and must be replaced by proper and acceptable materials. Materials shall be similar and in accordance with the provisions of this Specification.

F. No materials or equipment may be installed under this contract heading which do not meet the approval of the authorities having jurisdiction. Specific materials may have certain restrictions or exclusions as to their usage, including where they may not be located. Such regulations shall be adhered to where applicable. The requirements and regulations of the local and state building codes and regulations currently adopted shall be adhered to.

G. Piping systems shall be installed by workmen having skills acquired by working at the trade which is recognized as necessary for competency.

H. Pressure piping systems installed shall conform to the requirements of the State piping and welding codes where applicable.

1.07 PROJECT CONDITIONS

A. Unless otherwise stipulated under a particular heading, the following rules relative to responsibilities of the several Contractors and subcontractors will apply.
   1. Each Contractor shall install roughing-in work pertaining to his trade for connection of Work performed under other Sections of these Specifications.

B. Certain areas will be designated for the storage of materials and equipment and cooperation with the Owner in minimizing interference with existing operations will be mandatory.
   1. Where possible, store materials inside and protected from weather. Where necessary to store outside, elevate above grade and enclose with durable, waterproof wrapping.
   2. Follow manufacturer's instructions for receiving, inspecting, handling, storage, and protection of products prior to final installation

C. Equipment Clearances and Requirements
   1. For many items of equipment described in these Specifications, several manufacturers are listed. The manufacturer listed on the drawings is the make on which the layout was based and on which clearances, service required electrical, and plumbing characteristics, etc., have been checked. Additional manufacturers listed are considered acceptable.
   2. Due to the possibility of restrictions imposed by space limitations, the responsibility for resolving conflicts resulting from the use of equipment other than first named shall rest with the equipment supplier and the Contractor. Submittals for this equipment will be considered as a statement that clearances for access, service, maintenance, etc., have been checked and found adequate.
   3. Alternate equipment or the equipment of additional manufacturers named in these documents shall meet Base Bid Specifications. In the event such equipment or any equipment which the bidder proposes to furnish, deviates from the requirements of equipment first named regarding electric service, power wiring, control wiring, plumbing or piping, sound attenuation, or vibration damping, it shall be the responsibility of the bidder to include in his price a sufficient sum to cover additional costs or charges resulting therefrom.

D. In general, the piping and ductwork shown on the Drawings shall be considered as diagrammatic for clearness in indicating the general run and connections required, and may not be shown in its true position. The piping and ductwork and equipment may have to be offset, lowered or raised, as required, or as directed at the site in order to accommodate field conditions.

1.08 SUPERVISION AND COOPERATION

A. Work done by the Contractor under this Division shall include the services of an experienced superintendent, who shall be constantly in charge of the work, together with the qualified journeymen, helpers, and laborers required to properly unload, install, connect, adjust, start, and operate, and test the Work involved, including related equipment and materials furnished under other contracts or by the Owner.

B. A Pre-Installation meeting shall convene one week before starting work of this section.

PART 2 PRODUCTS

2.01 MATERIALS

A. Provide motors and starter/disconnect switches having the voltage and electrical characteristics of the service available and where denoted on Drawings or as required.
   1. All motors shall be high efficiency type.

PART 3 EXECUTION

3.01 INSTALLATION

A. Lubrication and Packing
   1. Rotating and reciprocating equipment requiring lubrication shall be lubricated with the correct grade, type, and quantity of lubricant before being placed in service.
   2. Each shaft containing a packing gland shall be checked for condition by backing the packing gland off and examining for proper grade, amount, and type of packing as recommended by the manufacturer. Upgrade to proper standards as required.
   3. Maintain lubrication gaskets and packing during construction and assure that at the time of acceptance by the Owner are in first-class operating conditions.

B. Motors, Starters, Controls, and Wiring
   1. Alignment of motors, that are factory coupled or mounted and field coupled and mounted, shall be performed by the equipment manufacturer and shall be rechecked after connections have been made and after 48 hours of operation in designed service.
   2. Starter/disconnects, controls, and wiring shall be coordinated with the appropriate Contractors and completed as required by these Documents.

C. Cutting and Patching
   1. Cutting and drilling of walls, slabs, and structural members, required in conjunction with Work under this Section, shall be done under the supervision of the Architect/Engineer. Work shall be neatly done, removing no unnecessary material. Holes, openings, etc., shall be located where they will not weaken the structure. No beams, joists, etc., shall be cut without the written consent of the Architect/Engineer.
   2. Cutting of holes in masonry and concrete shall be performed with a core drill to minimize spalling, and limit damage to wall. Locations shall be accurately determined and checked, and the appropriate drill bit shall be used to minimize hole size.
   3. Sleeves or thimbles for holes as well as escutcheons and trim plates shall be provided. Installation shall permit free movement of pipe.
   4. Patching of work, where necessary, is to be done by a mechanic of the appropriate trade. Unless otherwise noted, patching for Work performed under this Section shall be immediately repaired as part of the Work of this Section.

D. Pipe Sleeves: Install pipe sleeves where piping passes through walls, floors, ceilings, and roofs.
   1. Do not install sleeves through structural members of work, except as detailed on Drawings, or as reviewed and approved by Architect/Engineer.
   2. Install sleeves accurately centered on pipe runs.
   3. Size sleeves so that piping and insulation (if any) will have free movement in sleeve, including allowance for thermal expansion; but not less than 2 pipe sizes larger than piping run.
   4. Where insulation includes vapor barrier jacket, provide sleeve with sufficient clearance for installation.
   5. Install length of sleeve equal to thickness of construction penetrated, and finish flush to surface; except floor sleeves.
   6. Extend floor sleeves 1/4 inch above level floor finish, and 3/4 inch above floor finish sloped to drain unless otherwise noted.

7. Provide temporary support of sleeves during placement of concrete and other work around sleeves, and provide temporary closure to prevent concrete and other materials from entering sleeves.
8. Where insulated piping passes through fire barriers, stop insulation at barrier for fire barrier penetration seal.
9. Where piping passes through non-fire rated, or non waterproof, partitions, floors, and walls, apply pipe insulation continuous through pipe sleeves.
10. Do not install sleeves through suspended ceilings.
11. Caulk non-fire rated sleeves with sealant.

E. Protection
1. Provide proper protection to the building during the execution of Work involved under this contract heading.
2. This protection shall include covering apparatus, building surfaces, and other materials to protect same from dirt; adequate temporary connections to protect apparatus from damage and required shielding to protect finished parts of the building. The following shall apply where applicable:
   a. Protect finished floors from chips and cutting oil by the use of metal chip receiving pans and oil proof floor covers.
   b. Protect equipment and finished surfaces from welding and cutting spatters with baffles and spatter blankets.
   c. Protect equipment and finished surfaces from paint droppings, insulation adhesive, and sizing droppings, etc., by use of drop cloths.
3. Pumps, motors, fans, and other rotating/reciprocating equipment stored for this Project shall be adequately protected with openings, bearings, etc., covered to exclude dust and moisture. Stock piled pipe, valves, fittings, ductwork, etc., shall be placed on dunnage and protected from weather and from entry of foreign material.
4. During installation and until final connections are made, piping and ductwork shall be protected against entry of foreign matter. Equipment connections shall be carefully sealed until the actual time of system tie-in.
5. During construction, all air intake openings on variable frequency drives, control panels, and other electronic equipment shall be protected with a temporary filter. At completion of project, filters shall be removed.

F. Accessibility
1. Provide a union or flange in the piping at each screwed or welded valve, device, or item of equipment, and elsewhere as required for accessibility of repair. Each union shall be so installed as to permit the removal of item without disconnection of any piping except at the union.

3.02 EMERGENCY REPAIRS OR OPERATION

A. The Owner reserves the right to make emergency repairs and protection of the equipment and systems in operation without voiding the Contractor's guarantee bond or relieving the Contractor of his responsibility during the bonding period.

B. The air handling units may be used for temporary heating. If units are used for temporary heating the heat wheel section shall be completely blanked off on both the supply and exhaust side to prevent any air, dust, etc. from passing through heat wheel. Any damage to the heat wheel due to unit use for temporary heating shall be replaced at no additional cost to the owner.

3.03 PROVISIONS FOR LATER INSTALLATIONS

A. Where work cannot be installed as the structure is being erected, the Contractor for such work shall provide and arrange for the building-in of boxes, sleeves, inserts, fixtures, and devices necessary to permit installation of the omitted work during later phases of construction. The

Contractor shall arrange for layout, chases, holes, and other openings which must be provided in masonry, concrete, and other work.

B. The Contractor shall be responsible for becoming informed of the nature and arrangement of the materials and construction to which his work attached or passes through.

3.04 FINAL COMPLETION

A. Work shall be cleaned prior to Substantial Completion of the Work.

B. Retouch or repaint factory painted prime and finish coats where scratched or damaged. Whenever retouching will not be satisfactory, in the opinion of the Architect/Engineer, the Architect/Engineer has the option to require complete repainting until the desired appearance is obtained.

C. Deliver filters, belts, and equipment, as required by this Specification, to Owner for Division 23 - HVAC Systems and obtained signed receipts of delivery.

D. The Contractor shall clean equipment; restore damaged materials, remove grease, oil chemical, paint spots, and stains; and leave the Work in condition acceptable to Owner and Architect/Engineer.

E. On completion of his Work, the Contractor shall remove and see that each of his subcontractors removes from the site tools, equipment, surplus materials, and rubbish pertaining to his operations, and pay cost for such removal and disposition.

F. Contractor shall explain all components of the HVAC System and demonstrate their operation and maintenance to the owner's representative.
   1. All demonstration and training shall be video-taped by the HVAC Contractor. Two copies shall be turned over to the owner's maintenance staff.

3.05 MAINTENANCE AND OPERATING MANUALS AND INSTRUCTIONS

A. Comply with Section 01 7800 and the following:

B. Bind the written operating instructions, shop drawings, equipment catalog cuts, and manufacturer's instructions into the binder with each section separated by tabbed dividers. Material to be assembled as follows:
   1. First Page --Title of Job, Owner, Address, Date of submittal, Name of Contractor, and Name of Architect/Engineer. Emergency operating instructions and/or list of service organizations (including address and telephone numbers) capable of rendering emergency service on 24 hour calls.
   2. Second page--Index
   3. Sections--Each section shall include a subsection with a tab divider. The tab shall list the contents of the the divided section. There shall be a subsection that contains the following information:
      a. Written list of items requiring service and either state the service needed or refer to the manufacturer's data in the binder that described the proper service.
      b. A copy of the approved shop drawing for all systems, equipment, and components (clearly marked for item furnished).
      c. A copy of each manufacturer's operating instructions with an index at the beginning of the section.
      d. A list of equipment used on the job, Contractor's purchase order numbers, supplier's name, and address.

C. Submit electronic sets of final documents in final form. Electronic format shall be PDF's on CD's or USB flash drives.

3.06 RECORD DRAWINGS

A. The Contractor shall keep a running record of each change and deviation from the Drawings. Record shall be kept clean and undamaged upon a set of Drawings used for no other purpose. Upon completion of the Project, the Contractor shall submit to the Architect/Engineer one complete set of drawings which have been corrected to show deviations plus "Project Record Drawing" and the Contractor's letterhead type information. With the submittal shall be 2 sets of prints made from the corrected drawings.
   1. CADD drawing option may be used by Contractor. Disks with specific Drawings are available from Architect/Engineer at a nominal charge. Contact Architect/Engineer for current fee.

B. Record Drawings shall show:
   1. Size, type, and capacity of materials, devices, or pieces of equipment.
   2. Location of devices or pieces of equipment.
   3. Location of diffusers, volume dampers, fire dampers, smoke dampers, and related devices of the building systems.
   4. Routing of piping (above and below grade), ductwork, or other building services.

C. These drawings shall also record the location of concealed ductwork and piping by indication of measured dimensions to each such line from readily identifiable and accessible walls or corners of the building.

D. Record drawings must be complete and accurate with regard to concealed piping, ductwork, like equipment, or devices. Unless record drawings are sufficiently accurate to permit immediate location and identification of concealed work with a minimum of cutting, record drawings will be considered inadequate and the contract work deemed incomplete.

END OF SECTION 23 05 01

SECTION 23 07 13
DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Duct insulation.

1.02 RELATED REQUIREMENTS

A. Section 23 31 00 - HVAC Ducts and Casings: Glass fiber ducts.

1.03 REFERENCE STANDARDS

A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.

B. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).

C. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014 (Reapproved 2019).

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

E. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.

F. ASTM E 119 (UL 263) - Standard Test Methods for Fire Tests of Building Construction and Materials.

G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

H. ASHRAE Standard 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

C. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

1.05 QUALITY ASSURANCE

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

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

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

2.02 GLASS FIBER, FLEXIBLE

A. Manufacturer:
   1. Knauf Fiber Glass
   2. Johns Manville Corporation
   3. Owens Corning Corp
   4. CertainTeed Corporation; ____
   5. Manson

6. Substitutions: See Section 01 60 00 - Product Requirements.

B. Insulation: ASTM C553; glass fiber flexible, limited combustibility blanket.
   1. 'K' value: 0.27 at 75 degrees F, when tested in accordance with ASTM C518.
   2. Minimum 1.0 PCF Density
   3. Maximum Water Vapor Absorption: 5.0 percent by weight.

C. Vapor Barrier Jacket:
   1. Kraft paper with glass fiber yarn and bonded to aluminized film.
   2. Moisture Vapor Permeability: 0.029 ng/Pa s m (0.02 perm inch), when tested in accordance with ASTM E96/E96M.
   3. Secure with UL listed pressure sensitive tape.

D. Vapor Barrier Tape:
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

E. Tie Wire: Annealed steel, 16 gage, 0.0508 inch diameter.

2.03 GLASS FIBER, RIGID

A. Manufacturer:
   1. Knauf Fiber Glass
   2. Johns Manville Corporation
   3. Owens Corning Corp
   4. CertainTeed Corporation; ____
   5. Manson
   6. Substitutions: See Section 01 60 00 - Product Requirements.

B. Insulation: ASTM C 612; rigid, board.
   1. 'K' Value: 0.27 at 75 degrees F, when tested in accordance with ASTM C518.
   2. Minimum 3.0 PCF Density
   3. Maximum Service Temperature: 450 degrees F.
   4. Maximum Water Vapor Absorption: 5.0 percent.

C. Vapor Barrier Jacket:
   1. Kraft paper with glass fiber yarn and bonded to aluminized film.
   2. Moisture Vapor Permeability: 0.029 ng/Pa s m (0.02 perm inch), when tested in accordance with ASTM E96/E96M.
   3. Secure with UL listed pressure sensitive tape.

D. Vapor Barrier Tape:
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that ducts have been tested before applying insulation materials.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NAIMA National Insulation Standards.

C. All insulation shall be applied so that there is no fiberglass exposed to the air stream without filters downstream. All fiberglass insulation, including all exposed edges, shall be coated, or mylar or other suitable material shall be provided between fiberglass and the air stream.

D. Insulate ducts conveying air below ambient temperature:
   1. Provide insulation with vapor barrier jackets.
   2. Finish with tape and vapor barrier jacket.
   3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
   4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints except where prohibited by code.

E. Insulate ducts conveying air above ambient temperature:
   1. Provide with standard vapor barrier jacket.
   2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.

F. Duct and Plenum Liner Application:
   1. Adhere insulation with adhesive for 90 percent coverage.
   2. Secure insulation with mechanical liner fasteners. Refer to SMACNA (DCS) for spacing.
   3. Seal and smooth joints. Seal and coat transverse joints.
   4. Seal liner surface penetrations with adhesive.
   5. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.

3.03 SCHEDULES

A. Exhaust Ducts Within 10 ft of Exterior Openings and Where Noted on Drawings:
   1. Flexible Glass Fiber Duct Insulation: 1-1/2 inches thick.
   2. Rigid Glass Fiber Duct Insulation: 1-1/2 inches thick.

B. Exhaust/Relief Ducts Exposed to Outdoor Air:
   1. Flexible Glass Fiber Duct Insulation: 1-1/2 inches thick.
   2. Rigid Glass Fiber Duct Insulation: 1-1/2 inches thick.

END OF SECTION 23 07 13

SECTION 23 31 00
HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal ductwork.

B. Duct cleaning.

C. Testing and Repair

1.02 RELATED REQUIREMENTS

A. Section 09 91 13 - Exterior Painting: Weld priming, weather resistant, paint or coating.

B. Section 23 0593 - Testing, Adjusting, and Balancing for HVAC.

C. Section 23 07 13 - DUCT INSULATION: External insulation and duct liner.

D. Section 23 33 00 - Air Duct Accessories.

E. Section 23 37 00 - Air Outlets and Inlets.

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.

B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

D. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.

E. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2015.

F. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual; Sheet Metal and Air Conditioning Contractors' National Association; 2012, 2nd Edition.

G. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.

H. SMACNA (KVS) - Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines; 2001.

I. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual; 2012, 2nd Edition.

J. ASHRAE Standard 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings.

K. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; current edition, including all revisions.

1.04 PERFORMANCE REQUIREMENTS

A. No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for duct materials.

C. Sheet metal shop coordination drawings shall be provided by the Division 23 mechanical contractor. Refer to Section 23 0501 for coordination drawing requirements.

D. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA (LEAK).

E. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.06 QUALITY ASSURANCE

A. Construction of ductwork shall be in accordance with the recommendation of the latest edition of ASHRAE Handbook, HVAC Systems and Equipment, Chapter 16; Sheet Metal and Air Conditioning Contractor's National Association, Inc. (SMACNA) Manual.

B. Duct coverings, duct linings, tapes, and core materials in panels used in duct systems shall have a flame spread rating not over 25, without evidence of continued progressive combustion and a smoke developed rating no higher than 50. If coverings and linings are to be applied with adhesives, they shall be tested as applied with such adhesives, or the adhesives used shall have a flame spread rating not over 25 and a smoke developed rating no higher than 50 when in the final dry state.

C. Ductwork, shall be constructed of new prime grade galvanized sheet steel, manufactured in accordance with ASTM A924 standards for hot dip galvanized sheet and ASTM A653 quality.

D. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum 2 years ofdocumented experience.

1.07 REGULATORY REQUIREMENTS

A. Construct ductwork to NFPA 90A standards.

1.08 DELIVERY, STORAGE, AND HANDLING

A. All ductwork kept on site shall have open ends wrapped and protected from dirt entering inside of duct. All ductwork and duct accessories shall be kept off floor.

1.09 FIELD CONDITIONS

A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.

B. Maintain temperatures within acceptable range during and after installation of duct sealants.

C. Refer to section 01 5721 - IAQ Construction and Preoccupancy for additional requirements.

PART 2 PRODUCTS

2.01 DUCT ASSEMBLIES

A. Regulatory Requirements: Construct ductwork to comply with NFPA 90A standards.

2.02 MATERIALS

A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G90/Z275 coating.

B. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
   1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
   2. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.

C. Low Pressure Insulated Flexible Ducts:
   1. Manufacturers:
      a. Flexmaster Model 5M.
      b. Thermaflex, Model M-KC
      c. Buckley, Model Type 2.

d. Substitutions: See Section 01 6000 - Product Requirements.

2. Three ply aluminum/fiberglass/aluminized polyester film supported by helically wound spring steel wire; 1 inch thick, 3/4 lb. density, fiberglass insulation; air tight aluminized fire retardant vapor barrier film.
   a. Pressure Rating: 5 inches WG positive and 5 inches WG negative.
   b. Maximum Velocity: 4000 fpm.
   c. Temperature Range: -10 degrees F to 160 degrees F.

D. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
   1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.

E. Hanger Rod: ASTM A 36/A 36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

F. A maximum length of 12" of flexible ductwork will be allowed in the exhaust and return air ductwork systems. Contractor shall ensure that flexible ductwork used in these systems are sealed air tight to the sheet metal duct.

2.03 DUCTWORK FABRICATION

A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.

B. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

C. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.

D. Provide air foil turning vanes of performated metal with glass fiber insulation in all rectangular elbows in the supply air stream, return air stream, and exhaust air stream for all duct sizes with a width greater then 12" and a height greater then 12" (12"x12").

E. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

F. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).

G. Provide standard 45 degree lateral wye takeoffs unless otherwise indicated where 90 degree conical tee connections may be used.

H. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct. Bottom of ductwork shall be sloped down to louver to allow rain, snow, etc. to run out of ductwork.

I. All sheetmetal ductwork in the student dining / stage, shop areas, and other areas with exposed ductwork shall have paint grip type construction. All ductwork to be painted shall have the exterior wiped down after installation with proper cleaning solution to remove any oils, grease, etc. that would prohibit paint from sticking to ductwork. Painting of ductwork shall be by General Contractor.

2.04 MANUFACTURED DUCTWORK AND FITTINGS

A. Manufacture in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gages,reinforcing, and sealing for operating pressures indicated.

B. Construct ductwork of new prime grade galvanized sheet steel, manufactured in accordance with ASTM A525 standards for hot dip galvanized sheet. Coating weight shall not be less than

0.90 oz. per sq.ft. where used in normal applications. Sheets having coating that will flake or peel under forming operation will not be allowed.

C. Installation of sheet metal ducts and related work shall comply with applicable Local, State and National Codes, rules, regulations and ordinances, including the following specific codes:
   1. Air conditioning and ventilating systems of other than residence type NFPA No. 90A.
   2. Air conditioning, warm air heating, air cooling, and ventilating systems NFPA No. 90B.

D. Minimum round duct sheet metal gauge shall be as follows:
   1. Diameter 3 through 14 inches: Spiral Seam Gauge = 26, Longitudinal Seam Gauge = 24.
   2. Diameter 15 through 26 inches: Spiral Seam Gauge = 24, Longitudinal Seam Gauge = 22.
   3. Diameter 27 through 36 inches: Spiral Seam Gauge = 22, Longitudinal Seam Gauge = 20.

E. Fittings for duct construction shall be of sheet metal gauges as follows:
   1. Duct Diamter/Major Dimension 3 through 14 inches: Spiral Seam Gauge = 24, Longitudinal Seam Gauge = 20.
   2. Duct Diameter/Major Dimension 15 through 26 inches: Spiral Seam Gauge = 22, Longitudinal Seam Gauge = 20.
   3. Duct Diameter/Major Dimension 27 through 36 inches: Spiral Seam Gauge = 20, Longitudinal Seam Gauge = 20.

F. Provide with Class A seals for all duct joints.

2.05 METAL DUCT HANGERS AND SUPPORTS

A. Support horizontal ductwork runs with suitable strap or trapeze hangers on 6 foot centers. Where duct weight for the 6 foot length is less than 40 pounds, space hangers 8 feet on center. Support vertical risers at floors with galvanized steel angles riveted to duct on all sides. Size of angles shall be one gage heavier than the ductwork it is supporting.

B. Ductwork may be supported using load rated cable suspension system equal to Gripple Hang-Fast system. Suspension system shall have a specified manufacturer's Save Working Load (SWL) and supplementary safety factor of at least 5 times the SWL.
   1. Suspension system shall be verified by SMACNA Testing and Research Institute to be in compliance with SMACNA Duct Construction Standard Guidelines (1995 Ch 4).
   2. Support ductwork at 6' on center for all round supply 22 inch in diameter or equivlaent square and over. For all supply over 20" support on 6 ft centers.
      a. Mechanical contractor shall consult hanger manufacturer sizing chart for proper hanger sizing based on supported weight.
   3. The "Clutcher" cable hanging system manufactured by Ductmate is not an acceptable product and shall not be used.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install, support, and seal ducts in accordance with SMACNA (DCS).

B. Install in accordance with manufacturer's instructions.

C. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.

D. Install and seal metal and flexible ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.

E. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.

F. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

G. Use crimp joints with bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.

H. Use double nuts and lock washers on threaded rod supports.

I. Connect terminal units to supply ducts directly or with one foot maximum length of flexible duct. Do not use flexible duct to change direction.

J. Connect diffusers to low pressure ducts with 10 feet maximum length of flexible duct held in place with strap or clamp.

K. Connect flexible ducts to metal ducts with adhesive tape and draw bands.

L. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

M. Ducts shall be installed substantially as indicated on the Drawings. However, where conflicts occur with other trades, the Architect/Engineer reserves the right to require the Contractor to make minor changes in duct locations without extra cost to the Owner.

N. Locate ductwork within walls, ceilings, utility or pipe spaces, chases, joist spaces, and the like, insofar as is practical and so that such Work will be properly concealed.
   1. Space sufficiently distant from other Work and from adjacent lines, ducts, etc., to permit maintenance, replacement, insulation, etc., so not less than 1 inch space will exist between completed finished surfaces.
   2. Space parallel runs of ductwork so that each individual run of duct can be separately insulated. Parallel runs of duct or piping, insulated as a bundle, will not be accepted.
   3. This Contractor shall clean the interior of ductwork and fittings, leaving area clean and free of loose insulation and other construction debris.
   4. Provide flexible connections at all fan powered equipment on inlet and discharge sides of equipment.

O. Support horizontal ductwork runs with suitable strap or trapeze hangers on 6 foot centers. Where duct weight for the 6 foot length is less than 40 pounds, space hangers 8 feet on center. When weight of duct between hangers does not exceed 60 pounds, hangers shall be 1 inch wide by 18 gauge. For greater weights, use trapeze hangers 6 feet on center, as approved by Architect/Engineer. Support vertical risers at floors with galvanized steel angles riveted to duct on all sides. Size of angles shall be one size heavier than scheduled for stiffer angles.

P. Pack and caulk around ductwork passing through walls and floors where required to prevent sound transmission using fiberglass packing and metal collar.
   1. Connect to walls with galvanized angles anchored to wall and construction. Seal angles using approved sealant compound.

Q. Seal ductwork connections to exterior wall louvers using waterproof silicone or polyurethane sealant.
   1. Bottom of ductwork shall be sloped up minimum of 30 degrees toward inside of building to control entry of water.

R. Clean interior of ductwork, leaving it free of loose material and construction debris.

S. Sheet metal elbows and fittings shall be constructed to comply with the following:
   1. Curved elbows shall have a radius not less than 150 percent of duct width to the centerline of the duct (R/D = 1.5).
   2. Where R/D ratio is less than 1.5, use hollow vane (air foil) vanes or turn blades.

3. Elbows and other fittings shall be constructed the same as required for straight runs of ductwork. Round elbows shall be crimped and beaded on the downstream end. Square elbows must have turning vanes.
4. When air foil vanes are used in elbows, elbows may have square throat and heel or radius heel and radius throat.

T. Provide, where denoted on Drawings and in square elbows of low pressure ducts, air turning vanes designed to carry the air around the 90 degree bend without eddying or pressure fluctuations in the turn. Vanes shall be formed blade type and of standard catalog product of reputable manufacturer. Manufacturer of air turns shall recommend the number and size of blades. Air turns shall be the complete unit type installed along the diagonals of each square elbow.
1. Refer to specification section 23 3300 for additional requirements.
2. Vanes shall be constructed and installed to limit pressure loss to not more than 20 percent of the velocity pressure.

U. At exterior wall louvers, seal duct to louver frame and install blank-out panels. Slope bottom of ductwork down to louver to allow rain, snow, etc. to run out of ductwork.

V. Install suspension system in accordance with manufacturer's requirements. Installation instructions shall be provided with fabric duct system by unit manufacturer.

3.02 TESTING AND REPAIR

A. Ductwork shall be sealed and leak tested as required by ASHRAE Standard 90.1.

B. Upon completion of each respective ductwork system, but prior to insulating, covering, or backfilling, each system shall be thoroughly cleaned to remove construction dirt and foreign matter.

C. Test Ductwork as Specified Herein
1. No ductwork work shall be concealed or covered until it has been inspected and approved by the project inspector, who shall be notified when the Work is ready for inspection. Work shall be completely installed and tested as required by this Contract and Ordinances of the local Municipality and shall be leaktight to the satisfaction of those making the inspection and the Architect/ Engineer.
2. In general, pressure tests shall be applied to ductwork. In no case shall piping be subject to pressure exceeding its rating. Defective work shall be promptly repaired or replaced and test shall be repeated until the particular system and component parts thereof receive approval of the Architect/Engineer.
3. Provide temporary equipment for testing, including blower and gauges. Test ductwork system before insulation is installed and remove control devices before testing. Test each natural section of each ductwork system independently, but do not use ductwork dampers to isolate sections where test pressure exceeds damper pressure rating.
4. Repair ductwork system sections which fail required ductwork test by disassembly and reinstallation, using new materials to extent required to overcome leakage. Do not use chemicals, stopleak compounds, mastics, or other temporary repair methods.

D. Damage resulting from tests shall be repaired or damaged materials replaced, to satisfaction of Architect/Engineer, and at no cost to Owner.

3.03 CLEANING

A. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment that could be harmed by excessive dirt with temporary filters, or bypass during cleaning.

B. Temporary Closure: At ends of ducts which are not connected to equipment or distribution devices at time of ductwork installation, cover with polyethylene film or other covering which will keep the system clean until installation is completed.

3.04 SCHEDULES

A. Ductwork Material:
   1. General Exhaust: Galvanized Steel.
   2. Outside Air Intake: Galvanized Steel.

END OF SECTION 23 31 00

SECTION 23 33 00
AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air turning devices

B. Backdraft dampers.

C. Duct test holes.

1.02 RELATED REQUIREMENTS

A. Refer to Section 01 6000 - Product Requirements

B. Section 23 31 00 - HVAC Ducts and Casings.

1.03 REFERENCE STANDARDS

A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.

B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.

1.04 QUALITY ASSURANCE

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

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades.

B. All ductwork accessories kept on site shall be wrapped and protected from dirt. All ductwork and duct accessories shall be kept off floor.

PART 2 PRODUCTS

2.01 AIR TURNING DEVICES/EXTRACTORS

A. Air turning vanes/extractors shall be installer fabricated or manufactured.

B. Air turning vanes/extractors shall be provided where denoted on drawing and in all square elbows of low pressure supply, return, and exhaust ducts for sizes above 12"x12". Air turning vanes/extracotrs shall be designed to carry the air around the 90 degree bend without eddying or pressure fluctuation in the turn. Vanes shall be formed blade type and of standard catalog product of a reputable manufacturer. Manufacturer of air turns and extractors shall recommend the number and size of vanes. Air turning vanes shall be the complete unit type installed along the diagonals of each square elbow.

C. Vanes shall be constructed and installed to limit pressure loss to not more then 20 percent of velocity pressure.

2.02 BACKDRAFT DAMPERS

A. Manufacturers:
   1. Louvers & Dampers, Inc
   2. Nailor Industries Inc
   3. Ruskin Company
   4. Greenheck.
   5. Vent Products.
   6. Air Balance, Inc.
   7. United Enertech

8. Loren Cook Company
9. Pottorff
10. Substitutions: See Section 01 6000 - Product Requirements.

B. Multi-Blade, Parallel Action Gravity Balanced Backdraft Dampers: Galvanized steel or Extruded aluminum, with blades of maximum 6 inch width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.
1. Provide counterbalance for building pressure activation.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 31 00 for duct construction and pressure class.

B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

C. Air turning vanes shall be provided where denoted on drawings and in square elbows of low pressure ducts.

END OF SECTION 23 33 00

SECTION 23 34 23
HVAC EXHAUST FANS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Inline / Ceiling exhaust fans.

1.02 RELATED REQUIREMENTS

A. Refer to Section 01 6000 - Product Requirements

B. Section 23 0548 - Vibration and Seismic Controls.

C. Section 23 33 00 - Air Duct Accessories: Backdraft dampers.

1.03 REFERENCE STANDARDS

A. AMCA (DIR) - (Directory of) Products Licensed Under AMCA International Certified Ratings Program; 2015.

B. AMCA 99 - Standards Handbook; 2010.

C. AMCA 204 - Balance Quality and Vibration Levels for Fans; 2020.

D. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; 2016.

E. AMCA 300 - Reverberant Room Method for Sound Testing of Fans; 2014.

F. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data; 2014.

G. NEMA MG 00001 - Motors and Generators; 2024.

H. UL 705 - Power Ventilators; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.

C. Manufacturer's Instructions: Indicate installation instructions.

D. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.05 QUALITY ASSURANCE

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

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 FIELD CONDITIONS

A. Permanent ventilators may not be used for ventilation during construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Greenheck:

B. Loren Cook Company:

C. Twin City Fan Co.

D. PennBarry:

E. Fantech.

F. Acme Engineering and Manufacturing Corp.

2.02 POWER VENTILATORS - GENERAL

A. Static and Dynamically Balanced: AMCA 204 - Balance Quality and Vibration Levels for Fans.

B. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.

C. Sound Ratings: AMCA 301, tested to AMCA 300 and bearing AMCA Certified Sound Rating Seal.

D. Fabrication: Comply with AMCA 99.

E. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

2.03 CEILING EXHAUST FANS

A. Centrifugal Fan Unit: V-belt or direct driven as indicated with galvanized steel housing lined with acoustic insulation, resilient mounted motor. Backdraft damper to be provided by the unit manufacturer. Refer to section 23 3300 for backdraft damper requirements.

B. Disconnect Switch: Unit shall be provided with a factory mounted disconnect switch (UL approved), belt guard, unit mounted solid state speed controller for direct drive units.

C. Grille: Molded plastic or metal.

D. Direct Drive Fans: Provide a Fan Speed controller.
   1. Fan speed controller shall be mounted directly at exhaust fan and be used for balancing purposes only.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Hung Cabinet Fans:
   1. Install fans with spring isolators and flexible electrical leads. Refer to Section 23 0548.
   2. Install flexible connections specified in Section 23 33 00 between fan and ductwork. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.

C. Install backdraft dampers on inlet to roof and wall exhausters.

D. Provide backdraft dampers on outlet from cabinet and ceiling exhauster fans and as indicated.

END OF SECTION 23 34 23

SECTION 23 37 00
AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Registers/grilles.

1.02 RELATED REQUIREMENTS

A. Refer to Section 01 6000 - Product Requirements

B. Section 23 3100 - HVAC Ducts and Casings.

C. Section 09 91 23 - Interior Painting: Painting of ducts visible behind outlets and inlets.

1.03 REFERENCE STANDARDS

A. ADC 1062: GRD - Test Code for Grilles, Registers & Diffusers; Air Diffusion Council; 1984.

B. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2012.

C. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Inlets; 2006 (R2011).

D. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.

E. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.

1.04 QUALITY ASSURANCE

A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.

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

C. NFPA 90A for installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Krueger-HVAC: www.krueger-hvac.com/#sle.

B. Price Industries: www.price-hvac.com/#sle.

C. Titus, a brand of Air Distribution Technologies: www.titus-hvac.com/#sle.

D. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 EXHAUST, RETURN AND AIR TRANSFER: TYPE EG, RG, AT

A. Fabrication: Aluminum with 20-gauge minimum frames and 22 gauge minimum blades.

B. 35 degree louvers spaced 1/2 inch on center.

C. One set of fixed louvers parallel to long dimension.

D. Baked white enamel or powder paint white finish for ceiling installation and prime coat for side wall installation for final painting in field to match walls.

E. Frame: 1-1/4 inch margin with countersunk screw mounting for wall mounted and drywall ceiling installation.

F. Frame: 1-1/4 inch margin for lay-in ceiling application.

G. Design based on Titus, model 355FL, Krueger: Model S585, Price: Model 635, Tuttle & Bailey: Model A70D5.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Check location of outlets and inlets and make necessary adjustments in position to comply with architectural features, symmetry, and lighting arrangement.

C. Provide balancing dampers on duct take-off to diffusers, and grilles and registers. If dampers are specified and provided as part of the diffuser, or grille and register assembly balancing dampers are not required.

D. Refer to drawings for diffuser sizes, air flow patterns, etc.

E. Paint ductwork visible behind air outlets and inlets matte black. Refer to Section 09 91 23.

END OF SECTION 23 37 00

SECTION 23 37 10
EXTERIOR WALL LOUVERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Rectangular drainable wall louvers

1.02 RELATED REQUIREMENTS

A. Section 23 3100 HVAC Ducts and Casings.

1.03 REFERENCE STANDARDS

A. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; Air Movement and Control Association International, Inc.

B. SMACNA (DCS) - HVAC Duct Construction Standards - Metal and Flexible; Sheet Metal and Air Conditioning Contractor's National Associaton.

1.04 SUBMITTALS

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

B. Submittals of units noting the size, material, performance and exactness to specification shall be required.

C. Shop drawings of louvers and color selection must be approved by the Architect/Engineer before fabrication of louvers is started.

D. Submit three sets of color samples for selection by architect.

1.05 QUALITY ASSURANCE

A. Units shall meet or exceed the requirements and quality of the components herein specified and as denoted on the Drawings.

B. No dissimilar metals, which might induce electrolysis, shall be used in the construction, screenings, or mounting of the louvers.

C. All published ratings shall be based on testing in accordance with AMCA Standard 511.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Ruskin

B. Louvers and Dampers, Inc..

C. American Warming and Ventilating, Inc.

D. Greenheck.

E. United Enertech.

F. Dowco.

G. Air Balance

H. Industrial Louvers, Inc

I. Pottorff

J. Substitutions: See Section 01 6000 - Product Requirements.

2.02 RECTANGULAR DRAINABLE WALL LOUVERS-TYPE WL1

A. Maximum pressure drop 0.16 inch S.P. at 1000 FPM free area velocity.

B. Aluminum bird screen of 0.051 material tightly stretched and suitably braced to prevent sagging.

C. Frame shall be 4 inches deep and constructed of 6063T5 extruded aluminum of 0.081 inch minimum wall thickness.

D. Blades shall be horizontal, rain resistant style, constructed of 6063T5 extruded aluminum of 0.081 inch nominal wall thickness. Blades shall be the drainable type, positioned at a minimum 37.5 degree angle with 3.25 inch spacing center to center.

E. Include sills, mullion, sill extensions, and anchorages as required.

F. Finish shall be factory applied baked enamel to color as selected by Architect. Contractor shall assume two (2) custom colors.

G. Rectangular louvers shall be equal to Greenheck Model ESD-435.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install wall louvers where denoted and as detailed on the Drawings.

B. Sheet Metal Contractor to verify sizes of wall louvers required prior to ordering.

C. Fasten ductwork (where required) to the louver perimeter. Bottom of ductwork shall be sloped up minimum of 30 degrees toward inside of building to control entry of water. Seal joints with silicone or polyurethane sealant.

D. Install in accordance with manufacturer's instructions.

END OF SECTION 23 37 10

GARMANN MILLER

Division 26

Electrical

SECTION 26 01 01
GENERAL PROVISIONS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1, General Requirements, are included as a part of this Section as though bound herein.

B. Refer to Section 01 11 00 - Summary of Work.

C. Refer to Section 01 23 00 - Alternates.

D. Refer to Division 23 Mechanical Specifications and to the requirements stated therein applicable to the Electrical Work, where coordination of trades is covered.

E. Refer to Division 27 Communications Specifications and to the requirements stated therein applicable to the Electrical Work, where coordination of trades is covered.

F. Refer to Division 28 Electronic Safety & Security Specifications and to the requirements stated therein applicable to the Electrical Work, where coordination of trades is covered & inclusion of Work provided.

G. The requirements of this Section shall apply to Work for Sections listed under Division 26, Electrical.

1.02 SUMMARY

A. When equipment furnished for or by the Owner is indicated on the Drawings or specified, this Contractor shall provide the proper size switches, conduit, wires, boxes, and fittings that may be required; and make connections complete. This Contractor shall verify exact requirements and locations before installation.
   1. Boxes, raceways, fittings and the like required by this contractor or any subcontractor hired by this contractor shall be coordinated by this contractor prior to footer, floor, wall, etc. types of construction for correct size

B. If the equipment, other than that which the Drawings were designed around, does not properly adapt itself to the space allotted or lend itself accessible for repair and maintenance, the Contractor shall be responsible to provide additional access panels, pipe, fittings, materials, and labor, to achieve the same end results.

C. Electrical support from bar joists shall be allowed only at panel points in top of bottom cords.
   1. Loading shall not exceed 5 pounds/S.F. or 100 pounds per panel point applied at the panel point.
   2. If support must occur between panel points, then threaded rods shall be dropped from both panel points, an adequate angle attached to both, and then the support attached to the angle as required.
   3. Suspension wires, straps, and chains such as those used to support electrical fixtures or equipment shall not be attached to or through steel roof decks.

D. The Contractor shall take field measurements necessary for his Work and shall be responsible for the accurate location and size of openings, recesses, slots, ferrules, and the like.

E. The Contractor shall be required to cooperate with "Other Trades" and other Contractors in the coordination of his Work to avoid interferences with installations by other trades and Contractors.

F. Should structural difficulties prevent the setting of cabinets or running of conduits, at points shown on Drawings, necessary minor deviations therefrom, as determined by the Architect/Engineer, may be permitted and shall be made without additional costs.

G. Extra costs which might result from deviations from the Drawings, so as to avoid interferences, shall be considered a "Job Condition" and no additional compensation will be considered applicable. In the event that such interferences occur in course of the Work, due to an error, omission, or oversight by the Contractor, no additional compensation shall be allowed. Interferences which may occur during the course of construction shall be brought to the immediate attention of the Architect/Engineer, and his decision, confirmed in writing, shall be final.

1.03 REFERENCES

A. Work shall be in complete accordance with codes, rules, ordinances, regulations of authorities, bodies, associations, and governments, having proper and legal jurisdiction. Specifically, the following requirements shall be met in their entirety.
   1. State and Local Rules, Regulations, Codes, Statutes, and Ordinances
   2. National Fire Protection Association applicable requirements
   3. National Board of Fire Protection
   4. National Electrical Code applicable requirements
   5. Other Codes and Standards as specifically noted in each Section of the Specifications

B. Electrical equipment shall be Underwriter's approved; also, shall meet requirements established by NEC, NEMA, and ANSI and as specified hereinafter.

C. Abbreviations of authorities used in these Specifications:
   1. NEC National Electrical Code Latest Edition adopted by the National Fire Protection Association
   2. NEMA National Electrical Manufacturers Association
   3. OSHA Occupational Safety and Health Act
   4. IES Illuminating Engineering Society Standards
   5. IPCEA Insulated Power Cable Engineers Association
   6. ANSI American National Standards Institute, Inc.
   7. FCC Federal Communications Commission
   8. EIA Electronic Industries Association
   9. NAB National Association of Broadcasters
   10. NAEB National Association of Educational Broadcasters
   11. CBM Certified Ballasts Manufacturers
   12. ITL Independent Testing Laboratories
   13. ETL Electrical Testing Laboratories
   14. UL Underwriters Laboratories
   15. DLC Design Light Consortium
   16. NICET National Institute for Certification in Engineering Technologies

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Submit shop drawings and illustrations in accordance with requirements of Section 01 30 00 - Administrative Requirements.

C. Shop Drawings (By Contractor)
   1. Where limited space is available due to the nature of the Work, the requirements for shop and working drawings will apply and the Contractor is required to prepare complete shop drawings showing the exact disposition of apparatus, equipment, conduit, and the like, and its relation to the building so there will be no irregularities or interferences on this account. Shop drawings shall be prepared after coordination with other Contractors and other trades.

2. Shop drawings will not be required to be submitted for review by the Architect/Engineer, unless expressly required herein, but may be submitted when not expressly required, at the option of the Contractor.

PART 2 EXECUTION

2.01 EXPLANATION AND PRECEDENCE OF DRAWINGS

A. For purpose of clearness and legibility, the Electrical "E" drawings are essentially diagrammatic and, although size and location of equipment are closely drawn to scale whenever possible, each Contractor shall make use of the data in all of the Contract Documents and shall verify this information at the building site.

B. The Drawings indicate required size and points of termination of wiring and other related items and they may suggest proper routes for such items to conform to structure, avoid obstructions, and preserve clearances. It is not intended that Drawings indicate every necessary offset, and it shall be the Work of the Contractor to install each item in a manner as to conform to structure, avoid obstructions, preserve headroom, and keep opening and passageways clear, without further instructions or costs to the Owner.

C. It is intended that apparatus be located symmetrical with architectural elements and shall be installed at exact height and location stipulated.

D. The Contractor shall fully inform himself regarding peculiarities and limitations of the spaces available for the installation of work and materials provided under his Contract. He shall exercise due and particular caution to determine that parts of his work are made quickly and easily accessible.

E. The Contractor shall carefully examine existing conditions, existing wiring, and other materials on the premises and compare the Drawings to the existing conditions. Variances and necessary changes shall be adjusted by appropriate modifications.

2.02 PERMITS, FEES, REGULATIONS, AND INSPECTIONS

A. Unless specifically noted otherwise, the Contractor shall arrange and pay for permits, fees, and inspections required in connection with his work.

B. Work shall be inspected by approved local and state inspection bureaus, Electrical Inspection Agency or authority, and electric utility.

C. Upon completion of the Work, the Contractor shall furnish to the Architect/Engineer a certification of inspection and approval from said Bureau or Agency before final payment on contract will be allowed.

2.03 PERMANENT UTILITY CONNECTIONS

A. The Contractor shall make his own arrangements with the utility companies for connection of the permanent utilities.

2.04 HOISTS, RIGGING, TRANSPORTATION, AND SCAFFOLDING

A. The Contractor shall provide scaffolding, staging, cribbing, tackle, hoists, and rigging necessary for placing of his materials and equipment in their proper places in the Project. Temporary work shall be removed from the premises when its use is no longer required on the job.

B. The Contractor shall pay costs for transportation of materials and equipment to the jobsite and shall include such costs in his proposal.

C. Scaffolding and hoisting equipment shall comply with requirements of pertinent Federal, State, and Local Laws and Codes.

2.05 PROTECTION

A. In addition to other requirements of the Contract, the Contractor shall provide various types of protection as follows:

1. Protect finished floors from chips and cutting oil by the use of metal chip receiving pan and an oil proof floor cover.
2. Protect equipment and finished surfaces from welding and cutting spatters with baffles and spatter blankets.
3. Protect equipment, finished surfaces from paint droppings, insulation adhesive, and sizing droppings by use of drop cloths.

B. Switchboards, panelboards, light fixtures, and other electrical equipment shall be stored at the site with openings and bearings covered to exclude dust and moisture. Stockpiled pipe shall be placed on dunnage and protected from weather and from entry of foreign material.

C. The Contractor shall be responsible for the protection of finished work of other trades from damage or defacement by his operations and shall remedy such damage at his own expense.

2.06 EMERGENCY REPAIRS OR OPERATION

A. The Owner reserves the right to make emergency repairs and protection of the equipment and systems in operation without voiding the Contractor's guarantee bond or relieving the Contractor of his responsibility during the bonding period.

2.07 PROVISIONS FOR LATER INSTALLATIONS

A. Where Work cannot be installed as the structure is being erected, the Contractor for such Work shall provide and arrange for the building-in of boxes, sleeves, inserts, fixtures, and devices necessary to permit installation of the omitted work during later phases of construction. The Contractor shall arrange for layout, chases, holes, and other openings which must be provided in masonry, concrete, and other work.

B. The Contractor shall be responsible for informing himself of the nature and arrangement of the materials and constructions to which his work attaches or passes through.

2.08 DEMONSTRATION OF COMPLETE ELECTRICAL SYSTEM

A. Provide a minimum of 4 hours total instruction to personnel selected by the Owner. Instructions shall include the following:
1. Show equipment locations and explain how the various systems function, including: power system, and lighting controls.
2. Refer to operating instructions manual for record and clarify.
3. Coordinate written and verbal instructions so that each is understood by personnel.

B. Provide additional instructions to Owner's personnel as stipulated in other subsections of Division 26.

2.09 FINAL COMPLETION

A. Work shall be cleaned prior to Substantial Completion of the Work.

B. Retouch or repaint factory painted prime and finish coats, where scratched or damaged. Whenever retouching will not be satisfactory, in the opinion of the Architect/Engineer, the Architect/Engineer has the option to require complete repainting until the desired appearance is obtained.

C. Remove temporary wiring as soon as permanent system(s) or portions thereof are in operating condition and have been inspected and approved.

D. Lamps, fixtures, lenses, and reflectors shall be cleaned by the Contractor no sooner than 10 days prior to Substantial Completion of the Work.

E. The Contractor shall clean equipment; restore damaged materials; remove grease, oil, chemical, paint spots, and stains.

F. On completion of his Work, the Contractor shall remove and see that each of his subcontractors removes from the site tools, equipment, surplus materials, and rubbish pertaining to his operations, and pay costs for such removal and disposition.

2.10 CUTTING AND PATCHING

A. The Contractor shall do cutting and patching of building materials and piping, as required for the installation of his Work, but no structural members shall be cut without the approval of the Architect and such cutting shall be done in a manner directed by the Architect.

B. Patching of and repair of damage to Work in place shall be done in a neat and workmanlike manner, meeting with the approval of the Architect. Contractor whose operations require cutting of work in place, or who causes damage which entails repairs of such work, shall employ mechanics of the particular trade whose work must be cut or which is damaged, and shall pay the costs of such patching or repair.

C. Conduits penetrating masonry walls shall not interrupt the vertical masonry wall reinforcing. Coordinate the location of reinforcement with Division 4. Wherever more than 2 conduits 2 inches or larger are to pass through a masonry wall in the same location or where conduits of any size in a row equals a length of 3 feet or greater, prior approval from the Architect shall be required before disturbing the wall. Wherever multiple conduits pass through masonry walls provide a minimum of 4 inches between adjacent penetrations.

D. The Contractor shall caulk around all conduit penetrations in non-fire rated wall with sealant.

2.11 GUARANTEE AND WARRANTY

A. The Contractor shall submit his and each equipment manufacturer's written certificates, warranting that each item of equipment furnished complies with the requirements of the Drawings and Specifications. The electrical system shall be warranted for one year from the date of substantial completion.

2.12 SUPERVISION AND COOPERATION

A. Work done by the Contractor under this Division shall include the services of an experienced superintendent, who shall be constantly in charge of the Work, together with the qualified journeymen, helpers, and laborers required to properly unload, install, connect, adjust, start and operate, and test the Work involved, including related equipment and materials furnished under other contracts or by the Owner.

2.13 MAINTENANCE AND OPERATING MANUALS AND INSTRUCTIONS

A. Comply with Section 01 78 00 - Closeout Submittals and the following:

B. Bind the written operating instructions, shop drawings, equipment catalog cuts, and manufacturer's instructions into the binder. Material to be assembled as follows:

1. First Page - Title of Job, Arcanum-Butler Local School District, 23047.03 Arcanum Booster Stadium Phase 3, 310 North Main Street, Date of Submittal, Name of Contractor, and Garmann/Miller & Associates Inc. Emergency operating instructions and/or list of service organizations (including address and telephone numbers) capable of rendering emergency service on 24 hour calls.
2. Second Page - Index
3. Third Page - Introduction to first section containing a complete written description of the system.
4. First Section - Written description of system contents, where actually located in building, how each part functions individually, and how system works as a whole. Conclude with a list of items requiring service and either state the service needed or refer to the manufacturer's data in the binder that described the proper service.
5. Second Section - A copy of each approved shop drawing (clearly marked for item furnished), with an index at the beginning of the section. Provide a separate list of lighting fixtures used on the job; list shall include, but not be limited to: Plan type, manufacturer's catalog number, and voltage, number of lamps, lamp type, ballast catalog number, manufacturer's name and quantity (when required), catalog number and quantity of any replacement glass and plastic parts.

6. Third Section - A copy of each manufacturer's operating instructions with an index at the beginning of the section.
7. Fourth Section - A list of equipment used on the job, Contractor's purchase order numbers, supplier's name and address.

C. One (1) electronic copy of the Operation and Maintenance Manuals shall be placed on a Thumb Drive, or other form of Mass Storage Device, for the Owners use. Files must be in a PDF format or format approved by the Owner.
1. PDF shall be indexed/bookmarked to allow a quick search to the relevant material.

2.14 RECORD DRAWINGS

A. The Contractor shall keep a running record of each change and deviation from the Drawings. Records shall be kept clean and undamaged upon a set of drawings used for no other purpose. Upon completion of the Project, the Contractor shall submit to Garmann/Miller & Associates Inc. one complete set of Drawings which have been corrected to show deviations. With the submittal shall be 2 sets of prints made from the corrected Drawings for a total of 3 sets of record (as-built) drawings.

B. Record Drawings shall show:
1. Size, type, and capacity of materials, devices, or pieces of equipment.
2. Location of devices or pieces of equipment.
3. Location of outlets or sources in building service systems.
4. Routing of piping, conduit, ducts, or other building services.
5. Actual circuit number.
6. Actual luminaires (by manufacturer catalog number) installed.
7. Building plan and devices shall be a scale of original construction documents.
8. These drawings shall also record the location of concealed electric service, conduit, and other piping by indication of measured dimensions to each such line from readily identifiable and accessible walls or corners of the building.
9. Record drawings must be complete and accurate with regard to concealed conduit, raceways, wiring, and like equipment or devices. Unless record drawings are sufficiently accurate to permit immediate location and identification of concealed work with a minimum of cutting, record drawings will be considered inadequate and the contract work deemed incomplete.

C. One (1) electronic copy of the Record Drawings shall be placed on a Thumb Drive, or other form of Mass Storage Device, for the Owners use. Files must be in a PDF format or format approved by the Owner.

END OF SECTION 26 01 01

SECTION 26 05 05
MINOR ELECTRICAL DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical demolition.

1.02 RELATED REQUIREMENTS

A. Section 01 70 00 - Execution and Closeout Requirements: Additional requirements for alterations work.

B. Section 02 41 00 - Demolition.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify field measurements and circuiting arrangements are as indicated.

B. Verify that abandoned wiring and equipment serve only abandoned facilities.

C. Demolition drawings are based on casual field observation and existing record documents.

D. Report discrepancies to Garmann/Miller & Associates Inc. before disturbing existing installation.

E. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

A. Disconnect electrical systems in walls, floors, and ceilings to be removed.

B. Coordinate utility service outages with utility company. It is the Electrical Contractor's responsibility to provide all site electrical disconnections required for demolition. Coordinate this work with the General Contractor.

C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.

1. Obtain permission from Owner at least 24 hours before partially or completely disabling system.
2. Make temporary connections to maintain service in areas adjacent to work area.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Remove, relocate, and extend existing installations to accommodate new construction.

B. Repair adjacent construction and finishes damaged during demolition and extension work.

C. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.

D. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

3.04 CLEANING AND REPAIR

A. See Section 01 74 19 - Construction Waste Management and Disposal for additional requirements.

B. Clean and repair existing materials and equipment that remain or that are to be reused.

END OF SECTION 26 05 05

SECTION 26 05 06
TEMPORARY WORK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1, General Requirements, are included as a part of this Section as though bound herein.

B. Refer to Section 01 50 00 - Temporary Facilities and Controls for additional requirements.

1.02 SUMMARY

A. Except when otherwise stipulated, completed portions of the permanent installation or materials for use in the permanent installation shall not be used in temporary work without specific permission.

1. Installed raceways for the permanent installation may be utilized for installation of temporary wiring.

B. Overload protection and grounding for circuits and equipment of the temporary light and power system shall comply with applicable codes relating to permanent work. Panelboards and other protective equipment shall be furnished and installed as required by field conditions.

C. Contractor shall locate temporary electric service main disconnect in an approved enclosure with lock. Upon request, contractor shall arrange to daily disconnect electric power on load side of "Main(s)" and lock the enclosure(s) containing same. Solid grounding of the temporary electric service is required.

D. Provide ground fault interrupter circuit breakers for branch circuits in accord with codes and regulations, including "OSHA" and "IOSHA".

E. Lighting fixtures employed shall be of the type, quality, and quantity required to provide a temporary lighting system in accord with codes and regulations, including "OSHA" and "IOSHA", and same shall not be on the same circuits with receptacle and other devices.

F. Upon request, the Contractor shall submit shop drawings and detail information for temporary service and distribution to the Architect/Engineer for approval.

END OF SECTION 26 05 06

SECTION 26 05 19
CONDUCTORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal-clad cable.

B. Wire and cable for 600 volts and less.

C. Wiring connectors.

D. Electrical tape.

E. Oxide inhibiting compound.

F. Wire pulling lubricant.

G. Cable ties.

1.02 RELATED REQUIREMENTS

A. Section 26 05 05 - MINOR ELECTRICAL DEMOLITION : Disconnection, removal, and/or extension of existing electrical conductors and cables.

B. Section 31 23 16 - Excavation.

C. Section 31 23 16.13 - Trenching: Excavating, bedding, and backfilling.

D. Section 31 23 23 - Fill: Bedding and backfilling.

1.03 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010 (Reapproved 2014).

D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2014).

E. ASTM B800 - Standard Specification for 8000 Series Aluminum Alloy Wire for Electrical Purposes - Annealed and Intermediate Tempers; 2005 (Reapproved 2011).

F. ASTM B801 - Standard Specification for Concentric-Lay-Stranded Conductors of 8000 Series Aluminum Alloy Wire for Subsequent Covering of Insulation; 2007 (Reapproved 2012).

G. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2010.

H. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

I. NECA 104 - Recommended Practice for Installing Aluminum Building Wire and Cable; 2012.

J. NECA 120 - Standard for Installing Armored Cable (AC) and Metal-Clad Cable (MC); 2012.

K. NEMA WC 70 - Nonshielded Power Cable 2000 V or Less for the Distribution of Electrical Energy; 2009.

L. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.

M. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

N. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.

O. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.

P. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.

Q. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.

R. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.

S. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.

1.04 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.06 FIELD CONDITIONS

A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

B. Products: Furnish products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE MANUFACTURERS

A. Cerro Wire & Cable Company.

B. Encore Wire Corporation: www.encorewire.com.

C. Industrial Wire & Cable, Inc: www.iewc.com.

D. Southwire Company .

E. Alcan Cable

F. Phelps Dodge

G. Substitutions: See Section 01 6000 - Product Requirements.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

D. Comply with NEMA WC 70.

E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

G. Conductor Material:

1. Provide copper conductors except where aluminum conductors are specifically indicated. Substitution of aluminum conductors for copper is not permitted. Conductor sizes indicated are based on copper unless specifically indicated as aluminum. Conductors designated with the abbreviation "AL" indicate aluminum.
2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
3. Tinned Copper Conductors: Comply with ASTM B33.

4. Aluminum Conductors (only where specifically indicated or permitted for substitution): AA-8000 series aluminum alloy conductors recognized by ASTM B800 and compact stranded in accordance with ASTM B801 unless otherwise indicated.

H. Minimum Conductor Size:
   1. Branch Circuits: 12 AWG.
      a. Exceptions:
         1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
         2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.
   2. Control Circuits: 18 AWG.

I. Conductor Color Coding:
   1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
   2. Color Coding Method: Integrally colored insulation.
   3. Color Code:
      a. 240/120 V, 1 Phase, 3 Wire System:
         1) Phase A: Black.
         2) Phase B: Red.
         3) Neutral/Grounded: White.
      b. Equipment Ground, All Systems: Green.

2.03 SINGLE CONDUCTOR BUILDING WIRE

A. Description: Single conductor insulated wire.

B. Conductor Stranding:
   1. Feeders and Branch Circuits:Stranded.

C. Insulation Voltage Rating: 600 V.

D. Insulation:
   1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
      a. Size 4 AWG and Larger: Type XHHW-2.
      b. Installed Underground: Type XHHW-2.
   2. Aluminum Building Wire (only where specifically indicated or permitted for substitution): Type XHHW-2.

2.04 METAL-CLAD CABLE

A. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.

B. Conductor Stranding: Stranded or solid.

C. Insulation Voltage Rating: 600 V.

D. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.

E. Grounding: Full-size integral equipment grounding conductor.

F. Armor: Aluminum or steel, interlocked tape.

2.05 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Wiring Connectors for Splices and Taps:
   1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
   2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.

3. Connectors for Aluminum Conductors: Use compression connectors.

C. Wiring Connectors for Terminations:
   1. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
   2. Aluminum Conductors: Use compression connectors or mechanical connectors for all connections.
   3. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminalsfor connections to terminal screws.

D. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.

E. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.

F. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.

G. Mechanical Connectors: Provide bolted type or set-screw type.

H. Compression Connectors: Provide circumferential type or hex type crimp configuration.

I. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.

2.06 ACCESSORIES

A. Electrical Tape:
   1. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.

B. Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.

C. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.

D. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that raceway installation is complete and supported.

E. Verify that field measurements are as indicated.

F. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install aluminum conductors in accordance with NECA 104.

D. Install metal-clad cable (Type MC) in accordance with NECA 120.

E. Installation in Raceway:
   1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   2. Pull all conductors and cables together into raceway at same time.
   3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
   4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

F. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

G. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.

H. Terminate cables using suitable fittings.
   1. Metal-Clad Cable (Type MC):
      a. Use listed fittings.
      b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
      c. Do not use direct-bearing set-screw type fittings for cables with aluminum armor.

I. Install conductors with a minimum of 12 inches of slack at each outlet.

J. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

K. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

L. Make wiring connections using specified wiring connectors.
   1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
   2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
   3. Do not remove conductor strands to facilitate insertion into connector.
   4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
   5. Connections for Aluminum Conductors: Fill connectors with oxide inhibiting compound where not pre-filled by manufacturer.
   6. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
   7. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

M. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.

N. Insulate ends of spare conductors using vinyl insulating electrical tape.

O. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

P. In general, install EMT conduit for branch circuits throughout the building. EMT to junction box in room for lighting circuits. MC cable may be used from junction box to light fixtures. MC cable may also be used in metal stud walls for receptacles, but EMT shall still be used from the panel to a junction box in the room, between junction boxes above ceiling, and between each wall stub-out location.

Q. Include an equipment ground conductor with each circuit.

R. Provide dedicated neutrals for all circuits. Do not share neutrals.

S. Wire and cable routing indicated is approximate unless dimensioned.

T. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.

U. Install wire and cable in accordance with the NECA "Standard of Installation."

V. Protect exposed cable from damage.

W. Use suitable cable fittings and connectors.

3.04 FIELD QUALITY CONTROL

A. See Section 01 43 00 - Quality Assurance, for additional requirements.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is only required for services and feeders. The resistance test for parallel conductors listed as optional is not required.

D. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION 26 05 19

SECTION 26 05 26
GROUNDING AND BONDING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1, General Requirements, are included as a part of this Section as though bound herein.

B. Division 27 specifications and plans.

C. Refer to 01 23 00 - Alternates for Alternates that may affect the Work of this Section.

1.02 SUMMARY

A. Provide a complete grounding system which shall be in accordance with the National Electric Code, State and Local Ordinances, and utility company requirements, and as indicated on the Drawings.

1.03 QUALITY ASSURANCE

A. Grounding shall be in accord with NEC, Article 250, and others which apply. Equipment shall be provided with a suitable ground lug, except for distribution equipment (switchboards, panels, and the like) which shall be provided with a suitable ground bus.

B. UL 467

C. Bare solid copper conductors ASTM B3

D. Bare stranded copper conductors ASTM B8

E. Underground distribution components IEEE C2

PART 2 PRODUCTS

2.01 MATERIALS

A. Grounding connection "make-up" shall be with Erico Products Company "Cadweld", Burndy "Thermoweld", Harger "Ultraweld", or 3M of the type required at locations where a ground bus, lug, or connector is not stipulated.

B. Minimum 12 AWG 600V insulated copper equipment grounding conductor insulated with green colored insulation.

C. Stranded cable grounding electrode conductors.

D. Bare copper conductors.

E. Copper clad steel 3/4" grounding rods.

PART 3 EXECUTION

3.01 INSTALLATION

A. The following requires permanent grounds: Electrical service equipment and enclosures, conduits, and other conductor enclosures; neutral or identified conductor of interior system, main switchboard, power and lighting panelboards, control centers; noncurrent carrying metal parts of fixed equipment, such as transformers, motors, starter and controller cabinets, transfer switches, generator, instrument cases, lighting fixtures, switches, receptacles, equipment in hazardous locations; and others as indicated and/or required by NEC.

B. The grounding conductor shall be continuous wire and carried throughout the power system. Properly ground the neutral point of secondary transformers to conduit and to system ground wire. (Wire size per NEC). Grounding wire looping from transformer to transformer is not allowed.

C. Bond metallic conduit entering manholes, building service panel unit substation and building switchboard.

D. System neutral conductor shall be identified throughout and shall be grounded at the point of service only.

E. Metallic conduit shall be electrically continuous throughout and be grounded (bonded) at the service entrance. Feeder conduits (one inch and larger) shall also be grounded at pull boxes, junction boxes, cabinets, and terminal points using grounding knockouts and bushings, to the equipment grounding bar or lugs.

F. Cord connected appliance frames shall be grounded to the system grounding conductor and to the conduit system through a grounding conductor in the cord.

G. Flexible conduit connections to equipment and motors, and the like, shall have an equipment grounding conductor, size per NEC 250.

H. A green pigtail shall be installed from grounding slots of grounding outlets to system grounding conductor and to outlet box in each instance.

I. A green pigtail shall be installed from the attachment bar of toggle switches to system grounding conductor and to outlet box.

J. Green bonding jumper shall be installed in flexible metallic conduit, size per NEC 250.

K. Provide a grounding conductor, sized per NEC 250 from the ground bus at the service entrance to each side of any cold water meter; to the reinforcing bars of the concrete structure; to building; to the steel structure of the building. Similarly jumper the steel structure at building expansion joints, and "catwalks" to the steel structure.

L. Provide grounding of structural steel and ground field as denoted on the accompanying Drawings.

M. A separate equipment grounding conductor, sized in accord with NEC 250 shall be installed with each and every conduit and shall be attached to ground bars, lugs, equipment, frames, devices, pull boxes, junction boxes, outlet boxes, and the like.

N. Conduit is not an allowable grounding means.

O. Refer to Division 27 Specifications and Drawings for additional grounding and bonding requirements for Division 26.

3.02 TESTING

A. The contractor must test the primary earth ground and provide the testing results to the Engineer. The resistance shall be 5 ohms or less. If the value tested is greater than 5 ohms, additional ground rods shall be added until the test reading is 5 ohms or less.

END OF SECTION 26 05 26

SECTION 26 05 29
HANGERS AND SUPPORTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

B. Conduit and equipment supports.

C. Anchors and fasteners.

1.02 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2013.

D. MFMA-4 - Metal Framing Standards Publication; 2004.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with applicable building code.

C. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
   2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
   3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
   4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
   5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
      a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
      b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
   1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.

2. Conduit Clamps: Bolted type unless otherwise indicated.

C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.

D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
   1. Comply with MFMA-4.

E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.

F. Anchors and Fasteners:
   1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

2.02 MANUFACTURERS

A. Threaded Rod Company

B. All-Ohio Threaded Rod Company

C. Precision Brand

D. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 MATERIALS

A. Hangers, Supports, Anchors, and Fasteners - General: Corrosion-resistant materials of size and type adequate to carry the loads of equipment and conduit, including weight of wire in conduit.

B. Supports: Fabricated of structural steel or formed steel members; galvanized.

C. Anchors and Fasteners:
   1. Concrete Structural Elements: Use precast inserts, expansion anchors, or preset inserts.
   2. Steel Structural Elements: Use beam clamps, steel spring clips, steel ramset fasteners, or welded fasteners.
   3. Concrete Surfaces: Use self-drilling anchors or expansion anchors.
   4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts or hollow wall fasteners.
   5. Solid Masonry Walls: Use expansion anchors or preset inserts.
   6. Sheet Metal: Use sheet metal screws.
   7. Wood Elements: Use wood screws.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

G. Equipment Support and Attachment:
   1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.

2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

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

I. Remove temporary supports.

J. Install hangers and supports as required to adequately and securely support electrical system components, in a neat and workmanlike manner, as specified in NECA 1.
1. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
2. Obtain permission from Architect before drilling or cutting structural members.

K. Rigidly weld support members or use hexagon-head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.

L. Install surface-mounted cabinets and panelboards with minimum of four anchors.

M. In wet and damp locations use steel channel supports to stand cabinets and panelboards 1 inch off wall.

N. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

END OF SECTION 26 05 29

SECTION 26 05 50
BASIC MATERIALS AND METHODS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1, General Requirements are included as a part of this Section as though bound herein.

B. Refer to Section 01 2300 for Alternates that may affect the Work of this Section.

C. Refer to other Sections of Division 26 for additional detailed material and methods of Specifications.

1.02 SUMMARY

A. Load Balance and Adjustment
   1. The Contractor shall furnish personnel and equipment and insure that building power, lighting, motor, and appliance loads are balanced between phases of service entrances, distribution feeders, and panelboards as closely as possible.

B. This Contractor shall install rough-in work pertaining to his trade for each item of equipment furnished under another Section of the Specifications or by Owner. The Contractor shall, before bidding the Project, verify exact rough-in requirements before installation with the Contractor, subcontractor, Owner, or supplier furnishing said equipment, who shall furnish dimensional Drawings accurately locating rough-in for his equipment.

C. The Contractor shall rough-in and connect fixtures, equipment, appliances, and the like, requiring electric services.

D. Provide sleeves, raceways, conduit, conduit fittings, conductors, fuses, grounding equipment, devices, disconnects, starters, and protective systems required or denoted on Drawings.

1.03 QUALITY ASSURANCE

A. Materials shall be new, complete with manufacturer's guarantee or warranty, and shall be approved by the Underwriters' Laboratories, Inc., if a standard has been established by that agency for the type of material.

B. Materials shall also comply with applicable standards of the National Electrical Manufacturers' Association, Insulated Power Cable Engineers Association, National Safety Code, and the American Institute of Electrical Engineers. Such standards are hereby made a part of these Specifications.

C. Work shall be executed in a workmanlike manner and shall present a neat mechanical appearance when completed. Methods and techniques of installation shall be subject to the approval of the Architect.

D. Materials of the same type or class shall be the product of one manufacturer. For example, panelboards shall be from one manufacturer, lighting switches from one manufacturer.

1.04 PROJECT CONDITIONS

A. The Contractor shall be responsible for the accurate location of his Work and for informing himself of the nature and arrangement of the materials, equipment, and construction to which his Work attaches or passes through.

B. In general, piping, conduits, and other work shall be concealed in walls and above ceilings, in utility of pipe spaces, in chases, in joist spaces, in tunnels, in equipment rooms, and the like, insofar as is practical; so that such work will not interfere with the proper coordinated installation work of other trades or Contractors.

C. In general, piping, conduits, and lines, except those below slabs on grade shall be installed parallel (or at right angles) to the building walls, and at such heights as not to obstruct portions of windows, doorways, stairways, pipe space, tunnel, or passageway, and properly concealed to not interfere with the proper coordinated installation of other trades or Contractors. Where interferences develop in the field, the Work shall be offset or routed as required to clear such interferences. Consult architectural, mechanical, electrical drawings, Contractors, and other details before installing work; and unless otherwise specified, ductwork installation shall take precedence over other crafts, such as piping and conduit as determined by the Architect/Engineer.

D. Materials installed shall be new and never before used.

E. The Contractor shall procure definite locations and connections before rough-in or installation. This Contractor shall then lay out his Work and be responsible for determining proper elevations, angles, measurements, and locations required for the installation of his Work.

PART 2 PRODUCTS

2.01 MATERIALS

A. Provide overcurrent protective devices in accordance with Article 240 of the National Electric Code.

B. The overcurrent protective devices must be capable of interrupting the amount of short circuit current available at their location as stated in the National Electric Code.

C. Overcurrent protective devices shall be so selected and coordinated to permit maximum continuity of service and comply with the National Electric Code.

PART 3 EXECUTION

3.01 SITE PREPARATION

A. Excavation and Backfill - Underground Wiring: The following is supplemental to the requirements of Division 31, Site Construction.

B. The Contractor shall do excavating of materials encountered, including backfilling, as shown or as necessary for the installation of underground wiring, foundations, and equipment in his Contract. Provide and maintain bracing, shoring, or sheathing necessary to support the walls of excavations.

C. Trenches shall be opened in straight lines and bottomed out at least 4 inches below conduits or ducts. Exterior trenches shall have a minimum depth of 36 inches which shall be maintained between top of largest conduit or duct and finish grade.

D. Where roots of live trees are encountered in excavations, they shall be carefully protected during construction. Contractor shall cut or remove interfering trees, remove stumps, and rocks in the line of the excavation; however, approval of the Architect shall be obtained before a tree is removed or cut. Shrubbery in line of excavation shall be removed with a ball of dirt and replaced at completion of installation.

E. Where excavation is necessary in existing pavements, Contractors for whose work the excavation is required shall pay fees and costs of opening street or pavement and costs of filling and repaving in accordance with requirements of and to the satisfaction of the Municipality, Utility, or other Owners of such paving.

F. Where existing sidewalks, drives, and roadways must be cut, they shall be cut in straight lines, shall present a neat appearance when relaid and shall match existing work. At such locations the backfill medium shall be concrete from the bottom of the finished surface to the bottom of the trench except as may be otherwise approved by the Architect/Engineer.

G. Where excavation is necessary in an existing lawn, carefully remove and store sod. After backfilling trench, replace sod or apply top dressing of black dirt and seed to match existing

lawn. Care shall be exercised during the work to see that no unnecessary damage is done to lawns in the storing of dirt or other construction material. Should unnecessary damage occur, in the opinion of the Architect, the Contractor shall be required to recondition lawns at his own expense.

H. In addition, the Contractor shall provide and maintain warning barricades, flags, and warning lights, and shall conduct his work so as to create a minimum amount of inconvenience to others, traffic, construction, and the like. Temporary suspension of work does not relieve the Contractor of responsibility for the above requirements.

I. Remove and properly dispose of debris, rubbish, and excavation spoils resulting from the Work, off-site. Obtain necessary permits for dumping.

3.02 FOUNDATIONS AND ANCHOR BOLTS AND CURBS

A. The Contractor shall provide concrete pad foundations for floor mounted equipment installed under this Section. Pad foundations shall be 3-1/2 inches high minimum, unless otherwise indicated on Drawings. Edges shall be chamfered one inch. Faces shall be free of voids and rubbed smooth with carborundum block after stripping of forms. Tops of pads shall be dead level. Provide short dowel rods into floor for lateral stability and anchorage.

B. Set equipment anchor bolts in galvanized sheet metal sleeves one inch larger than bolt diameter. Secure each sleeve to a template and secure template to forms.

C. Machinery bases, bed plates, sole plates, and vibration isolation units shall be carefully aligned, shimmed, and leveled, then grouted in place with Embeco Grout (Master Builders).

D. For each surface mounted panel, provide a concrete floor curb around conduits which rise from below to the panel. Curb height shall correspond to the finish wall base material, but be not less than 3 inches high. Depth shall suit requirements but be not less than 6 inches deep (wall to face) and provide at least 2 inches concrete cover over the conduits.

3.03 INSTALLATION

A. Special care shall be taken during load balance to assure that reverse rotation of motors is not caused.

B. Materials installed under this Division of Work shall be supported from the building structure, independent of other pipe, duct, and equipment, except recessed "lay-in" fixtures not larger than 2 feet by 4 feet size may be supported as stipulated in other Divisions and Sections of Division 26.

C. Conductors and cables shall be installed in conduit and other specified raceways which have been properly supported and anchored, unless otherwise specified.

D. The Contractor shall install major and secondary control equipment and erect on approved type brackets or floor supports, located as directed, and make electric connections to major and secondary control equipment and motor or apparatus, complete, and assume full responsibility for the connections.

E. Install taps and connections in properly selected outlet boxes and junction boxes. Install pull boxes only as required. Enclosures for wiring connections of motor controllers or switches shall not be used as junction boxes for cable tapping or splicing, except where the enclosures are designed to provide space which is suitable, adequate, and approved for the purpose.

F. Cover and protect equipment, materials, enclosures, boxes, and raceways, before and after installation, to prevent injury and to prevent entrance of grit, dirt, and foreign matter.

G. Phase, neutral, and ground conductors of a given circuit must be in the same raceway. Circuiting shall be as specified and denoted on the Drawings, with loads balanced as closely as possible across all phase legs.

H. Make final electrical connections of equipment to rough-ins and the electrical system.

I. Equip outlets with fittings and outlet boxes adapted to that particular outlet.

J. Exposed outlets shall be equipped with heavy cast type boxes, such as "FS" and "FSA" type conduits. Exposed raceways in finished spaces shall be wiremold type finished to match adjacent surfaces in which case outlet boxes shall be compatible with the raceway system.

K. The ends of raceway systems and conduits shall be carefully and securely capped during construction.

3.04 ACCESS DOORS

A. Locate panels accurately in coordination with the General Construction requirements and as directed by the Architect. Panels are to be provided in unaccessible ceilings and walls where necessary to provide access to equipment and wiring as required.

3.05 DISCONNECTS

A. Provide properly sized disconnects for apparatus and equipment whenever disconnecting means is not furnished by others. Each device, apparatus, or equipment must have local disconnecting means within actual sight of the motor or apparatus, and within 49 feet of the same.

3.06 TESTING

A. Voltage and System Testing, Checking, and Reports
   1. The Contractor shall:
      a. Test and record voltages and ground loop impedance at various outlets.
      b. Test and determine that system is free of short circuits and other faults.
      c. Test insulation integrity of main service cables, main branch panel feeder cables, for 240 volt services utilizing 500 volt megger. Minimum acceptable reading is 30 megohms.
   2. Contractor shall conduct such other tests and adjustments of equipment as required by Architect/Engineer or necessary to verify performance requirements. Submit data taken during such tests to Architect/Engineer. Contractor shall pay professional engineering fees involved in required testing of equipment.
   3. Electrical Contractor shall provide necessary electrical personnel and testing instruments as required to assist Architect/Engineer in testing of installation.

END OF SECTION 26 05 50

SECTION 26 05 53
IDENTIFICATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Wire and cable markers.

D. Voltage markers.

E. Underground warning tape.

F. Field-painted identification of conduit.

1.02 RELATED REQUIREMENTS

A. Section 09 91 23 - Interior Painting.

B. Section 26 05 19 - CONDUCTORS: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

C. 26 0533.13 - Conduit.

D. 26 0533.16 - Boxes.

E. 26 2416 - Panelboards.

F. 26 2726 - Wiring Devices.

G. 26 2816.16 - Enclosed Switches.

1.03 REFERENCE STANDARDS

A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs; 2011.

B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2011.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

A. Identification for Equipment:
   1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
   2. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.
      a. Service equipment.

B. Identification for Conductors and Cables:
   1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.
   2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

2.02 MANUFACTURERS

A. Brady Corporation.

B. Seton Identification Products.

C. HellermannTyton.

D. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 IDENTIFICATION

A. Identification of Electrical Conduits and Raceways

1. Electrical conduit which is accessible for maintenance operations (except conduits in finished spaces) shall be identified with approved stencils or semi-rigid plastic identification pipe markers, electrical markers, or approved equal.
2. For stencils use black enamel (except white on black, red, blue or dark backgrounds). Where lines are painted, apply stenciling after the finish coat dried. Characters shall be one inch high and when dry shall be coated with clear lacquer or approved equivalent.
3. Electrical markers to be used on diameters 3/4 inch through 5 inches.
4. Electrical markers to be used on diameters 6 inches or larger (with wire bindings and seals).
5. Markers (or stencils) shall be located adjacent to each junction box, pull box, controller, panelboard, transformer, relay, and the like.
6. At Contractor's option, covers only of junction boxes shall be labeled or stenciled (in lieu of conduit) with approved permanent labels denoting voltage and circuit designation inside box (for single-phase legs, label voltage to ground; for two or more phase legs, label the phase-to-phase voltage; and combinations shall be suitably labeled).

B. Equipment Identification

1. Provide nameplates on equipment such as panelboards, distribution panels, motor starters, safety switches, control devices, and the like.
2. Lettering shall include name of equipment, the specific unit number, and reference to on/off or other instructions that are applicable.
3. Power panelboards, distribution panels, and motor control centers shall have a nameplate for each section of same and for each device contained therein, i.e., "Panel A," "Sump Pump," as is applicable.
4. Nameplates shall be laminated phenolic with a white surface and black core. Use 1/16 inch thick material for plates up to 2 inches by 4 inches. For larger sizes use 1/8 inch thick material. Lettering of names should correspond to nomenclature specified for apparatus, corresponding with the Drawings, details, schedules, charts, wiring diagrams, and operating instructions as approved by the Architect/Engineer.
5. Lettering shall be condensed Gothic. The space between lines shall be equal to the width of the letters. Use 1/4 inch minimum height letters which occupy 4 to the inch. Increase letter size to 3/4 inch on largest plates.
6. In addition, feeder circuits which serve devices (panelboards, appliances) that are located remote from (more than 3 feet from) their main circuit protective device shall have approved identification installed where and as directed which indicates the origin of the power supply, feeder size, and location of main protective device, i.e., "Feeder No. 3; 4-500 MCM, 1-2 AWG Ground, 4" C.; Main Switchboard Circuit 13"; as is applicable.
7. Appliances, motors, heaters, and the like which are served by a separately mounted disconnect switch, motor starter, or combination type motor starter shall be labeled accordingly for easy identification, i.e.:
   a. Combination Starter: "HVAC-4" - "Supply Air Fan Motor"
   b. Motor at HVAC Unit: "HVAC-4" - "Supply Air Fan Motor"
   c. Disconnect Switch: "HVAC-3" - "Primary Air Heater"
   d. Heater at HV Unit: "HVAC-3" - "Primary Air Heater"

8. Nameplates to be .020 inch to .064 inch thick aluminum, not less than 3/4 inches by 2-1/2 inches or 1 inch by 3 inches, except 1-1/2 inches by 4 inches or 3 inches by 6 inches for large items. Plates shall have a colored enamel background, with etched or engraved natural aluminum lettering not less than 3/16 inch high, except 1/4 inch high for 1 inch by 3 inches and 1-1/2 inches by 4 inch plates and 1/2 inch high for 1-3/4 inches by 6 inches and larger plates (unless specifically described elsewhere in this Specification).
9. Background color shall be black,or as otherwise required. Plate shall have pressure sensitive permanent adhesive factory backing, as approved.
10. Note: Use 3/4 inch by 2-1/4 inch size for single gang face plates, 1-1/4 inches by 4 inches for two gang plates attached with black, round head, self threading screws, made of 1/16 inch minimum thick, laminated phenol resin sheet, with white background and black ink or lacquer filled lettering.
11. Attached directly to the apparatus in a manner approved by the Architect/Engineer.

C. Outlet Box Covers (or finishing plates)
1. Indicate circuit numbers in box on back (box) side of cover (plate) using heavy line laundry marker pen.

D. Indexing
1. Index each distribution center circuit and each panel circuit, clearly, neatly, and completely, including "Spares." Index shall be typewritten upon heavy card stock paper not subject to fading or mildew and shall be covered with a clear plastic window, and held securely in a suitable frame. Type date (month and year) and panel designation on each index.
2. Each index shall be sequenced in accord with actual panel circuiting, i.e.:
   a. Left side - top to bottom - 1, 3, 5, 7
   b. Right side - top to bottom - 2, 4, 6, 8
   c. All circuits shall be visible without removing panel index.
3. Standard index cards printed 1, 2, 3, are not acceptable.
4. Use actual Owner provided room numbers for circuit labeling in lieu of construction room numbers. Indexes provided with the Drawings are not suitable to use as panelboard indexes.

E. Other Items
1. Provide identification as required in other subsections of these Specifications and as denoted on the Drawings.

2.04 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:
1. Materials:
   a. Indoor Clean, Dry Locations: Use plastic nameplates.
   b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.

B. Identification Labels:
1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.

2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Nameplates: Engraved three-layer laminated plastic, black letters on white background.

D. Locations:
1. Each electrical distribution and control equipment enclosure.
2. Communication cabinets.

E. Letter Size:
1. Use 1/8 inch letters for identifying individual equipment and loads.
2. Use 1/4 inch letters for identifying grouped equipment and loads.

2.05 WIRE AND CABLE MARKERS

A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.

B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.

C. Legend: Power source and circuit number or other designation indicated.

D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.

E. Minimum Text Height: 1/8 inch.

F. Color: Black text on white background unless otherwise indicated.

G. Description: Cloth type wire markers.

H. Locations: Each conductor at panelboard gutters, pull boxes, outlet boxes, and junction boxes each load connection.

I. Legend:
1. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.
2. Control Circuits: Control wire number indicated on schematic and interconnection diagrams on drawings.

2.06 UNDERGROUND WARNING TAPE

A. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.

B. Non-detectable Type Tape: 6 inches wide, with minimum thickness of 4 mil.

C. Legend: Type of service, continuously repeated over full length of tape.

D. Color:
1. Tape for Buried Power Lines: Black text on red background.
2. Tape for Buried Communication, Alarm, and Signal Lines: Black text on orange background.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

B. Degrease and clean surfaces to receive nameplates and labels.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:

1. Surface-Mounted Equipment: Enclosure front.
2. Flush-Mounted Equipment: Inside of equipment door.
3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
4. Elevated Equipment: Legible from the floor or working platform.
5. Interior Components: Legible from the point of access.
6. Conductors and Cables: Legible from the point of access.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.

E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

F. Install underground warning tape above buried lines with one tape per trench at 3 inches below finished grade.

END OF SECTION 26 05 53

SECTION 26 05 55
CONNECTORS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1, General Requirements, are included as a part of this Section as though bound herein.

B. Refer to Section 01 2300 for Alternates that may affect the Work of this Section.

1.02 SUMMARY

A. Provide required materials for a complete system.

B. Upon request, points of junction, splices, taps, connections, pull boxes, and outlets shall be opened for inspection by Architect/Engineer or other approved authority.

PART 2 PRODUCTS

2.01 MATERIALS

A. Connectors shall be similar and equal to those manufactured by O.Z. Electrical Manufacturing Company, Burndy Engineering Company, Thomas & Betts Company.

B. Splices, taps, and other connections involving conductors not larger than No. 8 AWG max. shall be made with insulated connectors like 3M Co. "Scotchloks," Ideal Co. "Wing-Nut," or T & B Co. "Piggy" connectors. Connectors shall be wrapped with 8.5 mil heavy duty, premium grade all-weather vinyl electrical insulating tape.

C. Splices, taps, and other connections involving conductors larger than No. 8 AWG shall be made using approved compression type connectors, insulated with at least four 1/2 lap layers of 8.5 mil heavy duty, premium grade all-weather vinyl electrical insulating tape and covered overall with at least two 1/2 lap wraps of friction tape.

D. Connections or joints in wet or damp areas shall be waterproofed in an approved manner.

E. Connections of aluminum conductors are not acceptable.

F. Connectors shall be sized to carry 100 percent of the current capacity of the conductors connected. Conductors shall not be trimmed to fit a connection, the connection device shall be changed to accommodate the conductor.

G. Compression lugs shall be by T&B, O.Z. Electrical Manufacturing, or Burndy Engineering Company.

PART 3 EXECUTION

3.01 INSTALLATION

A. Splices and taps shall be made using approved mechanical connectors of the type best suited.

B. Under no circumstances will a soldered splice, tap, or connection be acceptable.

END OF SECTION 26 05 55

SECTION 26 05 76
HAIR DRYERS/HAND DRYERS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1, General Requirements, and the Sections 26 0101 and 26 0550, are included as a part of this Section though bound herein.

B. Refer to Section 01 2300 for Alternatives that may affect the Work of this Section.

PART 2 PRODUCTS

2.01 MATERIALS

A. Approved Manufacturers
   1. Bobrick
   2. Nova
   3. World Dryer
   4. Excel

B. Hand/hair dryers shall be high velocity type, steel housing, white in color, automatic, surface mounted.

C. Xlerator Model number XL-W by Excel or equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Mount the unit where denoted on the Drawings. Mounting height shall be as directed by the Drawings.

END OF SECTION 26 05 76

SECTION 26 24 16
PANELBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Power distribution panelboards.

B. Lighting and appliance panelboards.

C. Overcurrent protective devices for panelboards.

1.02 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Section 26 05 29 - HANGERS AND SUPPORTS.

C. Section 26 05 53 - IDENTIFICATION: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; 2013e (Amended 2017).

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

C. NECA 407 - Standard for Installing and Maintaining Panelboards; 2009.

D. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.

E. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches; National Electrical Manufacturers Association; 1993.

F. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2000 (R2005), with errata, 2008.

G. NEMA BS 31047 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); 2013 (Reaffirmed 2023).

H. NEMA PB 1 - Panelboards; 2011.

I. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less; 2013.

J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

K. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

L. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

M. UL 67 - Panelboards; Current Edition, Including All Revisions.

N. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittal Procedures

B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.

E. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

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

1.06 MAINTENANCE MATERIALS

A. See Section 01 60 00 - Product Requirements, for additional provisions.

B. Furnish two of each panelboard key.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Square D

B. Siemens.

C. Eaton

D. General Electric

E. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PANELBOARDS - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
   1. Altitude: Less than 6,600 feet.
   2. Ambient Temperature:
      a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.

C. Short Circuit Current Rating: As indicated on drawings.

D. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.

E. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.

F. Bussing: Sized in accordance with UL 67 temperature rise requirements.
   1. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.

G. Conductor Terminations: Suitable for use with the conductors to be installed.

H. Enclosures: Comply with NEMA EN 10250, and list and label as complying with UL 50 and UL 50E.
   1. Environment Type per NEMA EN 10250: Unless otherwise indicated, as specified for the following installation locations:
   2. Boxes: Galvanized steel unless otherwise indicated.
      a. Provide wiring gutters sized to accommodate the conductors to be installed.
   3. Fronts:

a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.

4. Lockable Doors: All locks keyed alike unless otherwise indicated.

I. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

2.03 POWER DISTRIBUTION PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
1. Phase and Neutral Bus Material: Aluminum or copper.
2. Ground Bus Material: Aluminum or copper.

D. Circuit Breakers:
1. Provide bolt-on type or plug-in type secured with locking mechanical restraints.

E. Enclosures:
1. Provide surface-mounted enclosures unless otherwise indicated.
2. Substitutions: See Section 01 60 00 - Product Requirements.

F. Description: NEMA PB 1, circuit breaker type.

G. Minimum integrated short circuit rating: As indicated on the Drawings.

H. Molded Case Circuit Breakers: With integral thermal and instantaneous magnetic trip in each pole; UL listed. For air conditioning equipment branch circuits provide circuit breakers UL listed as Type HACR.
1. Coil operating voltage: 120 volts, 60 Hz.
2. Coil operating voltage: 120 volts, DC.
3. Size as shown on Drawings.
4. Provide unit mounted control power transformer, RED indicating light in front cover.

I. Circuit Breaker Accessories: Trip units and auxiliary switches as indicated.

J. Cabinet Front: Surface type, fastened with concealed trim clamps, hinged door with flush lock, metal directory frame, finished in manufacturer's standard gray enamel.

2.04 LIGHTING AND APPLIANCE PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
2. Phase and Neutral Bus Material: Aluminum or copper.

3. Ground Bus Material: Aluminum or copper.

D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.

E. Enclosures:
   1. Provide surface-mounted or flush-mounted enclosures as indicated.
   2. Provide clear plastic circuit directory holder mounted on inside of door.

F. Description: NEMA PB1, circuit breaker type, lighting and appliance branch circuit panelboard.

G. Provide an isolated ground bar in designated panelboards.

H. Minimum Integrated Short Circuit Rating: As indicated on the Drawings.

I. Molded Case Circuit Breakers: Thermal magnetic trip circuit breakers, bolt-on type, with common trip handle for all poles; UL listed.
   1. Type HACR for air conditioning equipment circuits.
   2. Class A ground fault interrupter circuit breakers where scheduled.
   3. Do not use tandem circuit breakers.

J. Current Limiting Molded Case Circuit Breakers: NEMA AB 1, circuit breakers with integral thermal and instantaneous magnetic trip in each pole, coordinated with automatically resetting current limiting elements in each pole.

K. Enclosure: NEMA PB 1, Type 1.

L. Cabinet Box: 6 inches deep, 20 inches wide for 240 volt and less panelboards.

M. Cabinet Front: Flush cabinet front with concealed trim clamps, concealed hinge, metal directory frame, and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.

2.05 OVERCURRENT PROTECTIVE DEVICES

A. Molded Case Circuit Breakers:
   1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
   2. Interrupting Capacity:
      a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
         1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
      b. Series Rated Systems: Provide circuit breakers listed in combination with upstream devices to provide interrupting rating not less than the short circuit current rating indicated.
   3. Conductor Terminations:
      a. Provide mechanical lugs unless otherwise indicated.
      b. Provide compression lugs where indicated.
      c. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
   4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
   5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.

PART 3 EXECUTION

3.01 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.

D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

E. Provide required support and attachment in accordance with Section 26 05 29.

F. Install panelboards plumb.

G. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.

H. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.

I. Provide grounding and bonding in accordance with Section 26 05 26.

J. Install all field-installed branch devices, components, and accessories.

K. Install panelboards in accordance with NEMA PB 1.1 and NECA 1.

L. Height: 6 feet to top of panelboard; install panelboards taller than 6 feet with bottom no more than 4 inches above floor.

M. Provide filler plates to cover unused spaces in panelboards.

N. Provide computer-generated circuit directory for each lighting and appliance panelboard and each power distribution panelboard provided with a door, clearly and specifically indicating the loads served. Revise directory to reflect circuiting changes required to balance phase loads. Identify spares and spaces.

O. Provide identification nameplate for each panelboard in accordance with Section 26 05 53.

P. Provide spare conduits out of each recessed panelboard to an accessible location above ceiling. Identify each as SPARE.
   1. Minimum spare conduits: 4 empty 1 inch.

3.02 FIELD QUALITY CONTROL

A. See Section 01 43 00 - Quality Assurance, for additional requirements.

B. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.03 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

B. Adjust alignment of panelboard fronts.

C. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 10 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

3.04 CLEANING

A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION 26 24 16

SECTION 26 27 26
WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall switches.

B. Receptacles.

C. Wall plates.

1.02 RELATED REQUIREMENTS

A. Section 26 05 33.16 - BOXES.

B. Section 26 0526 - Grounding and Bonding

1.03 REFERENCE STANDARDS

A. FS W-C-596 - Connector, Electrical, Power, General Specification for; 2014h (Validated 2022).

B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification); 2017g (Validated 2023).

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

D. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.

E. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (R 2010).

F. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2012.

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.

I. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.

J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

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

C. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.06 EXTRA MATERIALS

A. See Section 01 6000 - Product Requirements for additional provisions

B. Furnish two of each style, size, and finish wall plate.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Cooper

B. Arrow Hart

C. Pass & Seymour

D. Hubbell

E. Leviton

2.02 WIRING DEVICE APPLICATIONS

A. Provide wiring devices suitable for intended use and with ratings adequate for load served.

B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.

C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.

D. Provide GFCI protection for receptacles installed within 6 feet of sinks.

E. Provide GFCI protection for receptacles installed in kitchens.

F. Provide GFCI protection for receptacles serving electric drinking fountains.

2.03 ALL WIRING DEVICES

A. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

B. Finishes: See electrical general notes on sheet E1.1.

2.04 WALL SWITCHES

A. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20and where applicable FS W-S-896; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.

B. Wall Switches: Heavy Duty, AC only general-use snap switch, complying with NEMA WD 6 and WD 1.
   1. Body and Handle: Plastic with toggle handle.
      a. Voltage: 120 volts, AC.
      b. Current: 20 amperes.
   2. Ratings: Match branch circuit and load characteristics.

C. Switch Types: Single pole, double pole, 3-way, and 4-way.

2.05 RECEPTACLES

A. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498and where applicable FS W-C-596; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
   2. NEMA configurations specified are according to NEMA WD 6.

B. Receptacles: Heavy duty, complying with NEMA WD 6 and WD 1.
   1. Device Body: Plastic.
   2. Configuration: NEMA WD 6, type as specified and indicated.
   3. Prewired pigtail connectors that accommodate Fed Spec receptacles are approved. Must be crimped and welded terminal application connector.

C. Convenience Receptacles: Type 5 - 20 equal to Hubbell 5362, Cooper BR20, or Pass & Seymour CR20W.
   1. Prewired pigtail receptacles: Type 5 - 20 equal to Pass & Seymour PT5362, Hubbell SNAP5362, or Cooper ArrowLink.

D. GFCI Receptacles: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.

2.06 TECHNOLOGY OUTLETS

A. Provide rough-ins as indicated on the Drawings.

2.07 WALL PLATES

A. Wall Plates: Comply with UL 514D.
   1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
   2. Size: Standard.
   3. Screws: Metal with slotted heads finished to match wall plate finish.

B. Cover Plates: nylon.

C. Weatherproof covers to be metal hinged covers that allows cord to be plugged in with cover closed.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.

C. Verify that wall openings are neatly cut and will be completely covered by wall plates.

D. Verify that final surface finishes are complete, including painting.

E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

F. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of wiring devices provided under this section.

C. Install wiring devices in accordance with manufacturer's instructions.

D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.

F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.

G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.

I. Install securely, in a neat and workmanlike manner, as specified in NECA 1.

J. Install wiring devices plumb and level with mounting yoke held rigidly in place.

K. Install wall switches with OFF position down.

L. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.

M. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

N. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

O. Connect wiring device grounding terminal to outlet box with bonding jumper.

P. Install standard plates on switch, receptacle, and blank outlets in finished areas.

Q. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

3.04 INTERFACE WITH OTHER PRODUCTS

A. Coordinate locations of outlet boxes provided under Section 26 05 37 to obtain mounting heights specified.

B. Mounting heights refer to bottom of box.

C. Install wall switch 44 inches above finished floor, UNO.

D. Install convenience receptacle 16 inches above finished floor, UNO.

E. Install convenience receptacle 4 inches above backsplash of counter, UNO.

F. Install telephone jack 16 inches above finished floor, UNO.

G. Install telephone jack for side-reach wall telephone to position top of telephone at 44 inches above finished floor.

H. Install telephone jack for forward-reach wall telephone to position top of telephone at 48 inches above finished floor.

3.05 FIELD QUALITY CONTROL

A. See Section 01 43 00 - Quality Assurance, for additional requirements.

B. Inspect each wiring device for damage and defects.

C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.

D. Verify that each receptacle device is energized.

E. Test each receptacle to verify operation and proper polarity.

F. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.

G. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.06 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

3.07 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

SECTION 26 43 01
SURGE PROTECTIVE DEVICES AND POWER QUALITY

PART 1 GENERAL

1.01 RELATED SECTIONS

A. Section 26 24 16 - PANELBOARDS.

1.02 REFERENCES

A. IEEE C62.41 – Surge Voltages in Low-Voltage AC Power Circuits.

B. IEEE C62.45 – Low-Voltage AC Power Circuits, Guide on Surge Test.

C. NEMA 250 – Enclosures for Electrical Equipment (1000 Volts Maximum).

D. NEMA LS-1 – Low Voltage Surge Protective Devices.

E. UL 1283 – Electromagnetic Interference Filters.

F. UL 1449 – Surge Protective Devices.

1.03 DEFINITIONS

A. ATS: Acceptance Testing Specifications.

B. VPR: Voltage Protective Rating.

1.04 SUBMITTALS

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

B. Product Data: For each type of product indicated, include rated capacities, unit dimensions, operating weights, operating characteristics, furnished specialties, and accessories.

C. Product Performance: For surge protective devices, certified by an independent testing agency for compliance with UL, IEEE, and NEMA standards.

D. Product Certificates: For surge protective devices, signed by product manufacturer certifying compliance with the following standards:
   1. UL 1283
   2. UL 1449 (4th Edition)
   3. IEEE (62.41)
   4. IEEE (62.45)

E. Operation and Maintenance Data: For surge protective devices to include in emergency, operation, and maintenance manuals.

F. Warranties: Special warranties specified in this Section.

1.05 QUALITY ASSURANCE

A. Source Limitations: Obtain surge protective devices and accessories through one source from a single manufacturer.

B. Third Party Testing: Performance testing and ratings shall be documented by an independent testing agency nationally recognized for the type of testing required.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with IEEE C62.41, "IEEE Guide for Surge Voltages in Low Voltage AC Power Circuits," and test devices according to IEEE C62.45, "IEEE Guide on Surge Testing for Equipment Connected to Low Voltage AC Power Circuits."

E. Comply with UL 1283, "Electromagnetic Interference Filters," and UL 1449, "Surge Protective Devices."

1.06 PROJECT CONDITIONS

A. Service Conditions: Rate surge protective devices for continuous operation under the following conditions, unless otherwise indicated:
   1. Maximum Continuous Operating Voltage: Not less than 115 percent of nominal system operating voltage and in compliance with test and evaluation procedures outlined in the nominal discharge surge current test of UL 1449 4th Edition section 37.7.3. MCOV values claimed based on component values or on the 30 minute 115% operating voltage test, section 38 of UL 1449 will not be accepted.
   2. Operating Temperature: 30 to 120 degrees F.
   3. Humidity: 0 to 85 percent, noncondensing.
   4. Altitude: Less than 20,000 feet above sea level.

1.07 COORDINATION

A. Coordinate location of field-mounted surge protective devices to allow adequate clearances for maintenance. Surge protective devices may be externally mounted to the switchboard and/or panelboard.

B. Circuit breakers for externally mounted surge protection device shall be sized per manufacturer's recommendations.

1.08 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of surge protective device that fail in materials or workmanship within ten years from the date of substantial completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Square D.

B. Cutler Hammer.

C. General Electric.

D. Siemens.

E. Surge Suppression Inc.

F. Current Technology, Inc.

G. Liebert

H. Intermatic

I. Advanced Protection Technologies, Inc.

J. LEA International

K. Mersen

L. APF - Active Power Filter

M. PQI - Power Quality International

N. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DISTRIBUTION PANELBOARD SUPPRESSORS

A. Surge Protective Device Description: Modular design with field-replaceable modules, sine-wave-tracking type with the following features and accessories:
   1. Fuses, rated at 200-kA interrupting capacity.
   2. Fabrication using bolted compression lugs for internal wiring.
   3. Redundant suppression circuits.
   4. Arrangement with wire connections to phase buses, neutral bus, and ground bus.

5. LED indicator lights for power and protection status.
6. Audible alarm, with silencing switch, to indicate when protection has failed.
7. One set of dry contacts rated at 5 amp, 250 volt AC, for remote monitoring of protection status.
8. Surge-event operations counter.
9. Type 1 or Type 2 SPD per UL 1449 4th Edition.

B. Peak Single-Impulse Surge Current Rating: 150 kA per mode.

2.03 SUPPRESSORS FOR PANELBOARDS

A. Surge Protective Device Description: Sine-wave-tracking type, panel-mounted design with the following features and accessories:
1. Arrangement with wire connections to phase buses, neutral bus, and ground bus.
2. LED indicator lights for power and protection status.
3. Audible alarm, with silencing switch, to indicate when protection has failed.
4. One set of dry contacts rated at 5 amp, 250 volt AC, for remote monitoring of protection status.

B. Peak Single-Impulse Surge Current Rating: 80 kA per mode.

C. Protection modes and UL 1449 Voltage Protective Rating (VPR) based on the 6kV 3kA surge for 120/240 volt, 1 phase, 3-wire circuits shall be as follows:
1. Line to Neutral: 600 V
2. Line to Ground: 600 V
3. Neutral to Ground: 900 V

2.04 ENCLOSURES

A. NEMA 4 maximum, NEMA 250 minimum.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install devices at service entrance on line or load side, with ground lead bonded to service entrance ground.

B. Install devices for panelboard and auxiliary panels with conductors or buses between suppressor and points of attachment as short and straight as possible. Do not exceed manufacturer's recommended lead length and in no case shall conductors exceed 5 feet in length. Do not bond neutral and ground.

3.02 FIELD QUALITY CONTROL

A. Testing: Perform the following field tests and inspections and prepare test reports:
1. After installing surge protective devices, but before electrical circuitry has been energized, test for compliance with requirements.
2. Complete startup checks according to manufacturer's written instructions.
3. Perform each visual and mechanical inspection and electrical test stated in NETA ATS, "Surge Arresters, Low Voltage Surge Protective Devices." Certify compliance with test parameters.

B. B. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 26 43 01

SECTION 26 51 00
INTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior luminaires.

B. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding

B. Section 26 05 29 - HANGERS AND SUPPORTS.

C. Section 26 05 33.16 - BOXES.

1.03 REFERENCE STANDARDS

A. ANSI C78.379 - American National Standard for Electric Lamps -- Reflector Lamps -- Classification of Beam Patterns; 2006.

B. ANSI C82.1 - American National Standard for Lamp Ballast - Line Frequency Fluorescent Lamp Ballast; 2004.

C. ANSI C82.4 - American National Standard for Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type); 2002.

D. NECA/IESNA 500 - Standard for Installing Indoor Lighting Systems; 2006.

E. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.

F. NEMA WD 6 - Wiring Devices - Dimensional Requirements; National Electrical Manufacturers Association; 2002 (R2008).

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. NFPA 101 - Life Safety Code; 2015.

1.04 SUBMITTALS

A. See Section 01 3000 - Submittal Procedures

B. Shop Drawings: Indicate dimensions and components for each luminaire.

C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.

D. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Conform to requirements of NFPA 70 and NFPA 101.

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

PART 2 PRODUCTS

2.01 MANUFACTURERS - LUMINAIRES

A. As indicated on the Drawings.

B. Substitutions: See Section 01 60 00 - Product Requirements except where individual luminaire types are designated with substitutions not permitted.

2.02 LUMINAIRES

A. Furnish products as indicated in Schedule included on the Drawings.

B. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of luminaires provided under this section.

B. Install products in accordance with manufacturer's instructions.

C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).

D. Provide required support and attachment in accordance with Section 26 05 29.

E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

F. Install surface mounted luminaires plumb and adjust to align with building lines and with each other. Secure to prevent movement.

G. Install recessed luminaires to permit removal from below.

H. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.

I. Install wall mounted luminaires and emergency lighting units at height as indicated on Drawings.

J. Install accessories furnished with each luminaire.

K. Connect luminaires to branch circuit outlets provided under Section 26 05 37 using flexible conduit.

L. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

M. Bond products and metal accessories to branch circuit equipment grounding conductor.

N. Install specified lamps in each emergency lighting unit and luminaire.

O. Install lamps in each luminaire.

3.02 FIELD QUALITY CONTROL

A. See Section 01 43 00 - Quality Assurance, for additional requirements.

B. Inspect each product for damage and defects.

C. Perform field inspection in accordance with Section 01450 and 01451

D. Operate each luminaire after installation and connection to verify proper operation.

E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.03 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.

B. Aim and adjust fixtures as indicated.

C. Position exit sign directional arrows as indicated.

3.04 CLEANING

A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

B. Clean electrical parts to remove conductive and deleterious materials.

C. Remove dirt and debris from enclosures.

D. Clean photometric control surfaces as recommended by manufacturer.

E. Clean finishes and touch up damage.

3.05 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

3.06 PROTECTION

A. Relamp luminaires that have failed lamps at Substantial Completion.

3.07 SCHEDULE - SEE DRAWINGS

END OF SECTION 26 51 00

SECTION 26 56 00
EXTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exterior luminaires.

B. Poles and accessories.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Materials and installation requirements for concrete bases for poles.

B. Section 26 05 29 - HANGERS AND SUPPORTS.

C. Section 26 05 33.16 - BOXES.

1.03 REFERENCE STANDARDS

A. ANSI C78.379 - American National Standard for Electric Lamps -- Reflector Lamps -- Classification of Beam Patterns; 2006.

B. ANSI C82.1 - American National Standard for Lamp Ballast - Line Frequency Fluorescent Lamp Ballast; 2004.

C. ANSI C82.4 - American National Standard for Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type); 2002.

D. IES RP-8 - Roadway Lighting; 2014.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

F. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems; 2006.

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. UL 1598 - Luminaires; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittal Procedures

B. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.

C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.

D. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

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

C. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 COORDINATION

A. Furnish bolt templates and pole mounting accessories to installer of pole foundations.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. As indicated on the Drawings.

2.02 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the drawings.

B. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 LUMINAIRES

A. Provide products that comply with requirements of NFPA 70.

B. Provide products that are listed and labeled as complying with UL 1598, where applicable.

C. Provide products listed, classified, and labeled as suitable for the purpose intended.

D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.

F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

PART 3 EXECUTION

3.01 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of luminaires provided under this section.

B. Install products in accordance with manufacturer's instructions.

C. Install luminaires in accordance with NECA/IESNA 501.

D. Provide required support and attachment in accordance with Section 26 05 29.

E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

F. Install accessories furnished with each luminaire.

G. Bond products and metal accessories to branch circuit equipment grounding conductor.

H. Provide concrete bases for lighting poles at locations indicated, in accordance with Section 03 30 00.

I. Install poles plumb.
   1. Provide shims to adjust plumb.
   2. Grout around each base.

J. Install lamps in each luminaire.

K. Bond luminaires, metal accessories, and metal poles to branch circuit equipment grounding conductor.

3.02 FIELD QUALITY CONTROL

A. See Section 01 43 00 - Quality Assurance, for additional requirements.

B. Inspect each product for damage and defects.

C. Perform field inspection, testing, and adjusting in accordance with Section 01 40 00.

D. Operate each luminaire after installation and connection to verify proper operation.

E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.03 CLEANING

A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

B. Clean electrical parts to remove conductive and deleterious materials.

C. Remove dirt and debris from enclosure.

D. Clean photometric control surfaces as recommended by manufacturer.

E. Clean finishes and touch up damage.

3.04 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

3.05 SCHEDULE - SEE DRAWINGS

END OF SECTION 26 56 00

GARMANN MILLER

Division 27

Communications

SECTION 26 05 33.13
CONDUIT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).

B. Intermediate metal conduit (IMC).

C. Flexible metal conduit (FMC).

D. Liquidtight flexible metal conduit (LFMC).

E. Electrical metallic tubing (EMT).

F. Rigid polyvinyl chloride (PVC) conduit.

G. Conduit fittings.

1.02 RELATED REQUIREMENTS

A. Section 09 90 00 - Painting and Coating.

B. Section 26 05 26 - GROUNDING AND BONDING.
   1. Includes additional requirements for fittings for grounding and bonding.

C. Section 26 05 29 - HANGERS AND SUPPORTS.

D. Section 26 05 53 - IDENTIFICATION.

E. Section 26 05 33.16 - BOXES.

F. Division 27 - Communications.

G. Division 28 - Electronic Safety and Security.

H. Section 31 23 16 - Excavation.

I. Section 31 23 16.13 - Trenching: Excavating, bedding, and backfilling.

J. Section 31 23 23 - Fill: Bedding and backfilling.

1.03 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2005.

B. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT); 2005.

C. ANSI C80.5 - American National Standard for Electrical Rigid Aluminum Conduit (ERAC); 2005.

D. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit (EIMC); 2005.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

F. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.

G. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit; 2005.

H. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2013.

I. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2015.

J. NFPA 70 - National Electrical Code; National Fire Protection Association; Most recent edition adopted by Authority Having Jurisdiction, including all applicable Amendments and Supplements.

K. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.

L. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.

M. UL 360 - Liquid-Tight Flexible Steel Conduit; Current Edition, Including All Revisions.

N. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

O. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.

P. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

Q. UL 1242 - Electrical Intermediate Metal Conduit-Steel; Current Edition, Including All Revisions.

1.04 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and shown.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

B. Accept conduit on site. Inspect for damage.

C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

D. Protect PVC conduit from sunlight.

PART 2 PRODUCTS

2.01 CONDUIT REQUIREMENTS

A. Communications Systems Conduits: Also comply with Section 27 05 33.13 - Conduit for Communications Systems.
   1. Use extra large mogul rigid conduit bodies to allow large bending radius of technology cabling.

B. Fittings for Grounding and Bonding: Also comply with Section 26 05 26 - GROUNDING AND BONDING.

C. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

D. Provide products listed, classified, and labeled as suitable for the purpose intended.

E. Coordinate painting requirements with painting contractor where conduits are exposed due to open structure and the like.

F. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

G. Conduit Size: Comply with NFPA 70.
   1. Minimum size: 1/2" unless otherwise specified.

H. Underground Installations:
   1. PVC conduit may be used for underground installations. Where underground conduit (2" and larger) passes under a parking lot, driveway, roadway, or the like; encase conduit in concrete.

I. Outdoor Locations Above Grade: Use rigid steel conduit.

J. Wet and Damp Locations: Use rigid steel or intermediate metal conduit.

K. Dry Locations:
   1. Concealed: Use rigid steel conduit, intermediate metal conduit, or electrical metallic tubing.

2. Exposed: Use rigid steel conduit, intermediate metal conduit, or electrical metallic tubing.

L. In addition to raceways for Division 26 work, the electrical contractor shall provide raceway systems for Division 27 - Communications and Division 28 - Electronic Safety and Security as noted to the Drawings. When raceway requirements are not specifically noted in the electrical legends or the floor plans, Division 26 shall coordinate size and routing with the system installer prior to installation. Systems shall be installed in conduit inside walls, and for spaces with open structures. Raceway for open spaces shall be routed from rough-in box, to an adjacent space with an accessible ceiling, or to the cable tray if tray is routed through the space.

M. Where underground conduit enters a room and water entering through the conduit is a concern or an issue, provide a product similar to Raychem Rayflate Duct Sealing System at both ends of conduit to seal conduit air and water tight.

N. Where conduit penetrates a wall to a room below grade, utilize a product similar to Link-Seals to provide a watertight seal around the outside of the conduit.

2.02 MANUFACTURERS

A. Essex Group

B. Hubbell Power Systems

C. Hellermann Tyton

D. Wheatland Tube Company

E. Allied Tube and Conduit

F. Cantex Inc.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

B. Fittings:
1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
2. Material: Use steel or malleable iron.
3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 INTERMEDIATE METAL CONDUIT (IMC)

A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.

B. Fittings:
1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
2. Material: Use steel or malleable iron.
3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

C. Conduit Size: Comply with NFPA 70.

2.05 FLEXIBLE METAL CONDUIT (FMC)

A. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.

B. Fittings:
1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.

2. Material: Use steel or malleable iron.

C. Description: Interlocked steel construction.

2.06 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.

B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.

C. Description: Interlocked steel construction with PVC jacket.

2.07 ELECTRICAL METALLIC TUBING (EMT)

A. Thin wall conduit shall be Underwriter's approved electrical metallic tubing (EMT). EMT shall meet Federal Specification WW 806, latest edition.

B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

C. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use compression (gland) or set-screw type.
      a. Do not use indenter type connectors and couplings.

2.08 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. Nonmetallic conduit shall be Underwriter's approved Schedule 40 heavy wall "PVC" polyvinyl chloride plastic type, properly supported and anchored. Conduit shall be terminated in end-bells or bushings. Provide bonding or grounding conductors in accordance with NEC.

B. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.

C. Fittings:
   1. Manufacturer: Same as manufacturer of conduit to be connected.
   2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

D. Description: NEMA TC 2; Schedule 40 PVC.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive conduits.

C. Verify that conditions are satisfactory for installation prior to starting work.

D. Verify routing and termination locations of conduit prior to rough-in.

E. Conduit routing is shown on drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

3.02 INSTALLATION

A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

B. Install EMT conduit for branch circuits throughout the building. EMT to junction box in room for lighting circuits. MC cable may be used from junction box to light fixtures. MC cable may also be used in metal stud walls for receptacles, but EMT shall still be used from the panel to a junction box in the room , between junction boxes above ceiling, and between each wall stub-out location.

C. Branch circuits may be routed underslab. In no case may conduits be routed within the slab.

D. PVC conduit may be used for underground installations. Use metal rigid elbows with metal rigid above grade. Fiberglass elbows with zero burn-through, high strength/UV resistant reinforced epoxy may be used for large utility and electrical sweeps in lieu of the rigid. PVC conduits (2 inches and larger) that are routed outside the building under driveways, roadways, sidewalks or the like shall be incased in concrete.

E. Install conduit securely, in a neat and workmanlike manner, as specified in NECA 1.

F. Install nonmetallic conduit in accordance with manufacturer's instructions.

G. Arrange supports to prevent misalignment during wiring installation.

H. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

I. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.

J. Fasten conduit supports to building structure and surfaces under provisions of Section 26 05 29 - HANGERS AND SUPPORTS.

K. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.

L. Do not attach conduit to ceiling support wires.

M. Arrange conduit to maintain headroom and present neat appearance.

N. Route exposed conduit parallel and perpendicular to walls.

O. Maintain adequate clearance between conduit and piping.

P. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F.

Q. Cut conduit square using saw or pipecutter; de-burr cut ends.

R. Bring conduit to shoulder of fittings; fasten securely.

S. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.

T. Use conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations.

U. Install no more than equivalent of three 90 degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use factory elbows for bends in metal conduit larger than 2 inch size.

V. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

W. Provide suitable fittings to accommodate expansion and deflection where conduit crosses seismic and expansion joints.

X. Provide suitable pull string in each empty conduit except sleeves and nipples.

Y. Use suitable caps to protect installed conduit against entrance of dirt and moisture.

Z. Identify conduit under provisions of Section 26 05 53 - IDENTIFICATION.

END OF SECTION 26 05 33.13

SECTION 26 05 33.16
BOXES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.

B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.

C. Wall and ceiling outlet boxes.

D. Pull and junction boxes.

1.02 RELATED REQUIREMENTS

A. Section 26 05 29 - HANGERS AND SUPPORTS.

B. Section 26 27 26 - WIRING DEVICES:
   1. Wall plates.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.

C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.

D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013.

E. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports; 2013.

F. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

I. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

J. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.

K. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements.

B. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

C. Project Record Documents: Record actual locations and mounting heights of outlet, pull, and junction boxes on project record documents.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Products: Provide products listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 BOXES

A. General Requirements:

1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
3. Provide products listed, classified, and labeled as suitable for the purpose intended.
4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
3. Use suitable concrete type boxes where flush-mounted in concrete.
4. Use suitable masonry type boxes where flush-mounted in masonry walls.
5. Use raised covers suitable for the type of wall construction and device configuration where required.
6. Use shallow boxes where required by the type of wall construction.
7. Do not use "through-wall" boxes designed for access from both sides of wall.
8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
12. Wall Plates: Comply with Section 26 27 26.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
1. Comply with NEMA EN 10250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
2. NEMA EN 10250 Environment Type, Unless Otherwise Indicated:
3. Junction and Pull Boxes Larger Than 100 cubic inches:
a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.

2.02 MANUFACTURERS

A. Appleton Electric.

B. Arc-Co./Division of Arcade Technology: www.arc-co.com.

C. Unity Manufacturing: www.unitymfg.com.

D. Hubbell

E. Thomas and Betts

F. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 OUTLET BOXES

A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch male fixture studs where required.
2. Concrete Ceiling Boxes: Concrete type.

B. Cast Boxes: NEMA FB 1, Type FD, aluminum. Provide gasketed cover by box manufacturer. Provide threaded hubs.

C. Wall Plates for Finished Areas: As specified in Section 26 27 26.

D. Technology rough-in boxes to be extra deep (min 2-1/2").

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive boxes.

C. Verify that conditions are satisfactory for installation prior to starting work.

D. Coordinate locations of outlets with other trades prior to rough-in.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Box Supports:
   1. Secure and support boxes in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
   2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.

E. Install boxes plumb and level.

F. Flush-Mounted Boxes:
   1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
      a. For boxes installed in masonry walls, use fittings equal or similar to Raco Block-Loc to hold box flush, plumb and level.
   2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
   3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.

G. Install boxes as required to preserve insulation integrity.

H. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

I. Close unused box openings.

J. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

K. Provide grounding and bonding in accordance with Section 26 05 26.

L. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and as required by NFPA 70.

M. Set wall mounted boxes at elevations to accommodate mounting heights indicated.

N. Electrical boxes are shown on Drawings in approximate locations unless dimensioned.
   1. Adjust box locations up to 3 feet if required to accommodate intended purpose.

O. Orient boxes to accommodate wiring devices oriented as specified in Section 26 27 26.

P. Maintain headroom and present neat mechanical appearance.

Q. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

R. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.

S. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.

T. Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan.

U. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
   1. Switch outlets shall be located within 12" of latch side of door opening, nearest to the opening.

V. Use flush mounting outlet box in finished areas.

W. Coordinate the installation of flush mounted boxes in masonry walls with the Masonry Contractor to achieve neat openings.

X. Do not install flush mounting boxes back-to-back in walls; provide minimum 8 inches separation.

Y. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

Z. Use stamped steel bridges to fasten flush mounting outlet box between studs.

AA. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

BB. Use adjustable steel channel fasteners for hung ceiling outlet box.

CC. Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits both supported within 12 inches of box.

DD. Use gang box where more than one device is mounted together. Do not use sectional box.

EE. Use gang box with plaster ring for single device outlets.

FF. Use cast outlet box in exterior locations exposed to the weather and wet locations.

GG. Large Pull Boxes: Use hinged enclosure in interior dry locations, surface-mounted metal box in other locations.

3.03 ADJUSTING

A. Adjust flush-mounting outlets to make front flush with finished wall material.

B. Install knockout closures in unused box openings.

3.04 CLEANING

A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

B. Clean exposed surfaces and restore finish.

END OF SECTION 26 05 33.16

SECTION 26 28 16.16
ENCLOSED SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nonfusible switches.

1.02 RELATED REQUIREMENTS

A. Section 26 05 29 - HANGERS AND SUPPORTS.

B. Section 26 0526 - Grounding and Bonding

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

B. NECA (INST) - NECA Standard of Installation; National Electrical Contractors Association; 1993.

C. NEMA FU 1 - Low Voltage Cartridge Fuses; National Electrical Manufacturers Association; 2002 (R2007).

D. NEMA BS 31047 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); 2013 (Reaffirmed 2023).

E. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.

F. 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 3000 - Submittal Procedures

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.

C. Project Record Documents: Record actual locations of enclosed switches.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Square D

B. Siemens.

C. Cutler Hammer

D. General Electric

E. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 COMPONENTS

A. Nonfusible Switch Assemblies: NEMA KS 1, Type HD enclosed load interrupter knife switch.
   1. Externally operable handle interlocked to prevent opening front cover with switch in ON position.
   2. Handle lockable in OFF position.

B. Enclosures: NEMA KS 1.
   1. Interior Dry Locations: Type 1.
   2. Exterior Locations: Type 3R.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide required support and attachment in accordance with Section 26 05 29.

E. Install enclosed switches plumb.

F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.

G. Provide grounding and bonding in accordance with Section 26 05 26.

H. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.

3.02 FIELD QUALITY CONTROL

A. See Section 01 43 00 - Quality Assurance, for additional requirements.

B. Perform field inspection in accordance with Section 01 4500 and 01 4510

C. Inspect and test in accordance with NETA ATS, except Section 4.

D. Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.

E. Correct deficiencies and replace damaged or defective enclosed safety switches or associated components.

3.03 CLEANING

A. Clean dirt and debris from switch enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION 26 28 16.16

SECTION 27 11 00
COMMUNICATION EQUIPMENT ROOM FITTINGS

PART 1 GENERAL

1.01 RELATED SECTIONS

A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1, General Requirements, are included as a part of this Section as though bound herein.

B. Refer to Section 01 2300 for Alternates that may affect the Work of this Section.

1.02 SECTION INCLUDES

A. Wall Mount Rack

B. Horizontal Cable Management

C. Horizontal Power Strips

D. Blank Panels

E. Uninterruptible Power Supply (UPS)

1.03 RELATED DOCUMENTS

A. The provisions of the General Conditions, Supplementary Conditions and the sections included under Division 1, General Requirements, are included as a part of this Section as though bound herein.

B. Refer to Division 01 for Alternates that may affect the Work of this Section.

1.04 SYSTEM DESCRIPTION

A. The communication room fittings products provide the basic structure for mounting and installation of communication equipment.

1.05 DESCRIPTION OF WORK

A. Provide labor, material, equipment, and accessories necessary for operation of a complete system. The contractor shall furnish the equipment, accessories, and necessary materials as shown on drawings and described herein..

1.06 QUALITY ASSURANCE

A. All components and equipment shall be listed by Underwriters Laboratories, Inc. for network use, and the components shall bear the UL label. The system shall be installed in accordance with requirements set by the 2017 National Electrical Code.

B. Installing contractor must have a minimum of 5 years experience in computer network cable installations and utilize data cable installation technicians.

C. The contractor shall employ on his staff at least one Registered Communications Distribution Designer (RCDD) registered with the Building Industries Consulting Services International (BICSI) or be certified by the manufacturer of the cable solution for both copper and fiber systems.

D. The contractor shall submit with his bid the name, registration number, and seal of the RCDD on the contractor's staff or provide certificates from manufacturer of the cable solution for both copper and fiber systems.

E. The RCDD or factory trained designer shall review all design documents including these bid Specifications and provide in writing with the contractors bid, certification of this review, and shall note any and all discrepancies that the RCDD believes are of material concern to the completion of a fully operating system.

F. The RCDD or factory trained designer shall certify the final installation in writing and provide written verification that he/she has inspected the completed installation and that the installation meets the terms and conditions of this Specification, design requirements of the BICSI 14th Edition TDMM (Telecommunications Distribution Methods Manual), and all EIA/TIA, NFPA, NEC, and all local codes and Specifications related to this work.

G. All design documents, submittals, as-built Drawings, test results, and other documentation provided by the contractor shall bear the name, registration number, and seal of the RCDD responsible for this bid.

1.07 ADMINISTRATIVE REQUIREMENTS

A. Refer to Division 1 Front-End documents for additional requirements.

1.08 SUBMITTALS

A. Prior to commencement of work.
   1. Shop Drawings -Refer to Section 01 3000 - Administrative Requirements, for submittal procedures.
      a. The contractor shall be responsible for furnishing engineering Drawings which indicate the interlocking of equipment and wiring external to the various patch panels. These Drawings shall be included in the submittal to the Architect/Engineer Technology Designer for approval.
      b. Complete and comprehensive shop Drawings shall be submitted to the Architect/Engineer Technology Designer for review.
      c. Provide a complete bill of materials with model and part numbers and reference to the Specification paragraph number.

B. Post Construction
   1. Operation & Maintenance Manuals
      a. Provide complete O & Ms. One hard copy and PDF format.
      b. Both formats shall be fully indexed with tabs by Section Name/System/Device.
   2. The Architect/Engineer Technology Designer may require operational demonstration of any products and systems to verify Execution/Installation/Configuration requirements are met.

1.09 WARRANTY

A. Components, parts, and assemblies supplied by the contractor/manufacturer shall be guaranteed against defects in materials and workmanship for a period of 20 years, commencing upon system start-up and beneficial use, provided such defects are not caused by a misuse, abuse, neglect, unauthorized tampering, equipment modifications, or acts of God. Warranty services shall be provided by the installer of the equipment manufacturer during normal working hours. The representative shall be based in a fully staffed branch office and located within a reasonable distance from the job site. An adequate supply of repair parts shall be maintained by the branch office. The manufacturer shall not be liable for consequential damages. The manufacturer's statement of warranty shall be included in the submittals.

1.10 ADDITIONAL REQUIREMENTS

A. Provide three copies of Record Drawings (As-builts) in addition to the requirements under Front-End requirements. Upon completion (with no more than a month after completion) of the project, the Record Drawings shall be submitted to the Architect/Engineer Technology Designer for approval.

PART 2 PRODUCTS

2.01 HORIZONTAL WIRE MANAGEMENT

A. Provide horizontal wire management in racks as indicated on the Drawings.

B. Horizontal cable manager shall be front & rear, 2RU with covers per Drawings. 19 in. rack system width.

C. Approved Manufacturers: Same manufacturer as racks.

2.02 HORIZONTAL POWER STRIPS (TWO POST AND WALL MOUNT RACKS)

A. Provide horizontal power strip on each rack. Mount power strip near midpoint in the rack plugged into the UPS Outlet. Power strip to be 12-14-outlets, NEMA 5-15R. Power strips to be equipped with a minimum 10' power cord and 20A circuit breaker. (Provide extension/adapters as required). Power strip shall be equipped with an AC current meter.
   1. Strip to be connected to output of Rack UPS
   2. Approved Manufacturers 20A Power Strip:
      a. Tripp-Lite PDUMH20
      b. APC AP7801B
      c. Cyberpower PDU20M2F10R

2.03 UNINTERRUPTIBLE POWER SUPPLIES (UPS)

A. Provide one (1) UPS per rack, 1500VA, RM-2U 120V online, 6 NEMA 5 -15R outputs, Rack Mount/Tower
   1. Approved Manufacturers:
      a. Vertiv-Liebert GXT5-1500LVRT2UXL
      b. Tripp Lite SMART1500RM2U
      c. APC SMT1500RM2UUC

B. Provide one (1) rack mounting kit per UPS.

C. Provide one - 10/100 Mbit Ethernet SNMP Kit of the same manufacturer as the UPS.

D. Provide one (1) environmental monitoring unit for one UPS in each Telecommunications Room to measure room temperature. Provide automated exception (over temperature) reporting through management software

E. Provide rack mount accessories for proper mounting in wall rack.

2.04 WALL MOUNT RACKS

A. Wall-mount cabinets manufactured from steel sheet. Non-seismic applications - Maximum equipment weight of 150 lb when secured to the structural wall with standard anchors.

B. EIA compliant 19" cabling wall mount rack with a useable depth of 25 inches.

C. Weight capacity shall be 150 lbs minimum.

D. Rack rail shall be constructed of 11-gauge steel with tapped 12-24 mounting holes in universal EIA spacing with black powder coat finish.

E. Rack shall be constructed to swing open for component cabling access, rail section shall pivot for either left or right opening.

F. Rack shall be UL Listed in the US and Canada to the UL-2416 (NWIN) Category when used with bonding kit.

G. Be manufactured by an ISO 9001 and ISO 14001 registered company.

H. Rack shall be warrantied to be free from defects in materials or workmanship under normal use and conditions for the lifetime of the rack.

I. Rack shall have 12RU of rack space and a usable depth of 24 inches.

J. Provide grounding and bonding kit and bond to the TMGB.

K. Provide heavy duty swing gate kit

L. Approved Manufactures

1. Basis of design: Chatsworth Products - 11790-X25
2. Equals by: Panduit PanZone, Middle Atlantic, Tripp Lite

PART 3 EXECUTION

3.01 INSTALLATION

A. Cable ties and tape are NOT permitted for permantly securing cable coils or supporting cabling in any way during installation on any indoor cabling.

B. Cable ties may only be used to secure cabling outdoors. Cable tie ends shall be cleanly cut with flush cutters.

C. Cables shall be bound with non-printed Velcro straps. Plenum rated Velcro must be used above ceiling.

D. Coordinate with HVAC contractor for hot/cold aisle configuration.

E. Coordinate with the 27 0526 Bonding and Grounding Contractor.

F. Coordinate with the electrical contractor for lighting/cable tray within racks, and AC outlets on racks and communication backboards.

G. It is the responsibility of this contractor to provide grounding and bonding of the technology rack system to comply with the BICSI guidelines in the BICSI 14th Edition TDMM (Telecommunications Distribution Methods Manual).

3.02 LABELING AND MARKING

A. Contractor shall follow the 2017 National Electrical Code and the ANSI/TIA/EIA-606-B Standard for labeling.

B. Contractor shall mark all racks with appropriate permanent printed adhesive labels approved by the Architect/Engineer Technology Designer in accordance with Owner's requirements and Drawings. In addition to adhesive labels, the jacks shall be color coded as directed.

C. Refer to T Drawings for approved rack, outlet & patch panel labeling scheme.
   1. Coordinate with CM and Owner so room numbers in labeling scheme match final room numbers.

3.03 GROUNDING AND BONDING

A. All systems installed under these contracts shall comply fully with ANSI/TIA 607-C or most recent revision at time of release of bid documents and the BICSI 14th Edition TDMM (Telecommunications Distribution Methods Manual) as they relate to bonding and grounding systems.

B. All bonding conductors and connectors shall be listed for the purpose intended and approved by a Nationally Recognized Testing Laboratory (NRTL).

C. All bonding conductors shall be insulated and copper. The minimum bonding conductor size shall be a No. 6 AWG. Refer to Drawings for details.

D. Bonding conductors should not be placed in ferrous metallic conduit. If it is necessary to place bonding conductors in ferrous metallic conduit, the conductors shall be bonded to each end of the conduit with a conductor sized as a No. 6 AWG, minimum.
   1. All metallic duct or sleeve banks shall be bonded together with No. 6 AWG bonding conductors if any sleeve or duct is a part of the bonding system.

E. Labels, Color-Coding, and Markings
   1. Each telecommunications bonding conductor shall be labeled. Labels shall be located on conductors as close as practicable (i.e., ease of access to read the label) to their point of termination. Labels shall be nonmetallic and include the information below:
      a. Far end Type Termination
         1) TBB-Room Number

2) TBC - Room Number

b. Near End (at Busbar) Type Termination

1) Rack Number for Telecommunications Racks

2. Refer to ANSI/TIA/EIA 606-B for additional labeling requirements.
3. Each telecommunications bonding conductor shall be marked appropriately by a distinctive green color.

F. It is the responsibility of this contractor to provide grounding and bonding of the technology rack system to comply with the BICSI guidelines in the BICSI 14th Edition TDMM (Telecommunications Distribution Methods Manual).

3.04 TRAINING

A. Provide as a part of this contract/bid a total of (2) two hours of on-site training and demonstration of the new system to the Owner's staff.

B. Demonstrate and explain:
1. Labeling Scheme
2. Product use and product features

END OF SECTION 27 11 00

SECTION 27 15 13
HORIZONTAL COMMUNICATIONS CABLING

PART 1 GENERAL

1.01 RELATED SECTIONS

A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1, General Requirements, are included as a part of this Section as though bound herein.

B. Refer to Section 01 2300 for Alternates that may affect the Work of this Section.

1.02 SECTION INCLUDES

A. Horizontal twisted pair copper cable

B. Jacks, cover plates, and associated components

C. Bonding & Grounding

1.03 RELATED DOCUMENTS

A. The provisions of the General Conditions, Supplementary Conditions and the sections included under Division 1, General Requirements, are included as a part of this Section as though bound herein.

B. Refer to Division 01 for Alternates that may affect the Work of this Section.

C. This Specification covers the following sections
   1. 27 1513 - Communications Copper Horizontal Cabling

1.04 SYSTEM DESCRIPTION

A. The Ethernet System shall be capable of supporting 10/100/1000Mbps full-duplex transmission via 4-pr. Category 6 cable. The system must comply with EIA/TIA 568-B-5 standard and 568B.1, B.2, B.3 requirements for color-coding.

B. The voice and data cabling system shall consist but not limited to the following:
   1. Category 6 UTP Cabling
   2. Patch Panels
   3. Modular Jacks
   4. Telecommunications Bonding and Grounding System

1.05 DESCRIPTION OF WORK

A. Provide labor, material, equipment, and accessories necessary for operation of a complete network system. The cabling contractor shall furnish the equipment, accessories, and necessary materials as described herein and system Drawings.

B. The Technology work for cabling shall include, but not limited to, the following:
   1. Provide all horizontal UTP, shielded cabling, and audio-visual cable.
   2. Provide copper patch panels.
   3. Provide modular jacks and cover plates for system.
   4. Provide and terminate cabling within each room and in the data racks.

C. The modular computer/data eight-position jack shall match the color code EIA-568B as follows:
   1. Pair 1: Pin 4 - Blue; Pin 5 - White/Blue
   2. Pair 2: Pin 1 - White/Orange; Pin 2 - Orange
   3. Pair 3: Pin 3 - White/Green; Pin 6 - Green
   4. Pair 4: Pin 7 - White/Brown; Pin 8 - Brown

1.06 QUALITY ASSURANCE

A. All cabling components and equipment shall be listed by Underwriters Laboratories, Inc. for network use, and the components shall bear the UL label. The system shall be installed in accordance with requirements set by the 2017 National Electrical Code.

B. Installing contractor must have a minimum of 5 years experience in computer network cable installations and utilize data cable installation technicians.

C. The contractor shall employ on his staff at least one Registered Communications Distribution Designer (RCDD) registered with the Building Industries Consulting Services International (BICSI) or be certified by the manufacturer of the cable solution for both copper and fiber systems.

D. The contractor shall submit with his bid the name, registration number, and seal of the RCDD on the contractor's staff or provide certificates from manufacturer of the cable solution for both copper and fiber systems.

E. The RCDD or factory trained designer shall review all design documents including these bid Specifications and provide in writing with the contractors bid, certification of this review, and shall note any and all discrepancies that the RCDD believes are of material concern to the completion of a fully operating system.

F. The RCDD or factory trained designer shall certify the final installation in writing and provide written verification that he/she has inspected the completed installation and that the installation meets the terms and conditions of this Specification, design requirements of the BICSI 14th Edition TDMM (Telecommunications Distribution Methods Manual), and all EIA/TIA, NFPA, NEC, and all local codes and Specifications related to this work.

G. All design documents, submittals, as-built Drawings, test results, and other documentation provided by the contractor shall bear the name, registration number, and seal of the RCDD responsible for this bid.

1.07 CERTIFICATION

A. The cabling contractor shall provide the services of a network cabling company and provide equipment listed by Underwriters Laboratories, Inc. The cabling contractor shall issue an equipment certification stating that the equipment and connected wiring and devices which form the specified system, together with installation have a 20-year Application Assurance Product Warranty for a Gigabit (Standard) and/or 10 Gigabit Ethernet Solution, and are in compliance with the requirements established by EIA/TIA 568, B.1, B.2, B.3, 569, and BICSI Standards.
   1. Category 6 Channel & Component Warranty

1.08 ADMINISTRATIVE REQUIREMENTS

A. Refer to Division 1 Front-End documents for additional requirements.

1.09 SUBMITTALS

A. Prior to commencement of work.
   1. Shop Drawings -Refer to Section 01 3000 - Administrative Requirements, for submittal procedures.
      a. The contractor shall be responsible for furnishing engineering Drawings which indicate the interlocking of equipment and wiring external to the various patch panels. These Drawings shall be included in the submittal to the Architect/Engineer Technology Designer for approval.
      b. Complete and comprehensive shop Drawings shall be submitted to the Architect/Engineer Technology Designer for review.
      c. Provide a complete bill of materials with model and part numbers and reference to the Specification paragraph number.
      d. The contractor shall submit a schematic of the proposed bonding and grounding system outlining connectivity, landing locations of conductors on busbars, and

components to be provided. Catalog cut sheets are required for busbars, bonding & grounding conductors, and all connectors (6 AWG & above) used in the bonding system to the Architect/Engineer Technology Designer for review.

2. Provide documentation of on-staff RCDD or verifiable manufacturer certification and conformance with all of Article 1.06 Quality Assurance.
3. Provide sample of weekly inspection log to be placed on the wall of each telecommunications space. Log to include inspection date, room condition, name of inspector, and action taken.

B. Post Construction
1. Contractor to submit training syllabus to the Architect/Engineer Technology Designer for approval at least two weeks prior to commencement of training sessions.
2. Provide a complete wiring diagram of the system. Typicals, and the like, will not be acceptable. Include 1/8 inch = 1'-0" scale Drawings of the system layout. These diagrams shall conform to Article 1.06 Quality Assurance.
3. Include three (3) printed copies of all test data for the cabling system. Also, provide two (2) CD ROMs/digital copies containing the test data with any utility programs that may be necessary to view the data.
4. Provide signed (by attendees & trainer) & dated training syllabus for each completed training session to the Architect's technology designer.
5. Operation & Maintenance Manuals
   a. Provide complete O & Ms. One hard copy and PDF format.
   b. Both formats shall be fully indexed with tabs by Section Name/System/Device.
6. The Architect/Engineer Technology Designer may require operational demonstration of any products and systems to verify Execution/Installation/Configuration requirements are met.

1.10 WARRANTY

A. Components, parts, and assemblies supplied by the cabling contractor/manufacturer shall be guaranteed against defects in materials and workmanship for a period of 15 years, commencing upon system start-up and beneficial use, provided such defects are not caused by a misuse, abuse, neglect, unauthorized tampering, equipment modifications, or acts of God. Warranty services shall be provided by the installer of the equipment manufacturer during normal working hours. The representative shall be based in a fully staffed branch office and located within a reasonable distance from the job site. An adequate supply of repair parts shall be maintained by the branch office. The manufacturer shall not be liable for consequential damages. The manufacturer's statement of warranty shall be included in the submittals.
   1. Category 6 Channel & Component Warranty

1.11 ADDITIONAL REQUIREMENTS

A. Provide three copies of Record Drawings (As-builts) in addition to the requirements under section 270510. Upon completion (with no more than a month after completion) of the project, the Record Drawings shall be submitted to the Architect/Engineer Technology Designer for approval.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The installation shall be an end to end solution utilizing the following approved manufacturers:
   1. Category 6 Cabling:
      a. ADC AMP/Tyco - TrueNet series Components
      b. Commscope - SYSTIMAX GigaSPEED CAT6
      c. Panduit - MiniCom, and TX6 Series Components
      d. Leviton/Remee - Extreme series

e. Hubbell - NEXTSPEED CAT 6 series components or Hubbell-Hitachi
f. Superior Essex - Superior Essex DataGain Cat6
g. Pangen -(includes General Cable) - PanGen 6 Enhanced
h. Berk-Tek/Leviton - LANmark 6

2. Note: Other combinations of approved termination and cabling manufacturers may be submitted provided all specifications, warranties, and drawing requirements are met

2.02 DATA CABLE

A. Approved Manufacturers: Refer to Article 2.01

B. Category 6 Cable
1. The computer/data cable shall be four twisted pair unshielded (UTP), 23 AWG, solid bare CU, FEP insulation for all 4 pairs to reduce skew (skew shall be less than 18 nsec). UL listed CMP with transmission characteristics that meet and exceed those of FCC-68/EIA/TIA, 568 and EIA/TIA TSB-155 performance(up to 37 meters) and NEMA low loss, extended frequency, jacket shall be sequentially marked at 2 foot intervals and must be plenum rated. UL listed 1459 and 1863. Pairs twisting must be maintained to meet the category 6 performance. Maximum category 6 untwisting allowed is one half (1/2) inches, cable diameter .30 inches or less.

C. All cable shall be plenum rated UNO.

D. For cable runs terminating in first floor floor boxes, provide wet location certified cabling from floor box to the nearest ceiling mounted consolidation point. Transition from wet location cabling to conventional plenum cabling from the consolidation point to the serving technology room.

E. Cable shall be component certified.

F. Standards:
1. Category 6 - Design bandwidth - 250 MHz cable bandwidth, standard data rate 1000 Mbps

G. Color Code
1. Pair #1 - White/Blue and Blue
2. Pair #2 - White/Orange and Orange
3. Pair #3 - White/Green and Green
4. Pair #4 - White/Brown and Brown

H. Testing Standard:
1. Category 6 - Cable to be tested using a Level-IIIe Cable Certification Unit.

2.03 COPPER PATCH PANELS

A. Provide 48 and/or 24 port 8P8C modular patch panels as required for termination of all UTP cables with front and back cable management.

B. Standards:
1. Category 6 - Patch panels must meet or exceed all transmission performance for Category 6 as outlined in EIA/TIA-568 C.2 and be component certified.

C. Each 8P8C jacks will be terminated with 4 pair of UTP wire and shall be wired to meet EIA/TIA 568B (color code).

D. Provide a rear-mounted strain relief bar on each patch panel.

E. For shielded patch patch panels - Patch Panel must be bonded to TMGB or TGB via direct connection or rack bonding mechanism (provided that rack is bonded with a 6 AWG conductor to the TMGB or TGB) with the maximum size conductor supported by the panel (6 AWG maximum, 12 AWG minimum)

F. Approved Manufacturers: Refer to Article 2.01

2.04 DATA JACKS

A. Provide a flush mounted, modular data jack 8P8C to fit in a two gang 3-1/2 inch deep box or floor box as shown on the Drawings and as specified herein.

B. Data jacks shall be 8-position configurations and shall meet all the transmission performance of cabling standards required.

C. Standards:
   1. Category 6 - The data jacks must be UL listed and must meet EIA/TIA 568 B.2.1, TSB-155 to 37 meters Category 6a channel requirements and be component certified.

D. The data jacks to be wired to EIA/TIA 568B (color code).

E. All terminations shall also terminate cable shields when shielded cabling is utilized.

F. Modular data jacks shall be mounted in modular wall plates for below ceiling jacks and one/two port surface mount boxes for above ceiling jacks.

G. Approved Manufacturers: Refer to Article 2.01

2.05 MODULAR WALL PLATES

A. Provide modular cover plates with number of modular data jack/telephone jacks as shown on the Drawings and as specified in this section.

B. Match color of Electrical cover plates.

C. Approved Manufacturers: Refer to Article 2.01

2.06 HORIZONTAL WIRE MANAGEMENT

A. Provide horizontal wire management in racks as indicated on the Drawings.

B. Horizontal cable manager shall be front & rear, 2RU per Drawings. 19 in. rack system width.

C. Approved Manufacturers: Same manufacturer as racks provided by section 27 1100 contractor.

D. Provide horizontal wire management in racks as indicated on the Drawings.

E. Horizontal cable manager shall be front & rear, 2RU per Drawings. 19 in. rack system width.

F. Approved Manufacturers: Same manufacturer as racks provided by section 27 1100 contractor.

PART 3 EXECUTION

3.01 CABLING TYPES

A. The facility shall incorporate a combination of shielded twisted pair (F/UTP) and unshielded twisted pair (UTP).

3.02 TWISTED PAIR CABLE (UTP & F/UTP)

A. The computer eight-position modular jack wiring Pin/Pair assignment shall match the EIA-568B as follows:
   1. Pair 1: Pin 4, Blue; Pin 5, White/Blue
   2. Pair 2: Pin 1, White/Orange; Pin 2, Orange
   3. Pair 3: Pin 3, White/Green; Pin 6, Green
   4. Pair 4: Pin 7, White/Brown; Pin 8, Brown

B. Termination of the Category 5e 6 and Category 6a F/UTP cabling shall consist of the following:
   1. The data outlet shall consist of 8P8C modular jacks. Each 8P8C jack will be terminated with 4 pairs of F/UTP wire as indicated above.
   2. Provide 24 and/or 48 port 8P8C patch panels as required by Drawings. Each 8P8C jack will be terminated with 4 pairs of UTP wire.
   3. Provide wire management in rack as indicated on the Drawings.

4. For shielded cables bond shield drain wire at patch panel end and patch panels to the existing rack busbar.

C. Maximum pulling force is 25 lbs or as recommended by the manufacturer.
   1. Pair 1: Pin 4, Blue; Pin 5, White/Blue
   2. Pair 4: Pin 7, White/Brown; Pin 8, Brown

D. Termination of the Category 5e 6 and Category 6a F/UTP cabling shall consist of the following:
   1. The data outlet shall consist of 8P8C modular jacks. Each 8P8C jack will be terminated with 4 pairs of F/UTP wire as indicated above.
   2. Provide 24 and/or 48 port 8P8C patch panels as required by Drawings. Each 8P8C jack will be terminated with 4 pairs of UTP wire.
   3. Provide wire management in rack as indicated on the Drawings.
   4. For shielded cables bond shield drain wire at patch panel end and patch panels to the existing rack busbar.

3.03 TESTING

A. The Contractor shall be responsible for testing each cable "end-to-end" at Architect/Engineer Technology Designer direction and verifying, in writing, that the cabling is in proper working condition. The Contractor is required to test the cable after its installation and to provide Architect/Engineer Technology Designer with written and test equipment generated documentation verifying test results. Each test results shall be labeled as it is in the field with the serving technology room number, patch panel number/letter and patch panel port number. The field test shall be for Category 5e (Standard), Category 6, or Category 6a standards/requirements.
   1. Category 6 - must meet ANSI/EIA/TIA 568 B.2.1, TSB-155 to 37 meters Category 6a channel requirements and be component certified.

B. All installation work shall be done in a neat, high quality manner and in conformity with local and federal building codes.

C. Cables shall be placed with sufficient bending radius so as not to kink, shear, or damage outer jacket. Any cables damaged from exceeding bend radius limits shall be replaced.

D. It is the responsibility of the Contractor to calculate all actual cable footage required.

E. Provide cable certification summary report for all test results on 8-1/2 by 11 sheets.

F. It is the responsibility or the contractor to verify the labeling at the faceplate while testing to ensure ALL work area outlets are labeled correctly. If it is found that more than 5% of the cables are incorrectly labeled the contractor will be required to retest ALL cabling and correct labeling.

G. Basic Link Testing
   1. Category 6 - Testing of all installed “Basic Links” shall be performed using a Level IIIe hand-held tester with latest software version and performed to the latest revision of TIA/EIA TSB-67, TIA/EIA TSB-155 to 100 meters, and ANSI/TIA/EIA-568-B.2-10. All reports shall be recorded and presented to the Owner before acceptance

H. Testing Standards:
   1. Category 6 - Testing of cabling shall be performed prior to system cut-over, 100 percent of the UTP horizontal and copper backbone pairs shall be tested for opens, shorts, polarity reversals, transposition and presence of AC voltage. UTP voice and data horizontal wiring pairs shall be tested to TIA/EIA 568B Addendums 1, 2 and TSB-67, TSB -155 to 37 meters, and TIA/EIA-568B.2-1 from the information outlet to the TC and from the TC to the information outlet. In addition, all assigned circuits shall be tested from the information outlet/building control device to the MDF. Correct grounded and reversed pairs. Examine open and shorted pairs to determine if problem is caused by improper termination. If termination is proper, tag bad pairs at both ends and note on termination sheets.

2. For all cables terminated with Field Terminable Plugs, a TIA-568-C.2, Clause C.5.2 compliant Patch Cord Test Adapter shall be utilized.
3. All reports shall be recorded and presented to the Architect/Engineer Technology Designer and Owner before acceptance.
4. If horizontal cable contains bad conductors, remove and replace cable.
5. Submit printout for each cable tested.
6. Submit a CD with test results and any program required to view results.

I. Where any portion of system does not meet the Specifications, correct deviation and repeat applicable testing at no additional cost to the Owner.

3.04 FIELD QUALITY CONTROL

A. Employ Job superintendent or project manager during the course of the installation to provide coordination of work of this Specification, of other trades, and provide technical information when requested by other trades.
1. This person shall be responsible for quality control during installation, equipment set-up, and testing.
2. This person shall attend both the technology kick-off meeting and subsequent progress meetings.

B. Installation personnel shall meet approved manufacturer's training and education requirements for implementation of extended warranty program.

C. Copies of BICSI Technician, Installer and Apprentice certifications and approved cabling systems warranty provider certificates for copper and fiber optic systems shall be available upon request, for primary and/or subcontract personnel.

D. Provide an Inspection of all tech rooms weekly and vacuum if needed once any permanent cabling termination is made.

E. Maintain weekly inspection log on the wall of each telecommunications space. Log to include inspection date, room condition, name of inspector, and action taken. Provide Log sample with product submittals.

3.05 CABLE PULLING AND INSTALLATION

A. The equipment racks shall be completely installed before any cables are pulled.

B. Cable rollers shall be used when pulling cable. Cable pulleys must be used when pulling cable around bends and corners of wire ways. Pulleys shall have a minimum diameter of 6 inches.

C. Cable rollers used for pulling in cable shall be mounted close to wire way supports and shall be placed at the beginning of the run and spaced every 25 feet along the run.

D. Contractor shall use basket grips wherever possible and exercise care while pulling cable as not to exceed the maximum allowable pulling strength of the cable. Break away swivels rated at no more than 300 lbs shall be utilized for all fiber pulls (or 10% below the cable's maximum installation tensile rating. Excessive fiber twisting (as determined by jacket labeling having rotated 360 degrees in less than 5 linear feet) shall be considered evidence that a swivel was not used and the entire section **must** be replaced.

E. Cable pathways outside of the cable tray must be supported by "J" hooks or an approved support for category cabling. "O" rings will not be acceptable. The distance between cabling supports shall not exceed 48".

F. Category cables, security/access control, and paging cables shall be separated from one another in the wire mesh cable tray at a minimum of 6" or by a physical barrier of the same manufacture as the cable tray.

G. Contractor shall economize on the use of cable by limiting excess length on runs to 6 inches at the jack/outlet (2'6" above ceiling) and 3 feet at the distribution panels (9 feet above rack).

H. Contractor shall take measures to avoid unsupported bundles of cables hanging over unprotected edges of cable trays etc. during all phases of construction.

I. No cable may be pulled between the holes of the wire mesh cable tray. Cables must exit over the top of the side rail of the cable tray.

J. Cables are not to be run through conduits or sleeves without bushings installed. Any cabling pulled through conduit or sleeves without bushings must be removed and a new cable pulled.

K. It is not recommended to install cabling in rooms where painting is incomplete. Cabling contractor is responsible to take protective measures to assure cabling is not painted. Any cable found to have paint must be replaced.

L. Cable installed in areas with exposed ceilings must be concealed within conduit. Technology rooms are the only exception.

M. Cable ties and tape are **NOT** permitted for securing cable coils or supporting cabling in any way during installation, be it temporary or permanent, on any indoor cabling.

N. Cable ties may only be used to secure cabling outdoors. Cable tie ends shall be cleanly cut with flush cutters.

O. Cables shall be bound with non-printed Velcro straps. Plenum rated Velcro must be used above ceiling.

3.06 LABELING AND MARKING

A. Contractor shall follow the 2017 National Electrical Code and the ANSI/TIA/EIA-606-B Standard for labeling.

B. Contractor shall mark all patch panels, jacks, cables, and cover plates with appropriate permanent printed adhesive labels approved by the Architect/Engineer Technology Designer in accordance with Owner's requirements and Drawings. In addition to adhesive labels, the jacks shall be color coded as directed.

C. Contractor shall install labels as follows:
   1. One label at each end of each cable at the end of the cable sheath, after stripping.
   2. One label on the inside of each outlet box (vacant), plus one label on the outside of each face plate in the space provided.
   3. One label at the end of each cable, where it enters the connector in back of the distribution panel, plus one label on the front of the distribution panel, plus one label on the front of the distribution panel centered below each associated cable connector.
   4. All markings shall be carefully done so as to present a neat, professional appearance.

D. Provide means to identify locations of above ceiling outlets (Wi-Fi and IP CCTV camera) from below the ceiling.

E. Refer to T Drawings for approved outlet & patch panel labeling scheme.
   1. Coordinate with CM and Owner so room numbers in labeling scheme match final room numbers.

F. It is the responsibility or the contractor to verify the labeling at the faceplate while testing to ensure ALL work area outlets are labeled correctly. If it is found that more than 5% of the cables are incorrectly labeled the contractor will be required to retest ALL cabling and correct labeling.

3.07 CABLE SEPARATION FROM POWER WIRING

A. Between the cabling system and any fluorescent, neon, incandescent, or high intensity discharge lamp fixtures, the minimum distance shall be 6 inches.

B. Cable may be installed closer to lighting and convenience outlet power cable (single phase, 120V, 20A maximum), in metal cable channels for limited distances if the following guidelines are observed:

1. Coincident (parallel) runs of no more than 15 feet are permissible if a 1 inch separation between the power cable and the cabling system cable is maintained by separators or suitable retention hardware. If necessary, the separation may be less than 1 inch for a run of up to 6 inches if no contact between the cabling system cable and the power cable occur.
2. Coincident runs of no more than 30 feet are permissible if a 2 inch separation is maintained. The separation may be less than 2 inches for a run of up to 12 inches, if no contact occurs between the cabling system cable and the power cable.

3.08 GROUNDING AND BONDING

A. All systems installed under these contracts shall comply fully with ANSI TIA J-STD-607-C, the most recent revision at time of release of bid documents and the BICSI 14th Edition TDMM (Telecommunications Distribution Methods Manual) as they relate to bonding and grounding systems.

B. All bonding conductors and connectors shall be listed for the purpose intended and approved by a Nationally Recognized Testing Laboratory (NRTL).

C. All bonding conductors shall be insulated and copper. The minimum bonding conductor size shall be a No. 6 AWG. Refer to Drawings for details.

D. Bonding conductors should not be placed in ferrous metallic conduit. If it is necessary to place bonding conductors in ferrous metallic conduit, the conductors shall be bonded to each end of the conduit with a conductor sized as a No. 6 AWG, minimum.
   1. All metallic duct or sleeve banks shall be bonded together with No. 6 AWG bonding conductors if any sleeve or duct is a part of the bonding system.

E. Labels, Color-Coding, and Markings
   1. Each telecommunications bonding conductor shall be labeled. Labels shall be located on conductors as close as practicable (i.e., ease of access to read the label) to their point of termination. Labels shall be nonmetallic.
   2. Refer to ANSI/TIA/EIA 606-B for additional labeling requirements.
   3. Each telecommunications bonding conductor shall be marked appropriately by a distinctive green color.

F. Primary Bonding Busbar (PBB)
   1. The Primary Bonding Busbar (PBB) serves as the dedicated extension of the building grounding electrode system for the telecommunications infrastructure. The PBB also serves as the central attachment point for Backbone Bonding Conductor (BBC) and equipment, and shall be located such that it is accessible to telecommunications personnel.
   2. Provide a PBB in Room
      a. The PBB shall:
         1) Be a predrilled copper busbar provided with standard BICSI bolt hole sizing and spacing for the type of connectors to be used, Be sized in accordance with the immediate requirements of the application and with consideration of future growth. Have minimum dimensions of 1/4inch thick x 4 inches wide and 24 inches in length. The busbar shall be electrotin plated for reduced contact resistance.
         2) Approved Manufacturers:
            (a) Erico TMGB - A24L33PTHarger TGBI14424TMGBPanduit GB4B1028TPI-1
            (b) Harger TGBI14424TMGB
            (c) Panduit GB4B1028TPI-1
      b. Bonding Conductor Connectors
         1) BBC and TBC conductors to utilize 2-hole compression type connectors with 7/16" holes, 1" apart (center to center). Use the last 7/16" hole to land the TBC.

Provide connectors, 3/8" stainless steel bolts, washers and locknuts to land connectors on the busbars.

2) Remaining bonding conductors, Building Steel Bonding conductor (if applicable), Rack bonding conductor, and TBC to utilize 2-hole compression type connectors with 5/16" holes, 5/8" apart (center to center). Provide connectors, 1/4" stainless steel bolts, washers, and locknuts to land connectors on the busbars.
3) Provide a Telecommunications Bonding Conductor (TBC) to the service equipment (power) ground.
4) Provide a Building Steel Bonding conductor (if applicable).

G. It is the responsibility of this contractor to provide grounding and bonding of the technology cabling system to comply with the BICSI guidelines in the BICSI 14th Edition TDMM (Telecommunications Distribution Methods Manual).

3.09 TRAINING

A. Provide as a part of this contract/bid a total of (4) four hours of on-site training and demonstration of the new system to the Owner's staff.

B. Demonstrate and explain:
1. Labeling Scheme
2. Bonding/Grounding methods for shielded horizontal cabling
3. Fundamentals of Structured Cabling (patch cable routing, patch cable selection, rules to maintain channel warranty, etc)

END OF SECTION 27 15 13

GARMANN MILLER

Division 31

Earthwork

SECTION 31 10 00
SITE CLEARING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Installation of erosion and sedimentation control devices, per Storm Water Pollution Prevention Plans.

B. Clearing of existing vegetation.

C. Removal of existing debris, footings and backstop

1.02 RELATED REQUIREMENTS

A. Section 01 11 00 - Summary of Work: Limitations on Contractor's use of site and premises.

B. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

C. Section 01 70 00 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products.

D. Section 02 41 00 - Demolition: Removal of built elements and utilities.

E. Section 31 22 00 - Grading: Topsoil removal.

F. Section 31 23 23 - Fill: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

1.04 PROJECT CONDITIONS

A. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

B. Comply with other requirements specified in Section 01 70 00.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fill Material: As specified in Section 31 23 23 - Fill and Backfill

PART 3 EXECUTION

3.01 SITE CLEARING

A. Comply with other requirements specified in Section 01 70 00.

B. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

3.02 EXISTING UTILITIES AND BUILT ELEMENTS

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Protect existing structures and other elements that are not to be removed.

3.03 VEGETATION

A. Scope: Remove trees, shrubs, brush, and stumps in areas to be covered by building structure, and paving.

B. Do not remove or damage vegetation beyond the limits indicated on drawings.

C. In areas where vegetation must be removed but no construction will occur, remove vegetation with minimum disturbance of the subsoil.

D. Vegetation Removed: Do not burn, bury, landfill, or leave on site, except as indicated.
   1. Chip, grind, crush, or shred vegetation for mulching, composting, or other purposes; preference should be given to on-site uses.
      a. Green wood is not to be used for mulch.
   2. Trees: Sell if marketable; if not, treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches.
   3. Existing Stumps: Treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches.
   4. Sod: Re-use on site if possible; otherwise sell if marketable, and if not, treat as specified for other vegetation removed.
   5. Fill holes left by removal of stumps and roots, using suitable fill material, with top surface neat in appearance and smooth enough not to constitute a hazard to pedestrians.
   6. Dead Wood: Remove all dead trees (standing or down), limbs, and dry brush on entire site; treat as specified for vegetation removed.

E. Restoration:
   1. If vegetation outside removal limits or within specified protective fences is damaged, or destroyed, due to subsequent construction operations, replace at no cost to Owner. This includes root damage due to poor protection fence or upkeep.
      a. Trees and vegetation will be considered dead when main leader has died back or when 25 percent or more of crown has died .
      b. Trees will be considered damaged and not able to reasonably survive when repeated neglect of protection is observed.
   2. If a tree is deemed damaged or dead by the owner's representative, a $500 per caliper inch of tree penalty will be assessed.

3.04 DEBRIS

A. Remove debris, old fence foundations, wooden backstop, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION 31 10 00

SECTION 31 22 00
GRADING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Removal of topsoil.

B. Rough grading the site for site improvements.

C. Topsoil testing, amendment and Finish grading.

1.02 RELATED REQUIREMENTS

A. Document: Geotechnical Engineering Investigation, provide by Koontz Bryant Johnson Williams Inc.

B. Section 31 10 00 - Site Clearing.

C. Section 31 23 16 - Excavation.

D. Section 31 23 23 - Fill: Filling and compaction.

E. Section 32 92 19 - Seeding: Finish ground cover.

1.03 SUBMITTALS

A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.04 QUALITY ASSURANCE

A. Perform Work in accordance with State of Ohio Highway Department, County, or municipality standards.
   1. Maintain one copy of standards on site in job trailer.

1.05 PROJECT CONDITIONS

A. Protect above- and below-grade utilities that remain.

B. Protect plants, lawns, and other features to remain as a portion of final landscaping.

C. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from grading equipment and vehicular traffic.

PART 2 PRODUCTS

2.01 MATERIALS

A. All Topsoil
   1. Graded.
   2. Free of roots, gravel overages, rocks larger than 3/4 inch, subsoil, debris, large weeds and foreign matter.
   3. Topsoil must be amended and conditioned to be capable of sustaining vigorous plant growth with acceptable macronutrient and micronutrient levels per soil test results as determined by ASTM D5268.
   4. Specific amendments will be based on soil test results and type of area as indicated on site and landscape plans.
   5. Soil shall have the following USDA particle size analysis. Sand, silt and clay shall be determined by ASTM D422
      a. Gravel: Plus 2mm. Less than 10%
      b. Sand: .05mm to .2mm. 15-40%
      c. Silt: .002 to .05mm. 25-65%
      d. Clay: minus .002mm. 20-35%

B. Soil Amendment Materials:

1. Amend topsoil based on recommendations of topsoil test. Amendments may include, but are not limited to:
    a. Peat Moss: Shredded, loose, sphagnum moss; free of lumps, roots, inorganic material or acidic materials; minimum of 85 percent organic material measured by oven dry weight, pH range of 4 to 5; moisture content of 30 percent.
    b. Composted Organic Material: Mature, stable humus-like material derived from aerobic decomposition. The compost shall be dark brown to black in color and capable of supporting plant growth.
        1) Carbon to Nitrogen ratio not to exceed 30 to 1.
        2) Leaf-litter and yard waste sources only.
        3) Biosolid sources are unacceptable.
        4) Sources from EPA approved compost facility
        5) Most recent compost lab test results furnished to Landscape Architect prior to use as a soil amendment.
        6) Screened to three quarter inch.
    c. Carbon-Based Soil Conditioner: Site One/Lesco Carbon Pro G or equal, minimum 47% carbon derived from pyrolyzed hardwood biochar, mycorrhizae fungi package derived from *Bacillus* spp.
    d. Lime: Ground limestone, dolomite type, minimum 108 calcium carbonate equivalent percent carbonates; or Ground limestone, calcitic type, minimum 100 calcium carbonate equivalent percent carbonates.
    e. Elemental Sulfur: Tiger-Sul Turf Blend or equal, 90% elemental sulfur

C. Other Fill Materials: See Section 31 23 23.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

B. Verify the absence of standing or ponding water.

C. Verify all SWPPP sedimentation controls are in place downslope prior to stripping topsoil.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Stake and flag locations of known utilities.

C. Protect from damage above- and below-grade utilities to remain.

D. Notify utility company to remove and relocate utilities.

E. Provide temporary means and methods to remove all standing or ponding water from areas prior to grading.

F. Protect site features to remain, including but not limited to bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs, from damage by grading equipment and vehicular traffic.

G. Amend topsoil as indicated in the Topsoil Test Report as noted below in Soil Amendments.

3.03 ROUGH GRADING

A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.

B. Do not remove topsoil when wet.

C. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.

D. Do not remove wet subsoil , unless it is subsequently processed to obtain optimum moisture content.

E. When excavating through roots, perform work by hand and cut roots with sharp axe.

F. Grade areas adjacent to building to drain away from structures and to prevent ponding.

G. See Section 31 23 23 for filling procedures.

H. Benching Slopes: Horizontally bench existing slopes greater than 1:4 to key fill material to slope for firm bearing.

I. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

J. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack surface water control.

3.04 SOIL REMOVAL AND STOCKPILING

A. Stockpile topsoil to be re-used on site; remove remainder from site.

B. Stockpile subsoil to be re-used on site; remove remainder from site.

C. Stockpiles:
   1. Stockpile without intermixing soil types
   2. Use areas designated on the site
      a. Stockpile soil material away from edges of excavations
      b. Do not place stockpiles within the drip line of trees to remain.
   3. Pile depth not to exceed 8 feet
   4. Place, grade and shape stockpiles to drain surface water.
   5. Protect from erosion (wind and water). Stabilize with temporary vegetation or tarps.

3.05 GENERAL SURFACE GRADING

A. Uniformly grade areas within project limits including adjacent transition areas.
   1. Smooth finish surface within specified tolerances, grade in uniform levels or slopes between points where elevations are shown and between points and existing grades.
   2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

3.06 FINISH GRADING

A. Before Finish Grading:
   1. Verify trench backfilling have been inspected.
   2. Verify subgrade has been contoured and compacted.

B. Remove debris, roots, branches, stones, in excess of 3/4 inch in size. Remove soil contaminated with petroleum products.

C. Where topsoil is to be placed, scarify or till surface to depth of 3 inches.
   1. In areas where vehicles, equipment, material laydown or stockpiling have compacted the soil, scarify or till surface to a minimum depth of 6". Areas shall be identified by field marking and/or mapping prior to scarifying or tilling. Landscape Architect or Owner Representative shall verify locations prior to commencing work.

D. Pulverize and place topsoil where required to level finish grade.

E. Pulverize and place topsoil to the following compacted thicknesses:
   1. Areas to be Seeded with Grass: 6 inches.

F. Place topsoil during dry weather.

G. Remove roots, weeds, rocks, and foreign material while spreading.

H. Near site improvements and existing vegetation spread topsoil manually to prevent damage.

I. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.

J. Lightly compact placed topsoil.

K. Maintain stability of topsoil during inclement weather. Replace topsoil in areas where surface water has eroded thickness below specifications.

3.07 SOIL AMENDMENTS

A. Common Areas
   1. Carbon-Based Soil Conditioner:
      a. Using a properly calibrated rotary spreader, apply at a rate of 10 pounds per one thousand square feet over the topsoil prior to finish grading.
      b. Using a power rake, Harley Rake, or approved equal equipment, incorporate the material to a minimum depth of 2 inches in two directions.
      c. Place and incorporate manually near site improvements to avoid damage to amenities, sidewalks, curbs, parking lots, or buildings.
      d. Maximum use rate of 10 pounds per one thousand square feet.
   2. Fertilizer:
      a. Using a properly calibrated rotary spreader, apply recommended fertilizer at rates indicated by approved recommendations based on soil test report.
      b. Complete application after finish grading.
      c. Maximum use rate of 1.5 pounds of nitrogen, phosphorus, and potassium per one thousand square feet.
   3. Lime:
      a. Using a properly calibrated rotary spreader, apply recommended fertilizer at rates indicated by approved recommendations based on soil test report.
      b. Maximum use rate of 25 pounds of calcitic or dolomitic lime per one thousand square feet.
      c. Complete a minimum of 14 days prior to seeding or sodding turfgrass
   4. Elemental Sulfur:
      a. Using a properly calibrated rotary spreader, apply recommended fertilizer at rates indicated by approved recommendations based on soil test report.
      b. Maximum use rate of 5 pounds per one thousand square feet.
      c. Complete a minimum of 14 days prior to seeding or sodding turfgrass.

3.08 TOLERANCES

A. Top Surface of Subgrade: Plus or minus 0.10 foot (1-3/16 inches) from required elevation.

B. Top Surface of Finish Grade: Plus or minus 3/4 inch from required elevation.

3.09 REPAIR AND RESTORATION

A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition.

B. Trees to Remain: If damaged due to this work the contractor will hire an arborist to trim broken branches and repair bark wounds; if root damage has occurred, obtain instructions from Landscape Architect as to remedy.

C. Other Existing Vegetation to Remain: If damaged due to this work, replace with vegetation of equivalent species and size.

3.10 FIELD QUALITY CONTROL

A. See Section 31 23 23 for compaction density testing.

B. Furnish records of soil amendments applied as part of O & M.

C. Final inspection on levelness of finish grade subject to Landscape Architect approval prior to seeding or sodding. Contractor responsible to meet finish grades per contract documents.

3.11 CLEANING

A. Remove unused stockpiled topsoil and subsoil. Grade stockpile area to prevent standing water.

B. Leave site clean and raked, ready to receive landscaping.

END OF SECTION 31 22 00

SECTION 31 23 16
EXCAVATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Excavating for building volume below grade, footings, slabs-on-grade, paving, site structures, and dewatering.

B. Trenching for utilities

C. Dewatering

1.02 RELATED REQUIREMENTS

A. Section 01 4000 - Quality Requirements

B. Section 31 10 00 - Site Clearing: Vegetation and existing debris removal.

C. Section 31 22 00 - Grading: Grading.

D. Section 31 23 23 - Fill: Fill materials, backfilling, and compacting.

1.03 DEFINITIONS

A. Excavation: Removal of material encountered required for building volume below grade, footings, slab-on-grade, paving, utility trenches, etc.

B. Additional Excavation: Excavation below required excavation as directed by the Architect. Additional excavation and replacement material will be paid for according to the Contract provisions for changes in the work.

C. Unauthorized Excavation: Excavation below required excavation or beyond required excavation without direction of the Architect. Unauthorized excavation and remedial work directed by the Architect shall be without additional compensation.

1.04 QUALITY ASSURANCE

A. Code and Standards: Perform work complying with requirements of authorities having jurisdiction

B. Testing and Inspection: A qualified independent geotechnical engineering testing agency shall classify proposed on-site borrow soils to verify that soils comply with specified requirements and to perform required field and laboratory testing.

1.05 PROJECT CONDITIONS

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

B. Protect plants, lawns, and other features to remain.

C. Protect bench marks, survey control points, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the work are as indicated.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. See Section 31 10 00 for clearing, grubbing, and removal of existing debris.

C. See Section 31 22 00 for topsoil removal.

D. Protect utilities that remain and protect from damage.

E. Grade top perimeter of excavation to prevent surface water from draining into excavation. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by Owner's Representative.

3.03 DEWATERING

A. Prevent surface water and ground water from entering excavations and from flooding project site and surrounding area.

B. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings and soil changes detrimental to stability of subgrades and foundations.
   1. Provide and maintain pumps, sumps, suction and discharge lines and other dewatering systems necessary to convey water away from excavations.

3.04 EXCAVATING

A. General
   1. Explosives: Do not use explosives
   2. Underpin adjacent structures that could be damaged by excavating work.
   3. Excavate to accommodate new structures and construction operations.
   4. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
   5. Comply with local codes, ordinances, and requirements of authorities having jurisdiction to maintain stable excavations.
   6. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.
   7. Do not interfere with 45 degree bearing splay of foundations.
   8. Cut utility trenches wide enough to allow inspection of installed utilities.
   9. Hand trim excavations. Remove loose matter.
   10. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section 31 23 23.
   11. Provide temporary means and methods, as required, to remove all water from excavations until directed by Architect. Remove and replace soils deemed suitable by classification and which are excessively moist due to lack of dewatering or surface water control.
   12. Determine the prevailing groundwater level prior to excavation. If the proposed excavation extends less than 1 foot into the prevailing groundwater, control groundwater intrusion with perimeter drains routed to sump pumps, or as directed by the Architect. If the proposed excavation extends more than 1 foot into the excavation, control groundwater intrusion with a comprehensive dewatering procedures, or as directed by the Geotechnical Engineer.
   13. Remove excavated material that is unsuitable for re-use from site.
   14. Stockpile excavated material to be re-used in area designated on site 31 22 00.
   15. Remove excess excavated material from site.

B. Excavation for structures:
   1. Excavate to indicated elevations and dimensions within a tolerance of plus or minus one (1) inch. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction.
      a. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave a solid base to receive other work.

C. Excavation for walks and pavements:
   1. Excavate surfaces under walks and pavements to indicated cross sections, elevations and grades.

D. Excavation for trenches:

1. Cut utility trenches wide enough to allow inspection of installed utilities.
2. Excavate trenches to indicated gradients, lines, depths and elevations. Beyond building perimeter keep bottoms of trenches sufficiently below grade to avoid freezing.
3. Excavate trenches to uniform width to provide working clearance on each side of pipe or conduit. Provide 12 inches clearance on each side
4. If bedding course is not called for, excavated and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints and barrels of pipes and for joints, fittings and bodies of conduits. Remove stones and sharp objects to avoid point loading.
    a. For pipe and conduits less than 6 inches in nominal diameter and flat bottom multi-duct conduit lines excavate to indicated depths and support pipe and conduit on an undisturbed subgrade.

3.05 FIELD QUALITY CONTROL

A. See Section 01 43 00 - Quality Assurance, for general requirements for field inspection and testing.

B. Provide a test to verify required design bearing capacities at each strata of soil on which footings will be placed.

C. Provide a minimum of three (3) test for each building

D. Provide for visual inspection of load-bearing excavated surfaces by Owner's Representative before placement of foundations.

3.06 PROTECTION

A. Divert surface flow from rains or water discharges from the excavation.

B. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.

C. Protect open excavations from rainfall, runoff, freezing groundwater, or excessive drying so as to maintain foundation subgrade in satisfactory, undisturbed condition.

D. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

E. Keep excavations free of standing water and completely free of water during concrete placement.

F. Repair and re-establish grades to specified tolerances where completed surfaces become eroded, rutted, settled or lose compaction due to subsequent construction operations or weather conditions.

END OF SECTION 31 23 16

SECTION 31 23 23
FILL

PART 1 GENERAL

1.01 SECTION INCLUDES

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

B. Backfilling and compacting for utilities outside the building to utility main connections.

C. Proof rolling of building areas, drives and parking areas.

1.02 RELATED REQUIREMENTS

A. Document: Geotechnical Engineering Investigation, provide by Koontz Bryant Johnson Williams Inc.

B. Section 01 4000 - Quality Requirements

C. Section 31 22 00 - Grading: Site grading.

D. Section 31 23 16 - Excavation: Removal and handling of soil to be re-used.

E. Section 32 1123 - Aggregate Base and Surfacing

1.03 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

B. Subgrade Elevations: The uppermost surface of an excavation, the top of surface of a fill or backfill, immediately below subbase, drainage fill, or topsoil materials.

C. Borrow: Soil material obtained off-site when sufficient approved soil material is not available from excavations.

D. Bedding Course: Layer placed over excavated subgrade in a trench before laying pipe.

1.04 REFERENCE STANDARDS

A. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses; 1965 (2004).

B. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop; 2025.

C. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2014.

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

E. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method; 2024.

F. 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.

G. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2015.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used, including manufactured fill.

C. Compaction Density Test Reports.

1.06 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

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

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. General Fill: Subsoil excavated on-site and imported if required.
   1. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
   2. Excavated material subject to the approval by representative of the soils testing agency.

B. Structural Fill: Subsoil excavated on-site imported if required
   1. Fill to not contain more than 3 percent by weight of organic matter, waste construction debris, or other deleterious materials.
   2. Non-expansive materials must be used.
   3. Standard Proctor Maximum Density Greater than 100 pounds per cubic foot and Atterburg Liquid Limit less than 40, and a plasticity index of less than 20.
   4. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
   5. Excavated material subject to the approval by representative of the soils testing agency.

C. Engineered Fill: Subsoil excavated on-site and imported borrow if required.
   1. Silty-clayey soils or bankrun sand and gravel
   2. Fill to not contain more than 3 percent by weight of organic matter, waste construction debris, or other deleterious materials.
   3. Non-expansive materials must be used.
   4. Standard Proctor Maximum Density Greater than 100 pounds per cubic foot and Atterburg Liquid Limit less than 40, and a plasticity index of less than 20.
   5. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
   6. Excavated material subject to the approval by representative of the soils testing agency.

D. Concrete for Fill: Lean concrete.
   1. Ready-mixed concrete
   2. Compressive strength 1500 psi at 28 days

E. Flowable Fill:
   1. Mix design shall have an unconfined compressive strength according to ASTM D4832.
   2. Mix design shall generally conform to the following:
      a. Type 1 for pipe trench backfill
         1) Cement: 50 lbs/cu yd
         2) Fly Ash: 250 lbs/cu yd
         3) Fine Aggregate: 2910 lbs/cu yd
         4) Water: 500 lbs/cu yd
         5) Entrained Air: 0%
      b. Type 2 for backfill under structures
         1) Cement: 50 - 100 lbs/cu yd
         2) Fly Ash: 0 lbs/cu yd
         3) Fine Aggregate: 2420 lbs/cu yd
         4) Water: 210-300 lbs/cu yd
         5) Entrained Air: 5% plus or minus 1 1/2 %
   3. Mixes shall conform to the requirements of ACI 229 for Controlled Low Strength Material.
   4. Mixes shall be flowable.
   5. Flowable fill shall be ready-mixed concrete.

F. Granular Fill - Gravel : Angular crushed washed stone; free of shale, clay, friable material and debris.
   1. Graded in accordance with ASTM C136/C136M, within the following limits:
      a. 2 inch sieve: 100 percent passing.
      b. No. 200: 5 to 10 percent passing.

G. Drainage Fill:
   1. # 56 or # 57 in accordance with the Ohio Department of Transportation Construction and Material Specifications
   2. Drainage fill shall be clean and washed gravel

H. Sand: Conforming in accordance with Ohio Department of Transportation Construction and Material Specifications

I. Topsoil: See Section 31 22 00.

2.02 SOURCE QUALITY CONTROL

A. See Section 01 43 00 - Quality Assurance, for general requirements for testing and analysis of soil material.

B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.

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

D. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Identify required lines, levels, contours, and datum locations.

B. See Section 31 22 00 for additional requirements.

C. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.

D. Verify structural ability of unsupported walls to support imposed loads by the fill.

E. Verify areas to be filled are not compromised with surface or ground water.

3.02 PREPARATION

A. After topsoil has been stripped proof roll areas to be occupied by the new paved surfaces and site improvements using a medium weight roller. A representative of the soils testing agency shall be present during proof rolling.

B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.

C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

3.03 DEWATERING

A. Prevent surface water and ground water from entering excavations and from flooding project site and surrounding area.

B. Protect subgrade from softening, washout, undermining and damage.
   1. Provide and maintain pumps, sumps, suction and discharge lines and other dewatering systems necessary to convey water away from excavations.

3.04 FILLING

A. Fill to contours and elevations indicated using unfrozen materials.

B. Fill up to subgrade elevations unless otherwise indicated.

C. Fill placement shall extend beyond the limits of the proposed building and paved areas a minimum horizontal distance equal to the height of fill or 5 feet whichever is greater.

D. Employ a placement method that does not disturb or damage other work.

E. Maintain optimum moisture content of fill materials to attain required compaction density.
   1. Moisture reduction options:
      a. Disking and drying soil.
      b. Addition of lime or by-product lime modification. Modification procedure to follow the guidelines of ODOT Item 205 using a lime by-product or similar material capable of reducing the moisture content of moist soils. Testing agency to evaluate compatibility of materials and modification procedures.

F. Granular Fill: Place and compact materials in equal continuous layers not exceeding 8 inches compacted depth.

G. Soil Fill: Place and compact material in equal continuous layers not exceeding 8 inches compacted depth.

H. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

I. Correct areas that are over-excavated.
   1. Load-bearing foundation surfaces: Use structural fill, flush to required elevation, compacted to 100 percent of maximum dry density.
   2. Other areas: Use general fill, flush to required elevation, compacted to minimum 97 percent of maximum dry density.

J. Compaction Density Unless Otherwise Specified or Indicated:
   1. Under paving, slabs-on-grade, and similar construction: 97 percent of maximum dry density.
   2. At load bearing foundations: 100 percent of maximum dry density.
   3. At other locations: 90 percent of maximum dry density.

K. Reshape and re-compact fills subjected to vehicular traffic.

L. Maintain temporary means and methods, as required, to remove all water while fill is being placed as required, or until directed by the Architect. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

3.05 FILL AT SPECIFIC LOCATIONS

A. Use general fill unless otherwise specified or indicated.

B. Under load bearing footings and foundations
   1. Use Engineered Fill or Structural Fill
   2. Fill up to subgrade elevations.
   3. Maximum depth per lift: 8 inches, compacted.
   4. Compact to minimum 100 percent of maximum dry density.

C. At Foundation Walls:
   1. Use general fill.
   2. Fill up to subgrade elevation.
   3. Maximum depth per lift: 8 inches compacted.
   4. Compact each lift to 95 percent of maximum dry density.
   5. Do not backfill against unsupported foundation walls.
   6. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.

D. Over Buried Utility Piping, Conduits, and Duct Bank in Trenche

1. Bedding: Use sand or Drainage Fill
2. Haunching: Use sand fill. Haunching fill up to spring line of pipe
3. Initial Backfill: Use granular fill. Initial backfill up to 12 inches above the pipe
4. Cover with:
    a. Exterior lawn areas: General Fill
    b. Within building area: Granular Fill
    c. Within building area where trench is within 18 inches of column or footing and below bottom of footing:
        1) Wrap pipe with one inch of fiberglass blanket and Concrete Fill or Flowable to bottom of footing
        2) Above Concrete Fill: Granular Fill or Flowable Fill
    d. Under paving and walks: Granular Fill or Flowable Fill
5. Fill up to subgrade elevation.
6. Compact in maximum 6 inch lifts to 95 percent of maximum dry density.

E. Below aggregate base of asphalt drives, parking areas:
1. Use Engineered Fill or Structural Fill up to bottom of aggregate base as specified in Section - 32 1123
2. Maximum depth per lift: 6 inches of loose material.
3. Compact each lift to 100 percent of Standard proctor maximum dry density as determined by ASTM Designation D698.

F. Under Portland Cement Concrete Paving:
1. Use Engineered Fill or Structural Fill up to bottom of Drainage fill.
    a. Maximum depth per lift: 6 inches of loose material.
    b. Compact each lift to 100 percent of Standard proctor maximum dry density as determined by ASTM Designation D698.
2. Place 4 inches of Drainage Fill.
    a. Compact to 100 percent of Standard proctor maximum dry density as determined by ASTM Designation D698.

G. At Lawn Areas:
1. Use general fill.
2. Fill up to 6 inches below finish grade elevations.
3. Compact to 95 percent of maximum dry density.
4. See Section 31 22 00 for topsoil placement.

3.06 TOLERANCES

A. Top Surface of General Filling: Plus or minus 1 inch from required elevations.

B. Top Surface of Filling Under Paved Areas: Plus or minus 1 inch from required elevations.

3.07 FIELD QUALITY CONTROL

A. See Section 01 43 00 - Quality Assurance, for general requirements for field inspection and testing.

B. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167, ASTM D2922, or ASTM D3017.

C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with AASHTO T 180, AASHTO T 180, or AASHTO T 180.

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

3.08 PROTECTION

A. Protected newly filled areas from traffic, freezing and erosion. Keep free of trash and debris.

B. Repair and re-establish filled areas to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or loses compaction due to subsequent construction operations or weather conditions.
   1. Remove and replace material to depth directed by the Architect, reshape and recompact at optimum moisture content to the required density.

C. Settling: Where settling occurs during the project warranty period, remove finish surface, backfill with additional approved material compact and reconstruct surfacing.
   1. Restore appearance, quality, and condition of finished surfacing to match adjacent work and eliminate the evidence of restoration to the greatest extent possible.

3.09 CLEANING

A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.

B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION 31 23 23

GARMANN MILLER

Division 32

Exterior Improvements

SECTION 32 11 23
AGGREGATE BASE AND SURFACING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aggregate base course.

B. Aggregate Surfacing

1.02 RELATED REQUIREMENTS

A. Section 31 22 00 - Grading: Preparation of site for base course.

B. Section 31 23 23 - Fill: Compacted fill under base course.

C. Section 32 13 13 - Concrete Paving: Finish concrete surface course.

D. Section 31 23 23 - Fill: Topsoil fill at areas adjacent to aggregate base course.

1.03 REFERENCE STANDARDS

A. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses; 1965 (2004).

B. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop; 2025.

C. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2014.

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

E. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method; 2024.

F. 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.

G. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2015.

H. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on weed barrier

C. Materials Sources: Submit name of imported materials source.

1.05 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. Aggregate Storage, General:
   1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
   2. Prevent contamination.
   3. Protect stockpiles from erosion and deterioration of materials.

C. Verify that survey bench marks and intended elevations for the Work are as indicated.

PART 2 PRODUCTS

2.01 MATERIALS

A. Aggregate: Coarse aggregate, conforming to Ohio Department of Transportation (ODOT) Construction and Material Specifications, Item 304

B. AASHTO #57 Stone: Open-graded, self-compacting (angular) aggregate blend of size 5, 6 & 7 stone, graded in accordance with the following limits:
   1. 1 1/2" screen: 100% passing
   2. 1" screen: 95-100% passing
   3. 1/2" screen: 25-80% passing
   4. screen #4: 0-10% passing
   5. screen #8: 0-5% passing

C. Use of Reclaimed Base:
   1. Contractor may use a blend of new material in combination with reclaimed aggregate material.
   2. Material subject to the approval by representative of the testing agency.

D. Recyclable Aggregate: Concrete and masonry products from on site demolition:
   1. Remove reinforcing and separate to salvaged metals.
   2. Remove brick and clay masonry.
   3. Crush concrete and masonry waste to less than 1 1/2 inch in each direction.
   4. Crush concrete and masonry waste with at least four (4) parts of specified aggregate for each part of concrete waste.
   5. Material subject to the approval by representative of the testing agency.

E. Concrete Waste Disposal as Aggregate Material: Dispose of clean hardened concrete waste by crushing and mixing with aggregate as aggregate is placed.
   1. Remove reinforcing and separate to salvaged metals
   2. Crush concrete waste to less than 1 1/2 inch in each direction.
   3. Crush concrete waste with at least four (4) parts of specified aggregate for each part of concrete waste.
   4. Material subject to the approval by representative of the testing agency.

F. Masonry Disposal as Aggregate Material: Dispose of clean concrete masonry waste by crushing and mixing with aggregate as aggregate is placed. Comply with the requirements of the testing agency.
   1. Remove reinforcing and separate to salvaged metals.
   2. Remove brick and clay masonry.
   3. Crush concrete masonry waste to less than 1 1/2 inch in each direction.
   4. Crush concrete masonry waste with at least four (4) parts of specified aggregate for each part of concrete waste.
   5. Material subject to the approval by representative of the testing agency.

G. Filter Fabric:
   1. Professional Grade 100% spunbonded polypropylene with UV inhibitors
   2. Manufacturer:
      a. Product: Typar Professional Landscape Fabric by Reemay Inc. www.typarlandscape.com
      b. Other Acceptable Manufacturers:
         1) B.11 Groundcover Fabric by US Global Resources, Seattle WA. www.usgr.com
         2) Gintec Black Groundcover by Gintec Shade Technologies Inc., www.gintec-shade.com
         3) Substitutions: See Section 01 6000 - Product Requirements.

2.02 SOURCE QUALITY CONTROL

A. See Section 01 43 00 - Quality Assurance, for general requirements for testing and analysis of aggregate materials.

B. Where aggregate materials are specified using ASTM D2487 classification, test and analyze samples for compliance before delivery to site.

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

D. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench marks and intended elevations for the work are as indicated.

B. Verify substrate has been inspected, gradients and elevations are correct, and is dry.

3.02 PREPARATION

A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.

B. Do not place aggregate on soft, muddy, or frozen surfaces.

3.03 INSTALLATION

A. Under Portland Cement Concrete Paving:
   1. Place course aggregate to a compacted thickness as shown on drawings.
   2. Compact to 95 percent of maximum dry density.

B. Aggregate Surfacing:
   1. Place weed barrier on subsoil
   2. Place coarse aggregate to a total compacted thickness of 8 inches.
   3. 8 inches minimum thickness if not called out otherwise
   4. Compact to 95 percent of maximum dry density.

C. Place aggregate in maximum 4 inch layers and roller compact to specified density.

D. Level and contour surfaces to elevations and gradients indicated.

E. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.

F. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

G. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.04 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.

B. Scheduled Compacted Thickness: Within 1/4 inch.

C. Variation From Design Elevation: Within 1/2 inch.

3.05 FIELD QUALITY CONTROL

A. See Section 01 43 00 - Quality Assurance, for general requirements for field inspection and testing.

B. Compaction density testing will be performed on compacted aggregate base course in accordance with ASTM D1556, ASTM D2167, or ASTM D6938.

C. Results will be evaluated in relation to compaction curve determined by testing uncompacted material in accordance with AASHTO T 180, ASTM D698 ("standard Proctor"), or ASTM D1557 ("modified Proctor").

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

E. Proof roll compacted aggregate at surfaces that will be under slabs-on-grade and paving.

3.06 CLEANING

A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION 32 11 23

SECTION 32 13 13
CONCRETE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete paving, sidewalks.

1.02 RELATED REQUIREMENTS

A. Section 31 22 00 - Grading

B. Section 31 23 23 - Fill

C. Section 32 11 23 - Aggregate Base Courses

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 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000.

D. ACI 305R - Hot Weather Concreting; 2010.

E. ACI 306R - Cold Weather Concreting; 2010.

F. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.

G. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2015a.

H. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.

I. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.

J. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2013.

K. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2013).

L. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2004a (Reapproved 2013).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on joint filler, admixtures, and curing compound.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301.

B. Obtain cementitious materials from same source throughout.

C. Follow recommendations of ACI 305R when concreting during hot weather.

D. Follow recommendations of ACI 306R when concreting during cold weather.

E. Installer Qualifications: Installer with minimum three years experience in similar projects.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

PART 2 PRODUCTS

2.01 PAVING ASSEMBLIES

A. Comply with applicable requirements of ACI 301.

B. Pedestrian Concrete: 4,000 psi 28 day concrete, 4 inches thick. light broom finish.

2.02 FORM MATERIALS

A. Form Materials: As specified in Section 03 10 00, comply with ACI 301.

B. Joint Filler: Preformed; non-extruding bituminous type (ASTM D1751) or sponge rubber or cork (ASTM D1752).
   1. Thickness: 1/2 inch.

2.03 CONCRETE MATERIALS

A. Obtain cementitious materials from same source throughout.

B. Cement: ASTM C 150, Type I - Normal portland type, grey color.
   1. Acquire all cement for entire project from same source.

C. Supplementary Cementitious Materials:
   1. Fly Ash: ASTM C618, Type C or F may be used up to a maximum of 25% of the total cementitious materials content in all concrete mixes, unless otherwise noted.
   2. Ground Granulated Blast-Furnace Slag: ASTM C989, Grade 100 or 120 maybe used up to a maximum of 35% of the total cementitious material content in all concrete mixes, unless otherwise noted.
   3. The exact percentages shall be used on a successful test placement on the project site

D. Fine and Coarse Aggregates:
   1. ASTM C33, Class 3S, normal weight aggregates, uniformly graded, non-exceeding 1-1/2 inch nominal size.
   2. ASTM C330, light weight aggregates.
   3. Combined aggregate gradation for slabs shall be 8%-18% for large top size aggregate (1 1/2") or 8 - 22% for smaller top size aggregates (1" of 3/4") retained on each sieve below the top size and above the No. 100.
   4. Aggregate Supply: Provide aggregate from one source of supply to maintain uniformity of color size and shape.

E. Water: Clean and not detrimental to concrete.
   1. ASTM C94

F. Air-Entraining Admixtures: ASTM C260/C260M.
   1. Acceptable Manufacturers:
      a. Air-Mix or Perma-Air, Euclid Chemical.
      b. Sealtight AEA WR Meadows, Inc.
      c. Darex AEA or Daravair, WR Grace Company.
      d. Axim Italcmenti Group.
      e. Promix.
      f. Substitutions: See Section 01 60 00 - Product Requirements.

G. Chemical Admixtures: ASTM C494/C494M, Type A - Water Reducing.
   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 C 309, Type 1, Class A.
   1. Clear waterborne membrane-forming curing compound.
      a. Day Chem Rez Cure: Dayton Superior Corporation
      b. Diamond Clear Vox: Euclid Chemical Co.

c. Safe-Cure Clear; Chem Masters

B. Bonding Compound: Polyvinyl acetate or acrylic base complying with ASTM C 1059, type II.

C. Epoxy Adhesive: ASTM C881

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 Architect for preparing and reporting proposed mix designs.

C. Admixtures:
   1. Use of admixtures: Admixtures, except air entraining mixture, are not allowed except with permission of Architect.
   2. 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 with a tolerance of plus 1 - 1/2 percent with the following limits:
      a. Concrete structures and slabs exposed to freezing and thawing, deicer chemicals, or hydraulic pressure(all above grade):
         1) 6.0 percent(severe exposure) 3/4 inch max. aggregate
         2) Other concrete (not exposed to freezing, thawing, or hydraulic pressure or to receive a surface hardener: 2 percent to 4 percent air
   3. NO calcium chloride will be permitted.

D. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.

E. Normal Weight Concrete:
   1. Compressive Strength, per ASTM C 39 at 28 days: As scheduled.
   2. Water-Cement Ratio: Provide concrete for following conditions with maximum water-cement (W/C) ratios as follows:
      a. Subjected to deicer/watertight and freezing and thawing: W/C 0.45.
      b. Subjected to brackish water, salt spray, or deicer: W/C 0.40
   3. Slump Limits: Proportion and mixes to result in concrete slump a point of placement as follows:
      a. Slump limit for concrete containing high-range water reducing admixture (superplasticizers): Not more than 8 inches after adding admixture to site-verified 2 to 3 inch slump concrete.
      b. Ramps, slabs and sloping surfaces: Not more than 4 inches.
      c. Reinforced foundation systems: Not less than 1 inch and not more than 4 inches.
      d. Other concrete: Not less than 1 inch, not more than 4 inches.

2.06 MIXING

A. Transit Mixers: Comply with ASTM C94/C94M.
   1. When air temperature is between 85 degrees F and 90 degrees F, reduce mixing and delivery time from 1 1/2 hour to 75 minutes, and when air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.
   2. Use set retarding admixtures during hot weather only when approved by Owner's Representative.

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 32 11 23 for construction of base course for work of this Section.

3.03 PREPARATION

A. Moisten base to minimize absorption of water from fresh concrete.

B. Coat surfaces of manhole and catch basin frames with oil to prevent bond with concrete pavement.

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.

3.05 PLACING CONCRETE

A. Before placing concrete, inspect, and complete formwork installation, reinforcing steel, and install items to be embedded or cast in. Notify other trades to permit installation of their work.
   1. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.

B. Moisten subbase to provide a uniform dampened condition at the time concrete is placed.

C. Place concrete in accordance with ACI 304R.

D. Ensure reinforcement, inserts, embedded parts, formed joints are not disturbed during concrete placement.

E. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

F. Consolidate concrete by mechanical vibrating equipment supplemented by rodding or tamping. Use equipment and procedures to consolidate concrete complying with ACI 309R.

3.06 JOINTS

A. General: Construct contraction, construction and isolation joints true to line with faces perpendicular to surface plan of concrete. Construct transverse joints at right angles to the centerline, unless otherwise indicated.
   1. Align curb, gutter, and sidewalk joints.
   2. When joining existing paving, place transverse joints to align with previously placed joints, unless indicated otherwise

B. Construction Joint: Set construction joints at side and end termination of paving at locations where paving operations are stopped unless paving terminates at isolation joints.
   1. Continue reinforcement across construction joints unless otherwise indicated.

C. Expansion Joints:
   1. Place 1/2 inch wide expansion joints at 20 foot intervals unless otherwise indicated on drawings and to separate paving from vertical surfaces and other components and in pattern indicated.
   2. Form joints with joint filler extending from bottom of pavement to within 1/2 inch of finished surface.
   3. Furnish joint fillers in one-piece lengths for full width being placed wherever possible. Where more than one length is required lace or clip joint filler sections together.
   4. Secure to resist movement by wet concrete.

D. Contraction Joints: Provide weakened-plane contraction joints, section concrete into areas as shown on Drawings. Construct contraction joints for a depth of 1/4 of the concrete thickness.
   1. Inserts: Form contraction joints by inserting premolded plastic, hardboard, or fiber strips into fresh concrete until top surface of strip is flush with concrete. Radius each joint edge with a jointer tool. Carefully remove strips after concrete has hardened. Clean groove of loose debris.
   2. Provide joints at five (5) feet intervals if not indicated.

E. Saw cut contraction joints 3/16 inch wide at an optimum time after finishing. Cut 1/3 into depth of slab.

3.07 FINISHING

A. Nonslip Broom Finish (Ns-Brm-FN): Apply nonslip broom finish to exterior concrete platforms, steps, walks, curbs, gutters and ramps.
   1. Immediately after float finishing, slightly roughen concrete by brooming with fiber bristle broom, perpendicular to main traffic route unless otherwise indicated on drawing.

B. Area Paving: Light broom, texture perpendicular to pavement direction unless otherwise indicated on drawings.

C. Sidewalk Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius unless otherwise indicated on drawing.

D. Curbs and Gutters: Light broom, texture parallel to pavement direction.

E. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.08 TOLERANCES

A. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.

B. Maximum Variation From True Position: 1/4 inch.

3.09 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 43 00 - Quality Assurance.

B. The owner will employ services of an independent testing agency to perform specified testing and inspections

C. Provide free access to concrete operations at project site and cooperate with appointed firm.

D. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.

E. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.

F. Compressive Strength Tests: ASTM C 39. For each test, mold and cure three concrete test cylinders. Obtain test samples for every 50 cu yd or less of each class of concrete placed in a day or for each 3000 square feet of surface area placed..
   1. Cure specimens on job site under same conditions at concrete it represents
   2. Test one specimen at 7 days
   3. Test one specimen at 28 days
   4. Retain one specimen in reserve for later testing if required.

G. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

H. Slump: ASTM C 143, one test for each concrete load at point of discharge, and one for each set of compressive strength test specimens.

3.10 DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to Owner's Representative and Contractor within 24 hours of test.

B. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

C. Repair or replacement of defective concrete will be determined by the Owner's Representative. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

3.11 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

B. Do not permit pedestrian or vehicular traffic over pavement until 75 percent design strength of concrete has been achieved.

END OF SECTION 32 13 13

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. Manual gates with related hardware.

E. Accessories.

F. Cantilever sliding gates

1.02 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

C. ASTM A392 - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric; 2011a (Reapproved 2022).

D. ASTM A428/A428M - Standard Test Method for Weight (Mass) of Coating on Aluminum-Coated Iron or Steel Articles; 2010 (Reapproved 2014).

E. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2014.

F. ASTM F567 - Standard Practice for Installation of Chain-Link Fence; 2023.

G. ASTM F668 - Standard Specification for Polyvinyl Chloride (PVC), Polyolefin and Other Polymer-Coated Steel Chain Link Fence Fabric; 2017 (Reapproved 2022).

H. ASTM F1043 - Standard Specification for Strength and Protective Coatings on Steel Industrial Fence Framework; 2014.

I. CLFMI CLF-FIG0111 - Field Inspection Guide; 2014.

J. CLFMI CLF-SFR0111 - Security Fencing Recommendations; 2014.

K. CLFMI CLF 2445 - Product Manual; 1997.

1.03 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. See CLFMI CLF-SFR0111 for planning and design recommendations.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

B. Fence Installer: Company with demonstrated successful experience installing similar projects and products, with not less than five years of documented experience.

C. Comply with Chain Link Fence Manufacturers Institute “Product Manual”.

1.05 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Chain Link Fences and Gates:
   1. Allied Fence
   2. Master-Halco, Inc: www.masterhalco.com/#sle.
   3. Merchants Metals: www.merchantsmetals.com/#sle.
   4. Reeves Southeastern Corp.; Product Hot Dipped Galvanized.: www.reevesse.com.
   5. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS

A. Posts, Rails, and Frames:

B. Black vinyl coated steel.

C. Concrete: Comply with Section 03 3000 Cast-in-Place Concrete.
   1. Footing: Concrete is to extend a minimum 6 inches below bottom of post with weep provided. Typical footing size as follows:
      a. Intermediate posts: minimum 12 inch diameter by 3'-6" below grade.
      b. End, corner, pull posts 6 feet and lower: minimum 14 inch diameter by 3'-6" below grade.
      c. Gate posts 6 feet wide leaf and smaller: minimum 14 inch diameter by 4'-6" below grade.
      d. Intermediate posts, end, corner, pull posts at wind screen fence: minimum 16 inch diameter by 3'-6" below grade.

2.03 COMPONENTS

A. Framework:
   1. under 10'-0" high fence
      a. Line Posts: 2.38 inch diameter with .154 inch wall thickness
      b. Corner and Terminal Posts: 2.88 inch diameter with .203 inch wall thickness.
   2. 10'-0" high fence and over.
      a. Line Posts: 4.0 inch diameter with .226 inch wall thickness
      b. Corner and Terminal Posts: 4.0 inch diameter with .226 inch wall thickness.
      c. Gate post: 4-1/2 inch diameter.
   3. Gate Post: The following sizes for single swing gates or on leaf of double gate:
      a. Gate leaf up to 6 feet wide:
         1) Schedule 40, 2.875 inch diameter with .203 inch wall thickness
      b. Gate leaf over 6' wide:
         1) Schedule 40, 4 inch diameter with .226 inch wall thickness
   4. Top and Brace Rail: 1.66 inch diameter with .140 wall thickness, plain end, sleeve coupled.
   5. Bottom Rail: 1.66 inch diameter, plain end, sleeve coupled.
   6. Gate Frame: 1.66 inch diameter for welded fabrication.
      a. Install pipe bracing as required to prevent gate from sagging.

B. Fabric:
   1. General
      a. 2 inch diamond mesh interwoven
      b. Wire: 9 gage
      c. Selvage:

1) Top: Knuckle
2) Bottom: Knuckle

d. Black vinyl coated.

2. Tension Wire: 6 gage, 0.1920 inch thick steel, single strand.
   a. Connectors: 12-1/2 gauge aluminum coated steel clips or 'Hog Rings' (11 gauge)
   b. Spacing: Note to exceed 18 inches
3. Tension Band (Bar): 3/16 inch thick steel by 5/8 inch wide and 1 inch less than full height of fabric.
4. Tension Strap: 0.11 inch thick steel by 1 inch wide.
   a. Spacing: One for each foot in height
   b. Connection: 3/8 inch diameter carriage bolts
5. Tie Wire: Aluminum alloy steel wire, 9 gage.
   a. Spacing:
      1) Intermediate Post: Not to exceed 14 inches
      2) Top Rail: Not to exceed 24 inches

2.04 MANUAL GATES AND RELATED HARDWARE

A. Hardware for Single Swinging Gates: 180 degree hinges, 2 for gates up to 60 inches high, 3 for taller gates; fork latch with gravity drop and padlock hasp; keeper to hold gate in fully open position.

B. Hardware for Double Swinging Gates: 180 degree hinges, 2 for gates up to 60 inches high, 3 for taller gates; drop bolt on inactive leaf engaging socket stop set in concrete, active leaf latched to inactive leaf preventing raising of drop bolt, padlock hasp; keepers to hold gate in fully open position.

C. Hinges: Finished to match fence components.
   1. Brackets: Round.
   2. Mounting: Center.
   3. Closing: Manual.

D. Latches: Finished to match fence components.
   1. Brackets: Round.
   2. Locking: Mechanical.

2.05 CANTILEVER SLIDE GATES

A. Match existing on site.

B. Provide locking mechanism to match existing on site.

2.06 ACCESSORIES

A. Caps: Cast steel galvanized; sized to post diameter, set screw retainer.

B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; steel.

2.07 FINISHES

A. Components and Fabric: Vinyl coated over coating of 1.8 ounces per square foot galvanizing.

B. Color(s): Black.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Verify that areas are clear of obstructions or debris.

3.02 INSTALLATION

A. Install framework, fabric, accessories and gates in accordance with ASTM F567.

B. Place fabric on outside of posts and rails at football/track.

C. Set intermediate, terminal, and gate posts plumb, in concrete footers with top of footing 4" below grade .

D. Line Post Footing Depth Below Finish Grade: ASTM F 567.

E. Corner, Gate and Terminal Post Footing Depth Below Finish Grade: ASTM F 567.

F. Brace each gate and corner post to adjacent line post with horizontal center brace rail. Install brace rail one bay from end and gate posts.

G. Provide top rail through line post tops and splice with 6 inch long rail sleeves.

H. Install center brace rail on corner gate leaves.

I. Do not stretch fabric until concrete foundation has cured 28 days.

J. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.

K. Position bottom of fabric 2 inches above finished grade at football/track.

L. Position bottom of fabric 1/2 inch above finished grade at tennis court.

M. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.

N. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.

O. Install bottom tension wire stretched taut between terminal posts.

P. Do not attach the hinged side of gate to building wall; provide gate posts.

Q. Install hardware and gate with fabric to match fence.

R. Provide concrete center drop to footing depth and drop rod retainers at center of double gate openings.

3.03 CANTILEVER GATE INSTALLATION

A. Install according to manufacturer's instructions and in accordance with ASTM F567.

B. Gates shall be plum in the closed position, installed to slide with an initial pull force no greater than 40 lbs. (18.14 kg). Ground clearance shall be 3 in. (76 mm)

C. Installed to slide with an initial pull force no greater than 40 lbs. (18.14 kg).

D. Ground clearance shall be 3 in. (76 mm)

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch.

B. Maximum Offset From True Position: 1 inch.

C. Do not infringe on adjacent property lines.

3.05 FIELD QUALITY CONTROL

A. See Section for Quality Assurance, for additional requirements.

B. Layout: Verify that fence installation markings are accurate to design, paying attention to gate locations, underground utilities, and property lines.

C. Post Settings: Randomly inspect three locations against design for:
   1. Hole diameter.
   2. Hole depth.
   3. Hole spacing.

D. Gates: Inspect for level, plumb, and alignment.

E. Workmanship: Verify neat installation free of defects. See CLFMI CLF-FIG0111 for field inspection guidance.

3.06 CLEANING

A. Leave immediate work area neat at end of each work day.

B. Clean jobsite of excess materials; remove excess excavation material.

C. Clean fence with mild household detergent and clean water rinse well.

D. Remove mortar from exposed posts and other fencing material using a 10 percent solution of muriatic acid followed immediately by several rinses with clean water.

E. Touch up scratched surfaces using materials recommended by manufacturer. Match touched-up paint color to factory-applied finish.

END OF SECTION 32 31 13

SECTION 32 92 19
SEEDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Confirmation and evaluation of topsoil and grading by others.

B. Finish grading of topsoil

C. Seeding, mulching and fertilizer.

D. Maintenance.

1.02 RELATED REQUIREMENTS

A. Section 31 22 00 - Grading: Topsoil material.

1.03 DEFINITIONS

A. Weeds: Include, but not limited to, Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Seed Certification: Contractor to provide documentation that seed is blue tag certified or contains blue tag varieties. Indicate minimum purity and germination rates for each.

C. Seeding Schedule: Indicate dates for proposed seeding and existing lawn restoration. Correlate with specified maintenance periods.

D. Maintenance Data: Include maintenance instructions, cutting method and maximum grass height; types, application frequency, and recommended coverage of fertilizer .

1.05 REGULATORY REQUIREMENTS

A. Comply with regulatory agencies for fertilizer and herbicide composition.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in seeding with three (3) years experience of similar size projects.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable. Deliver seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.08 PROJECT CONDITIONS

A. Utilities: Determine location of underground utilities and perform work in a manner that will avoid possible damage. Hand excavate, as required. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned. Note overhead lines for safety purposes.

B. Fine Grading: When conditions detrimental to seed growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Contractor and Landscape Architect before commencing work.

C. Provide topsoil as required to complete work

1.09 SEQUENCING AND SCHEDULING

A. Permitted seeding time: Seeding shall be performed from April 1 to May 15, or from August 15 to September 30. When permitted in writing by the Landscape Architect, seeding may be performed outside of these limitations.

B. Notify Owner's Representative at least 72 hours prior to seeding to verify project conditions.

C. Coordination with planting: If planting of trees and shrubs is scheduled after lawn work, protect lawn areas and promptly repair damage to lawns resulting from planting operations.

1.10 WARRANTY

A. Warrant lawns through specified lawn maintenance period to be a smooth and thick lawn, free of weeds, ruts and eroded/bare areas larger than 8" square.

PART 2 PRODUCTS

2.01 SEED MIXTURE

A. Common Areas
   1. Turf Type Tall Fescue: 80% percent.
      a. Provide equal portions of three to four varieties that have been evaluated by NTEP within the last 5 years and was rated within the first group of Least Significant Difference (LSD) in mean Turfgrass Quality.
      b. Seed Growers: Mountain View Seeds, Landmark Turf and Native Seed, DLF Pickseed, Seed Research of Oregon.
   2. Perennial Ryegass: 10% percent.
      a. Provide equal portions of variety that has been evaluated by NTEP within the last 5 years and was rated within the first group of Least Significant Difference (LSD) in mean Turfgrass Quality.
      b. Seed Growers: Mountain View Seeds, Landmark Turf and Native Seed, DLF Pickseed, Seed Research of Oregon.
   3. Kentucky Bluegrass: 10% percent.
      a. Provide equal portions of one variety that has been evaluated by NTEP within the last 5 years and was rated within the first group of Least Significant Difference (LSD) in mean Turfgrass Quality.
      b. Seed Growers: Mountain View Seeds, Landmark Turf and Native Seed, DLF Pickseed, Seed Research of Oregon.

2.02 SOIL MATERIALS

A. Topsoil: Excavated from site, see Section 31 2200 Grading.

2.03 ACCESSORIES

A. Mulching Material:
   1. Paper or Cellulose Mulch, made from recycled newsprint, applied at a rate between 1000 - 1200 pounds per acre.
   2. Pelletized Mulch, composed of 20% recycled wood and 80% recycled paper, applied at 1100 to 1300 pounds per acre.
   3. Combination Mulch, made from a mixture of wood and paper mulch.
   4. Bonded Fiber Matrix
   5. Oat or wheat straw, crimped, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.

B. Fertilizer: as indicated in analysis;or to the following or equal proportions
   1. Nitrogen: **[19]** percent.
   2. Phosphoric Acid: **[19]** percent.

3. Soluble Potash: 19 percent

C. Water: Clean, fresh and free of substances or matter that could inhibit vigorous growth of grass.
   1. Contractor shall furnish necessary equipment attachments and accessories for adequate irrigation of seeded areas.

D. Erosion Fabric: Jute matting, open weave.

E. Pre-Plant Herbicide: Syngenta Tenacity or equal.

F. Erosion Hydromulch: Profile Products Flexterra HP-FGM.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that prepared soil base is ready to receive the work of this Section.

B. Examine areas to receive lawns and grass for compliance with requirements and other conditions affecting performance.

C. Proceed with installation only after unsatisfactory conditions have been corrected

D. Ensure SWPPP plan is adhered to and any areas with potential erosion issues are noted in the pre-planting coordination meeting with the Landscape Architect. Any issues noted shall be corrected as soon as is practicable prior to seeding.

E. Coordinate work with Landscape Contractor.

3.02 PREPARATION

A. Prepare subgrade in accordance with Section 31 22 00.

B. Place topsoil in accordance with Section 31 22 00.

C. Establish lines for seeding, sod, and planting bed prior to seeding. Identify areas to receive different seed mixes (Prime, Common, Utility, Detention Basin, Sports Turf).

D. Remove all debris, roots, branches, and stones in excess of 1 inch.

E. Uniformly grade areas within project limits including adjacent transition areas.
   1. Smooth finish surface within specified tolerances, grade in uniform levels or slopes between points where elevations are shown and between points and existing grades. Roll and rake, remove ridges, and fill depressions to meet finish grades.
   2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
   3. Provide additional topsoil if required
   4. Tolerances
      a. Top Surface of Finish Grade: Plus or minus the following inches from required elevation over 25 feet in any direction.
         1) Common: 3/4 inch

3.03 FERTILIZING

A. Apply fertilizer Apply fertilizer in accordance with recommendations based on stockpile and placed soil test results; or at a minimum rate of [0.5 pounds Nitrogen, 0.5 pounds Phosphorus, 0.5 pounds Potassium per thousand square feet].

B. Apply after smooth raking of topsoil and prior to roller compaction.

C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.

D. Lightly water to aid the dissipation of fertilizer.

3.04 GENERAL SEEDING

A. Equipment

1. Primary Seeding on Prime, Common, Utility, and Sports Turf Areas
    a. Vredo, TurfCo, Brillon, Land Pride or Approved Equal
2. Hydroseeding on Common, Utility and Detention Basin Areas
    a. Finn, Kincaid, Epic Manufacturing or Approved Equal

B. Method – General Seeding
1. Apply seed in two directions on a 30-degree angle at a rate equal to one-half the full seeding rate in each direction.
2. Seed shall have no greater than 1/8" soil cover for optimum germination.
3. Roll seed bed with tow-behind roller less than one ton in weight. Hand tamp bed and sidewalk edges as needed.
4. Apply Syngenta Tenacity herbicide or an approved equal with the active ingredient of mesotrione (40% active ingredient) at a rate of 5 fluid ounces per acre.
5. Install erosion control materials as specified on the site plan.
    a. 70/30 wood fiber hydromulch at 2,000 pounds per acre
    b. Profile Products Flexterra HP at 3,000 pounds per acre or higher based on manufacturer's recommendations for slope gradient
    c. Do Not Use straw

C. Seeding Rates
1. Seed shall be applied by a properly calibrated primary or hydroseeding apparatus at a rate noted below per thousand square feet
    a. Common Areas: 10 pounds;
2. Apply seed evenly in two intersecting directions (passes) at 30-degree angles.
3. Do not seed areas in excess of that which can be mulched on same day.
4. Seed blends or mixtures with coated or treated seed shall be seeded at the specified rate multiplied times 1.5 during the spring, summer, and dormant seeding windows.
5. Seed blends or mixtures planted during the dormant seeding window shall be seeded at the specified rate multiplied times 1.25. If using coated or treated seed, additional multiplier must also be used.

D. Planting Season
1. Spring Seeding: April 1st to May 15th
2. Fall Seeding: August 21st to October 15th
3. Dormant Seeding: August 21st to December 31st

E. Do not sow immediately following rain, when ground is too dry, or during windy periods.

F. Using caution to protect grades and other plant material, roll seeded area with roller not exceeding 2000 lbs.

G. Apply water with a fine spray immediately after each area has been mulched. Saturate to 2 inches of soil.

H. Following germination, immediately re-seed areas without germinated seeds that are larger than 8 by 8 inches until such time as the area achieves 95 percent coverage of desirable turfgrass with no more than 5 percent weeds and/or bare areas.

3.05 HYDROSEEDING

A. Mix seed specified, fertilizer, and pulverized mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.

B. Apply slurry uniformly to all areas to be seeded. Rate of application as required to obtain specified seed sowing rate as noted above.

C. Apply water with a fine spray immediately after each area has been mulched. Saturate to 2 inches of soil.

D. Following germination, immediately re-seed areas without germinated seeds that are larger than 8 by 8 inchesuntil such time as the area achieves 95 percent coverage of desirable turfgrass with no more than 5 percent weeds and/or bare areas.

3.06 RECONDITIONING EXISTING LAWNS

A. Recondition existing lawn areas damaged or left unmanaged by Contractor's operations including, but not limited to, storage of materials and equipment and movement of vehicles. Also recondition existing lawn areas where minor regrading, filling of low spots and removal of humps, is required for a smooth, level lawn.

B. Remove diseased and unsatisfactory lawn areas; do not bury into soil. Remove topsoil containing foreign materials resulting from construction, including but not limited to, oil drippings, stone, gravel or other loose materials.

C. Using a lawn aerator, aerate the soil to disrupt a minimum of 3 percent of the surface area at a minimum depth of 3 inches.

D. Remove weeds by hand or with a selective chemical weed killer as required.

E. Mow lawn short (1-1.5") and slice seed at a rate of 50 percent of the specified seeding rate based on location of lawn area. Bare spots should be treated at the rate recommended for new seeding. After seed is deposited, top dress the lawn/seed area with compost to lightly cover the seed and water in well.

F. Discourage foot traffic and keep soil moist until seed germination.
   1. Prime Areas: Install snow fence around the perimeter of the area to discourage foot traffic and keep soil moist until seed germination.

3.07 REPAIR AND RESTORATION

A. Contractor to maintain the original grades of the slopes after commencement of planting operations and during the maintenance period. Damage to the finished surface shall be promptly repaired. In the event erosion occurs from rainfall or other causes such damage shall be promptly repaired after each occurrance during the maintenance period and documented through field reports submitted to Owner and Architect . Ruts, ridges, tracks, and other surface irregularities shall be corrected and areas replanted where required prior to final acceptance by Landscape Architect. Utilize straw bales or wattles to mitigate water eroding slopes, protect area until establishment then remove or move down to establish additional areas.

B. Plant Materials: If damaged due to this work, replace with vegetation of equivalent species and size.

3.08 MAINTENANCE

A. Provide maintenance at no extra cost to Owner; Owner will pay for water.

B. See Section 01 70 00 - Execution Requirements, for additional requirements relating to maintenance service.

C. Maintain seeded areas immediately after placement until grass is well established and exhibits a vigorous growing condition, but not less than the following periods:
   1. Seeded lawns: Until the date of Final Acceptance by Landscape Architect or as long as may be necessary to produce a uniform stand of grass.
      a. When full maintenance period has not elapsed before the end of the growing season, or if the lawn is not fully established, the maintenence period shall continue into the next growing season

D. For the purpose of establishing an acceptable standard, scattered bare spots, none of which is larger than 8 inches by 8 inches, will be allowed up to a maximum of 5 percent of the lawn area. Areas not meeting this requirement will be reseeded on an ongoing basis until this performance standard has been achieved.

E. Mow grass at regular intervals to maintain at a maximum height of 3 inches. Do not cut more than 1/3 of grass blade at any one mowing.

F. Neatly trim edges and hand clip where necessary.

G. Immediately remove clippings after mowing and trimming.

H. Water to prevent grass and soil from drying out.

I. Roll surface to remove minor depressions or irregularities.

J. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.

K. Immediately reseed areas that show bare spots.

L. Protect seeded areas with warning signs during maintenance period.

END OF SECTION 32 92 19

SECTION 32 93 00
PLANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. New plants.

B. Mulch and Fertilizer.

C. Maintenance.

1.02 RELATED REQUIREMENTS

A. Section 31 22 00 - Grading: Topsoil storage.

B. Section 31 23 23 - Fill: Topsoil material.

C. Section 32 9219 - Seeding

1.03 DEFINITIONS

A. Weeds: Include but not limited to, Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

B. Plants: Living trees, plants, and ground cover specified in this Section , and described in ANSI Z60.1.

1.04 REFERENCE STANDARDS

A. ANSI/AHIA Z60.2 - American Standard for Nursery Stock; 2025.

B. ANSI A300 Part 1 - American National Standard for Tree Care Operations -- Tree, Shrub and Other Woody Plant Maintenance -- Standard Practices; 2008.

C. NAA (STDS) - Pruning Standards for Shade Trees; National Arborist Association; current edition.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Convene a meeting two weeks before starting planting to discuss coordination, planting details and topsoil acceptance
   1. Require attendance by personnel responsible for grading and installers of planting, seeding and adjacent work
   2. Include representatives of Contractor.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Maintenance Data: Include cutting and trimming recommendations for plants, owner should be encouraged to not prune plants unless necessary; types, application frequency, and recommended coverage of fertilizer .

C. Submit list of plant life sources.

1.07 QUALITY ASSURANCE

A. Nursery Qualifications: Company specializing in growing and cultivating the plants with three years documented experience.

B. Installer Qualifications: Company specializing in installing and planting the plants with three (3) years experience of similar size projects,

C. Plants shall conform to names indicated on the drawings and plant list and to the nomenclature listed in the American Joint Committee on Horticultural Nomenclature' s 'Standardized Plant Names", latest edition.

D. Size, quality, handling, planting and maintenance of plant materials shall be in accordance with "American Standard of Nursery Stock", American Nursery & Landscape Association. Minimum acceptable sizes of plants, measured before pruning with branches in normal position, shall conform to measurements specified in the plant list.

E. Maintenance Services: Performed by installer.

1.08 REGULATORY REQUIREMENTS

A. Comply with regulatory agencies for fertilizer and herbicide composition.

B. Provide certificate of compliance from authority having jurisdiction indicating approval of plants, fertilizer and herbicide mixture.

C. Plant Materials: Certified by federal department of agriculture; free of disease or hazardous insects.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

B. Prepare, transport and handle plants to ensure protection against injury. Cover all plants while transporting to and from the site.

C. Deliver plants with legible waterproof identification labels.

D. Deliver plant life materials immediately prior to placement.
   1. Plants shall remain on the site of the work no longer than three days prior to being planted or placed in storage.
   2. The earth balls shall be kept moist and their solidity carefully preserved. To prevent drying out or freezing, store plants in a compact group with a suitable mulch material placed around and between the balls so they are completely covered. The duration of storage, method of storage of plants and mulch material shall be acceptable to the Landscape Architect.

1.10 FIELD CONDITIONS

A. Do not install plant life when ambient temperatures may drop below 35 degrees F or rise above 90 degrees F.

B. Do not install plant life when wind velocity exceeds 30 mph.

C. Install plant materials during time periods indicated. Planting operations conducted at other times are at the option and full responsibility of the Contractor and without additional compensation, except as otherwise agreed to by the Landscape Architect and Owner.
   1. Plant Materials:
      a. March 1 to June 15
      b. September 1 to November 1
   2. When planting operations vary, plant early in the day. When planting occurs in the summer, apply anti-desiccant spray to plantings after leaves become full size.

1.11 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Warranty:
   1. Guarantee unconditionally labor and plant materials for a period of one year after Landscape Architect's acceptance. Replace at Contractor's expense all plant materials

that die during guarantee period. At end of guarantee period, replace all material not showing definite and satisfactory life and growth.

2. During guarantee period, replace plants that die or are, in the Landscape Architect's opinion, in an unhealthy, unsightly, or badly impaired condition. Make no replacements in any season unfavorable for planting. Provide replacement plants of the same kind and size as specified in the plant list, and meeting all requirements of these specifications.
3. Initial inspection of planting will be made by Landscape Architect at completion of planting. Guarantee period shall begin at date of acceptance.

C. Replacements: Plants of same size and species as specified, planted in the next growing season, with a new warranty commencing on date of replacement.

PART 2 PRODUCTS

2.01 PLANTS

A. Plants: Species and size identified in plant schedule, grown in climatic conditions similar to those in locality of the work.

B. Plant Materials:
1. Provide healthy, sound, vigorous plant materials, free from plant diseases, insect pests, or their eggs, with healthy well-developed root systems; freshly dug, nursery-grown, well-branched, densely foliated when in leaf, and well-proportioned, particularly with respect to the width-height relationship, hardy under climatic conditions similar to those of the project.
2. Damaged or broken branches, broken ball, and loose top in ball are not acceptable. Provide balled and burlapped plants, designated B&B, adequately balled with firm natural balls as set forth in the ASNS. Firmly wrap balls with burlap or approved cloth secured in place.
3. Obtain the Landscape Architect's specific written approval for substitution of plants other than those named in the plant list. Proposed substitutes shall have essentially the same characteristics as plants specified in appearance, ultimate height, shape, habit of growth, general soil and other requirements. Average cost and value of substituted plants shall be no less than cost and value of plants specified. Plants of greater value may be accepted without additional cost to the Owner.
4. Provide container-grown stock with root system sufficiently developed to hold soil together, firm and whole. No plants shall be loose in containers; nor pot-bound.
5. Size range and measurement of height and caliper of all material shall be as specified in the ASNS.

2.02 SOIL MATERIALS

A. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay or impurities, plants, weeds and roots; minimum pH value of 5.4 and maximum 7.0.

B. Topsoil to contain 3-8 organic matter

C. Soil shall have the following USDA particle size analysis. Sand, silt and clay shall be determined by ASTM D422
1. Gravel: Plus 2mm. Less than 10%
2. Sand: .05mm to .2mm. 15-40%
3. Silt: .002 to .05mm. 25-65%
4. Clay: minus .002mm. 20-35%

2.03 SOIL AMENDMENT MATERIALS

A. Fertilizer: Containing fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil, as indicated in analysis..

B. Peat Moss: Shredded, loose, sphagnum moss; free of lumps, roots, inorganic material or acidic materials; minimum of 85 percent organic material measured by oven dry weight, pH range of 4 to 5; moisture content of 30 percent.

C. Composted Organic Material: Mature, stable humus-like material derived from aerobic decomposition. The compost shall be dark brown to black in color and capable of supporting plant growth.
   1. Carbon to Nitrogen ratio not to exceed 35 to 1.

D. Bone Meal: Raw, finely ground, commercial grade, minimum of 3 percent nitrogen and 20 percent phosphorous.

E. Lime: Ground limestone, dolomite type, minimum 95 percent carbonates.

F. Water: Clean, fresh, and free of substances or matter that could inhibit vigorous growth of plants.

2.04 MULCH MATERIALS

A. Mulching Material: Hardwood species wood shavings, free of growth or germination inhibiting ingredients containing no sticks larger than 1/4 inch in diameter, stones, clay or other foreign material that will prevent eventual decay of the mulch necessary for its complete effectiveness.

2.05 ACCESSORIES

A. Edging: All plant beds are to have a 45 degree angle spade formed edge.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that prepared, amended subsoil is in place in planters and plan beds are ready to receive work.

B. Saturate soil with water to test drainage.
   1. Notify Landscape Architect if water sits in hole when surrounding ground is not saturated.

3.02 FERTILIZING

A. Apply fertilizer in accordance with manufacturer's instructions.

B. Apply after initial raking of topsoil.

C. Mix thoroughly into upper 2 inches of topsoil.

D. Lightly water to aid the dissipation of fertilizer.

3.03 PLANTING

A. Place plants for best appearance.

B. Set plants in center of pits plumb and straight and at such a level that after settlement, plants will bear same relation to finished grade of surrounding ground as to grade of ground from which plants were dug.

C. Remove non-biodegradable root containers.

D. Set plants in pits or beds, partly filled with prepared plant mix, at a minimum depth of 6 inches under each plant. Remove burlap, ropes, and wires, from the root ball.

E. Place bare root plant materials so roots lie in a natural position. Backfill soil mixture in 6 inch layers. Maintain plant life in vertical position.

F. Saturate soil with water when the pit or bed is half full of topsoil and again when full.

3.04 INSTALLATION OF ACCESSORIES

A. Place mulch, where indicated on drawings. Tree rings, hedge rectanglar bed and larger beds as shown

B. Place Gater Bags at base of trees and fill with water.
   1. Use on trees with branches at least 30" off the ground.
   2. Install between April 1st and June 1st. Avoid installing before last frost of year to ensure bags will not freeze and crack.
   3. Uninstall no later than October 15th and turn over to owner for reuse the following spring.

C. Wrap deciduous shade and flowering tree trunks and place tree protectors.

3.05 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01 43 00.

B. Plants will be rejected if a ball of earth surrounding roots has been disturbed or damaged prior to or during planting.

3.06 MAINTENANCE

A. Provide maintenance at no extra cost to Owner; Owner will pay for water.

B. Irrigate sufficiently to saturate root system and prevent soil from drying out.

C. Cultivate and weed plant beds and tree pits.

D. Remove dead or broken branches and treat pruned areas or other wounds.

E. Neatly trim plants where necessary.

F. Immediately remove clippings after trimming.

G. Water to prevent soil from drying out.

H. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions.

I. Control insect damage and disease. Apply pesticides in accordance with manufacturers instructions.

J. Remedy damage from use of herbicides and pesticides.

K. Replace mulch when deteriorated.

L. Maintain wrappings, guys, turnbuckles, and stakes. Adjust turnbuckles to keep guy wires tight. Repair or replace accessories when required.

3.07 ADJUST AND CLEAN

A. Upon completion of planting and prior to acceptance, remove excess soil and debris from site and repair all damage to structures and site improvements, resulting from planting operations.

B. Sweep and hose down paved surfaces affected by planting operations.

END OF SECTION 32 93 00